

APPROACHES TO DETERMINING AND REPRESENTING GEOGRAPHICAL UNITS, INCLUDING GEOCODING FOR STATISTICS

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**INTERNATIONAL WORKSHOP: INTEGRATING GEOSPATIAL AND
STATISTICAL INFORMATION, 9-12 JUNE 2014, BEIJING, CHINA**



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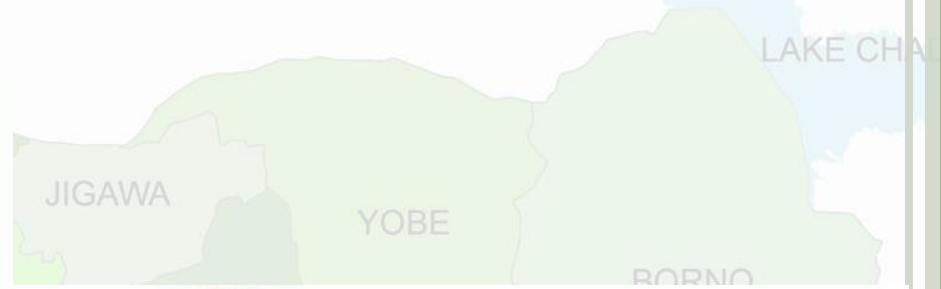
United Nations Initiative on
Global Geospatial Information Management

INTRODUCTION

- Nigeria is the most populated country on the African continent and the 10th biggest in the World, and occupies an area of about 924000 sq. kms, with a population of 170 million.
- It is made up of 36 states with 774 Local Government Areas (LGAs) and a Federal Capital Territory (FCT).



INTRODUCTION



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INTRODUCTION

- A modern society has vast informational needs.
- Nigeria contains many different kinds of geographic situations and settlement patterns.
- There is great value in linking geospatial, demographic and statistical (socio-economic) information to improve the relevance of the data for decision making.
- Demographic and vital statistics in Nigeria are produced through censuses, surveys and administrative records



INTRODUCTION

*The **Office of the Surveyor General of the Federation (OSGOF)** is the National Survey and Mapping organization of Nigeria and a repository for geospatial information in the country.*

*The **National Population Commission (NPopC)** has the statutory responsibility for the production of demographic and vital statistics in Nigeria and is therefore, the main source of data.*

*The **National Bureau of Statistics (NBS)** and the Immigration Service are also sources of demographic statistics in Nigeria.*



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SOME SURVEYS AND STATISTICS PROVIDED IN NIGERIA

- *Harmonized Nigeria Living Standards Survey (NDSS)*
- *National Integrated Survey of Household (NISH)*
- *National Integrated Survey of Establishment (NISE)*
- *Agricultural Export Commodities*
- *National Survey of Agricultural Export Commodities*
- *Nigerian Fertility Survey (NFS)*
- *National Demographic Sample Surveys*
- *Demographic and Health Surveys (DHS)*
- *Nigerian Sentinel Survey*
- *Survey of Internal Migration (SIM)*
- *General Household Survey*
- *Nigeria Demographic and Health Survey*



ENUMERATION AREA DEMARCATION IN NIGERIA

- Systematic pre-census mapping was first introduced to census exercise in Nigeria in 1973.
- During the 1991 and 2006 censuses Enumeration Area Demarcation (EAD), the whole country was completely demarcated into enumeration and supervisory areas, a threshold success in pre-census mapping.
- The 1973 EAD produced 112,000 EAs, it increased to 212,072 in 1991 and the most recent of 2006 produced 662,529 EAs, of which 40,000 were delineated on very high resolution satellite imagery.



ENUMERATION AREA DEMARCATION IN NIGERIA

- NPopC collects demographic data at the block geographic level using Enumeration Areas (EAs).
- EAs are primary sampling units bounded on all sides by visible features such as streets, roads, streams and by invisible boundaries such as city and municipal (local government) limits.
- NPopC maintains a database of about 600,000 EA maps covering the entire country.



ENUMERATION AREA DEMARCATION IN NIGERIA

- Enumeration Area Demarcation (EAD) is the division of the entire country into small land areas that can be conveniently covered by a pair of enumerators during the census moment.
- EAD prevents cases of omission or overlap in the enumeration of persons.
- A 9 digit locality coding system was adopted, while codes used for States and LGAs were redefined to have an interval of ten to create room for new LGAs and States.



ENUMERATION AREA DEMARCATION IN NIGERIA

- The methodology for 2006 EAD was more scientific and computerized with the introduction of some aspects of Geographic Information Systems (GIS) including the use of high resolution imagery.
- EAD parameters were revisited and redefined.
- The boundaries of the census delineations are chosen on the basis of linear features and administrative boundaries.





Digitized EAs on satellite imagery



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ENUMERATION AREA DEMARCATIION IN NIGERIA

In its data collection operations, NPopC must assign each person, household, housing unit, institution, business establishment, or other responding entity to a specific location.

The location must then be assigned to the tabulation units appropriate to the particular census or sample survey.

This geographic coding (geocoding) process assures that NPopC can provide correct counts for small geographic entities.



ENUMERATION AREA DEMARCATION IN NIGERIA

The design of enumeration areas should take the following criteria into account:

- They should be mutually exclusive (non-overlapping) and exhaustive (cover the entire country);
- They should have boundaries that are easily identifiable on the ground;
- They should address the needs of government departments and other data users;
- They should be consistent with the administrative hierarchy.
- They should be useful, also, for other types of censuses and data collection activities;



ENUMERATION AREA DEMARCATION IN NIGERIA

- They should be compact without pockets or disjoint sections;
- They should be of approximately equal population size;
- They should be small enough and accessible to be covered by an enumerator within the census period;
- They should be small and flexible enough to allow the widest range of tabulations for different statistical reporting units;
- They should be large enough to guarantee data privacy.



2006 EAD EXERCISE

The methodology for 2006 EAD was more scientific and computerized with the introduction of some aspects of Geographic Information Systems (GIS) such as:

- Spatial data acquisition equipment like GPS hand-held receivers
- High resolution satellite imagery of 0.6 m covering over 500 towns and cities and 5.0m resolution satellite imagery covering about 95% of the Country were acquired.
- EAD parameters were revisited and redefined. A 9 digit locality coding system was adopted, while codes used for States and LGAs were redefined to have an interval of ten to create room for new LGAs and States.
- Personnel were trained on digital cartography.



EXPLANATION OF SOME BASIC CONCEPTS

Locality

A locality is a distinct inhabited place in which the inhabitants live in neighboring buildings and which has a name or a locally recognized status. For census tabulation purposes, localities have been sub-divided into the following four levels:

- *Sub-primary locality*
- *Primary locality*
- *Secondary locality*
- *Tertiary locality*

Building

A building is any independent free standing structure comprising one or more rooms, covered by a roof and may or may not be enclosed within external walls or dividing walls. We have different classes:

- *Residential Building*
- *Institutional Building*
- *Uncompleted Building*



Compound

- A compound is a premises usually enclosed by a wall, and having one or more structural units with a common entrance.
- In some parts of Nigeria, housing units or structures are traditionally located within a compound.

Household

- Household comprises a person or group of persons living together under the same roof or in the same building/compound, who acknowledge one adult male or female as the head, share a common source of food and think of themselves as a unit.

Enumeration Area (E.A.)

- An Enumeration Area is a compact area carved out of a locality, or a group of small localities, with well-defined and identifiable boundaries.
- It is an area which an enumerator is supposed to cover without any omission or duplication during a census or a sample survey.



Special Enumeration Area

A special EA is one or a set of Institutional buildings which contains more than 250 persons.

A set of institutional buildings may have more than one special EA if the number of occupants so warrants.

Any institutional building that inhabits less than 250 persons may be demarcated as part of a regular EA.

Supervisory Area (S.A.)

A supervisory area is made up of two to five contiguous EAs. On very rare occasions, the EAs in an SA could be up to 6.



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EA CODING SYSTEM

- States and LGA codes have two numeric digits each.
- The codes of the 36 States and FCT are topologically related in a West-East, serpentine fashion starting from the Northwest border of the country.
- Similarly, the codes of LGAs in a State are also arranged topologically, in the same fashion as the States.
- The actual EA code is a sequential 4-digit numeric number. Thus the full code of any EA is an 8-digit numeric number of which the first 2-digits represents the state, the second 2-digits represents the LGA, and the last 4-digits the EA.
- An example of an EA Code in Badagry Local Government Area of Lagos State is 36010289.



LOCALITY CODING SYSTEM

The coding system for all the different types of localities in the country is based on four categories, namely:

- Sub-Primary e.g. Camps, multi-camps, farmstead, satellite settlements, etc
- Primary - Regular settlement/localities
- Secondary - Multi - settlements/District localities
- Tertiary - Multi - LGA localities.

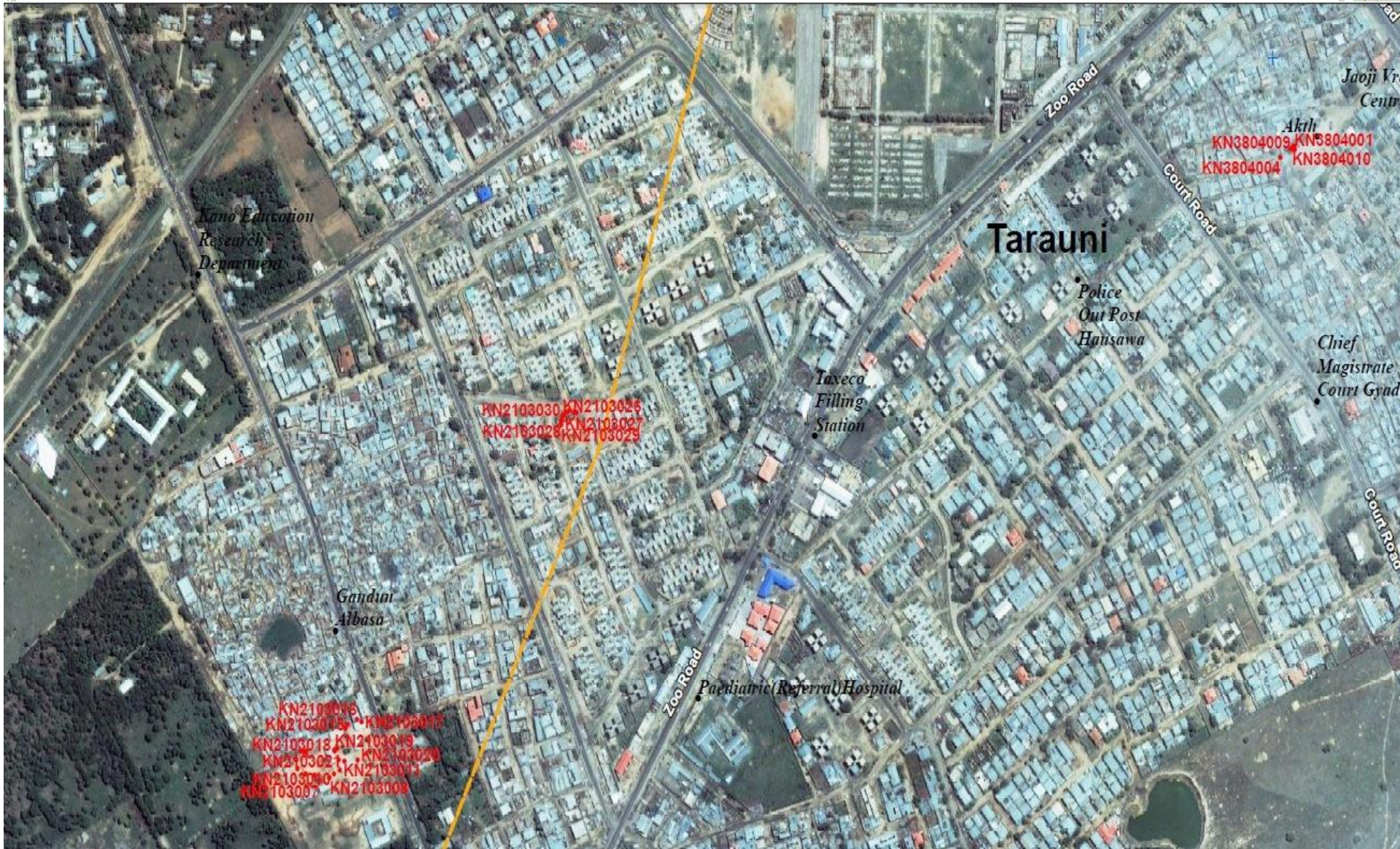
Each locality will be coded based on its class.

These localities are a valuable layer in the Satellite Image Maps (SIMs) produced by OSGOF for the Independent National Electoral Commission (INEC) to aid in the forthcoming 2014 elections.



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Satellite Image Map showing some localities



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Practical Example with FCT

SNO	TERTIARY LOCALITY NAME	TERTIARY LOCALITY CODE	SECONDARY LOCALITY NAME	SECONDARY LOCALITY CODE	PRIMARY LOCALITY NAME	PRIMARY LOCALITY CODE	SUB-PRIMARY LOCALITY NAME	SUB-PRIMARY LOCALITY CODE
1	ABUJA	1	CITY CENTRE	01	WUSE	001	WUSE ZONE 1	001
2	ABUJA	1	CITY CENTRE	01	WUSE	001	WUSE ZONE 2	002
3	ABUJA	1	CITY CENTRE	01	WUSE	001	WUSE ZONE 3	003
4	ABUJA	1	CITY CENTRE	01	WUSE	001	WUSE II	004
5	ABUJA	1	CITY CENTRE	01	GARKI	002	GARKI VILLAGE	001
6	ABUJA	1	CITY CENTRE	01	GARKI	002	GARKI AREA 1	002
7	ABUJA	1	CITY CENTRE	01	GARKI	002	GARKI AREA 2	003
8	ABUJA	1	CITY CENTRE	01	GARKI	002	GARKI AREA 3	004
9	ABUJA	1	CITY CENTRE	01	GARKI	002	GARKI AREA 4	005
10	ABUJA	1	CITY CENTRE	01	GARKI	002	GARKI AREA 8	006
11	ABUJA	1	CITY CENTRE	01	MAITAMA	003	MAITAMA	001
12	ABUJA	1	CITY CENTRE	01	MAITAMA	003	MAITAMA EXTENSION	002
13	ABUJA	1	CITY CENTRE	01	ASOKORO	004	ASOKORO	001



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SOME EXAMPLES FROM THE INDEPENDENT ELECTORAL COMMISSION

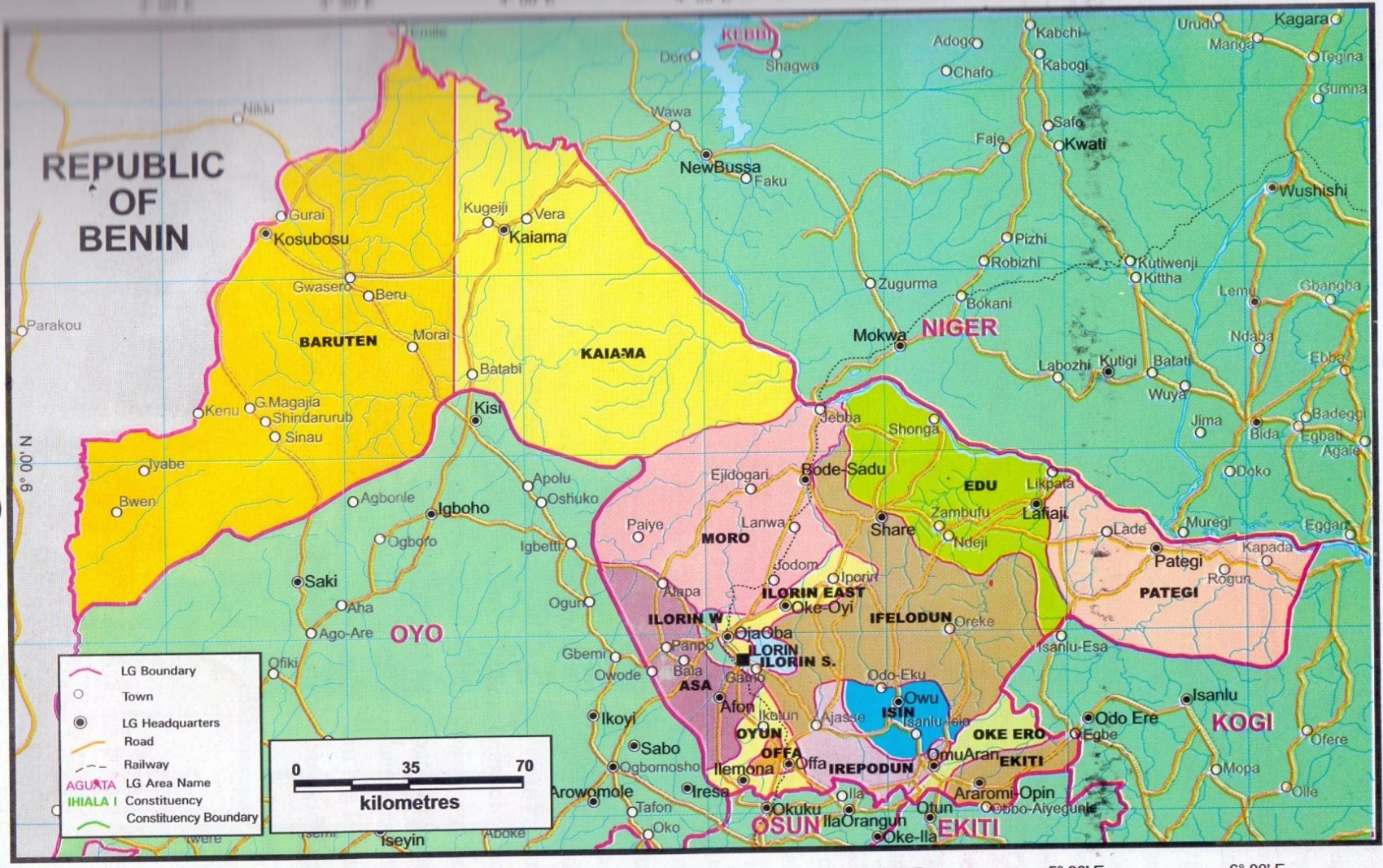
- A TYPICAL EXAMPLE OF THE RELATIONSHIP BETWEEN OSGOF AND THE INDEPENDENT ELECTORAL COMMISSION ARE SHOWN



3° 00' E 3° 30' E 4° 00' E 4° 30' E 5° 00' E 5° 30' E 6° 00' E

N 10° 00' N 9° 30' N 9° 00' N 8° 30' N 8° 00' N

REPUBLIC OF BENIN



215

KWARA STATE

POLITICAL

3° 00' E

3° 30' E

4° 00' E

4° 30' E

5° 00' E

5° 30' E

6° 00' E

10° 00' N

9° 30' N

9° 00' N

8° 30' N

8° 00' N

10° 00' N

9° 30' N

9° 00' N

8° 30' N

8° 00' N

REPUBLIC OF BENIN

BARUTEN/KAIAMA

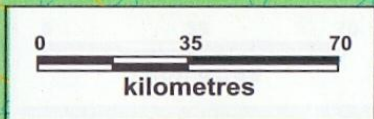
EDU/MORO/PATEGI

ILORIN EAST
ILORIN SOUTH

IFELODUN/OFFA/OYUN

EKITI/SINI/IREPODUN/
OKE-ERO

- LG Boundary
- Town
- LG Headquarters
- Road
- - - Railway
- AGUATA LG Area Name
- IHIALA Constituency
- Constituency Boundary



3° 00' E

3° 30' E

4° 00' E

4° 30' E

5° 00' E

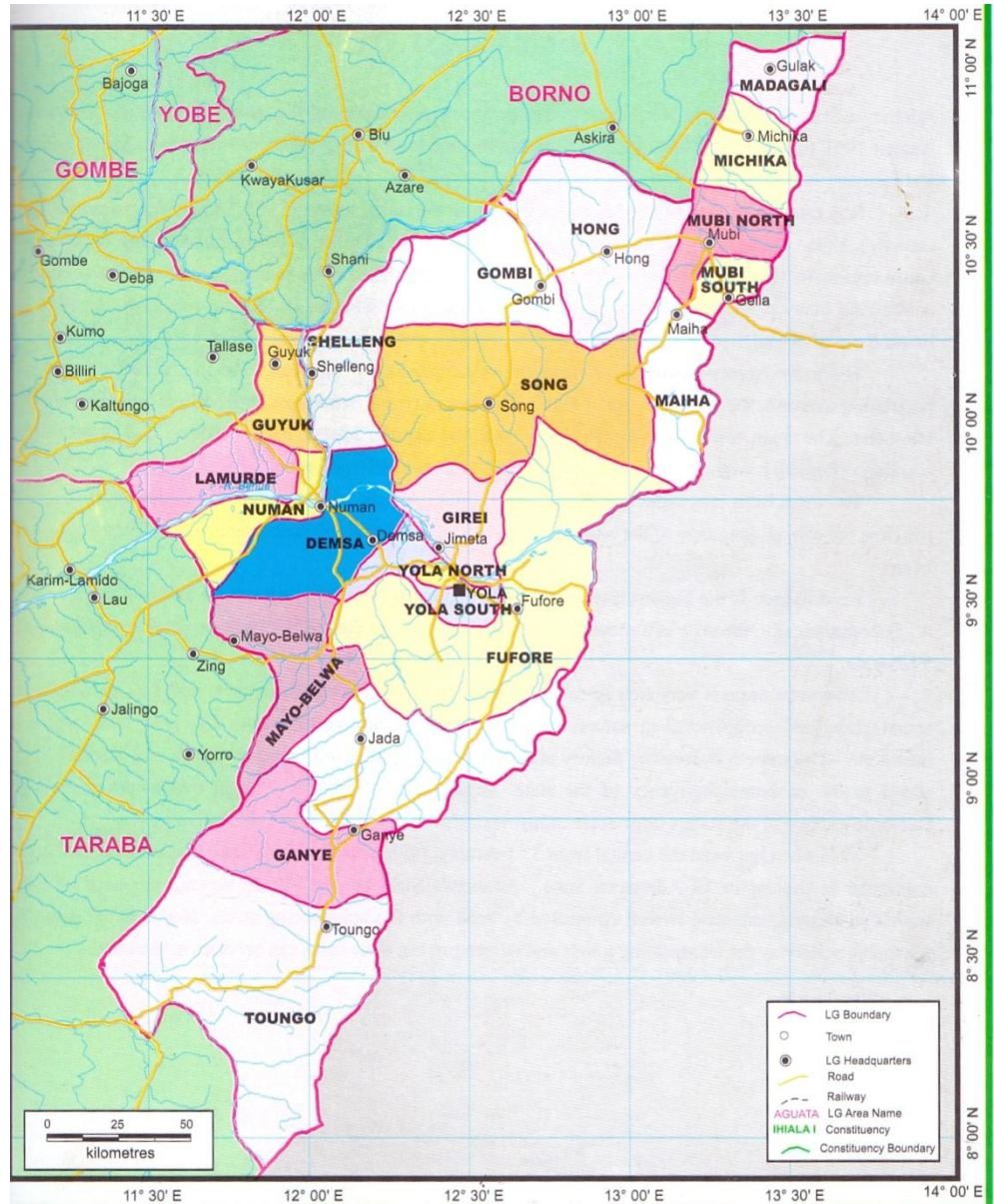
5° 30' E

6° 00' E

KWARA STATE

FEDERAL
CONSTITUENCIES

219



RECOMMENDATIONS

- National mapping and statistics organisations will need to follow standards for geographic referencing established at the national level.
- Consideration needs to be given especially to the administrative classification system to be used to organize territories.
- Above all, there is the need to develop realistic plans to harness the power of GIS and other geospatial technologies to modernize mapping and census operations and get better results and analysis.
- To ensure widespread acceptance of new geographic units, it is desirable that
- there should be a general consensus by various data users about the underlying conceptual issues.



CONCLUSIONS

- Planning for the operational implementation of such geographic programs requires inputs from various stakeholders.
- Highly detailed large and medium scale maps are always needed.
- OSGOF has produced maps at a fine enough scale to capture variation and allow use with other data layers in a geographic information system (GIS).
- In summary, the National Mapping and Statistical Organisations of the country act to complement each other.



**THANK YOU FOR
LISTENING**



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