

STREET GUIDE MAP OF DAMATURU METROPOLIS, YOBE STATE, NIGERIA

ABDULKADIR AHMED¹, ZAIDU MUHAMMAD HASHIM², ADAMU MAKAMA PINDIGA³, ISAH YAKUBU LERE⁴ AND ABDULWAHAB AUWAL SALIS⁵

¹Department of Surveying and Geoinformatics, Abubakar Tafawa Balewa University Bauchi, Nigeria. ²Department of Surveying and Geoinformatics, Abubakar Tafawa Balewa University Bauchi, Nigeria. ³Department of Surveying and Geoinformatics, Federal Polytechnic Bauchi, Nigeria. ⁴Department of Surveying and Geoinformatics, Abubakar Tafawa Balewa University Bauchi, Nigeria. ⁵Department of Quantity Surveying, Jigawa State Polytechnic, Dutse, Jigawa State, Nigeria

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ABSTRACT

Street guide map is important for effective movement of people from one location to another. The purpose of the paper is to produce the street guide map of Damatru Town, Yobe state. Digital mapping technique using satellite imagery was adopted. The satellite imagery was obtained from SANS planet and then lunch to ArcMap where it was digitized on-screen. The attribute data was also linked to the digitized image automatically. Finally, the street guide map of Damaturu, Yobe state has been produced with a lot of updates. The street guide map will be useful for environmental development and navigation of basic structures within Damaturu Town, Yobe state.

Keywords: Street, Satellite, Imagery, Map, Attribute

Introduction

A map is a model of part of the earth surface showing the shape, and position of different countries, political borders, natural features such as rivers and mountains, and artificial features such as roads and buildings (Ezra, 2007). A map can also give you particular type of information about a certain area on the surface of the earth. It can be made so simple and specific that it shows direction of travel from one place to another (Victor, 2012). Reconnaissance technologies such as aerial photograph and satellite-based

Sensing have come to man's aid in quest to understand and preserve his environment. This advancement has given the map makers new tools for creating and updating maps as well as allowing mapping in details which is of great use most especially in planning of urban areas. Maps are specially designed to serve several purposes and answer specific questions such maps includes street maps, utility maps etc (Abbas, 2010).

A street map has the ability to provide answers to question like: where a road is; where it leads to; the distance and type, the best route between two points or the shortest point (Musa, 2007). Also, some of the usage of street map as: for locating houses and streets; car navigation; planning of transportation, trips and driving directions; and for planning of movement and provision of facilities, goods and services (Udah, 2014). Street map stands as a basic datum that can also help researchers conduct good research such as emergency response studies, proximity and accessibility studies. This can be designed and consistently updated to accommodate further developments using a robust technology such as Geographical Information System (GIS) and remote sensing (Tini, 2010).

A street map is a type of map that contains the position and names of streets. A street map is useful in areas such as: planning enumeration areas by demographers; navigation for tourists; salesmen; firemen; police; security agent; tax collectors, postal service etc.(Ezra, 2007). It can also be defined as a graphic portrayal of a town or city, showing the positions and names of all the streets; major/minor highways and roads, railroads, tracks and other points of interest and the general road network. It is a form of map that details roads and transport links (Udah, 2014).

Statement of the Problem

In recent time due to growth, several activities and changes have been going on in Damaturu metropolis, Yobe State. This has necessitates the creation of new streets and roads hence a need to develop a standard road network database for the use of government and stake holders. In addition, further up-date within the study area will be added as there is need to up-date the image in order to reflect the present situation.

Aim and Objectives

The aim of this study is to produce a street guide map of road networks in Damaturu, Yobe state. The aim of this project will be achieved through the following objectives.

- i. To classify the attribute data into different classes
- ii. To Produce the street guide map of Damaturu, Yobe state

- iii. To Query the information/data based on request

Justification of the Study

The street guide map will help users and tourists to know where they are and to know where they are heading to. It can also serve as bedrock for planning; tourist and physical development in Damaturu metropolis, and it will also help in selecting a suitable site for new construction.

Study Area

Damaturu is the capital city of Yobe State in northeastern Nigeria. It is located in a semi-arid region characterized by high temperatures and sparse vegetation. The city experiences a short rainy season from June to September, with average annual rainfall ranging from 300 to 600 millimeters.

As of September 2022, the estimated population of Damaturu was around 345,000 people, and the city serves as a major administrative, economic, and educational center in the state. The economy is based on agriculture, trade, and public administration, with farming of crops like millet and sorghum and livestock rearing being significant.

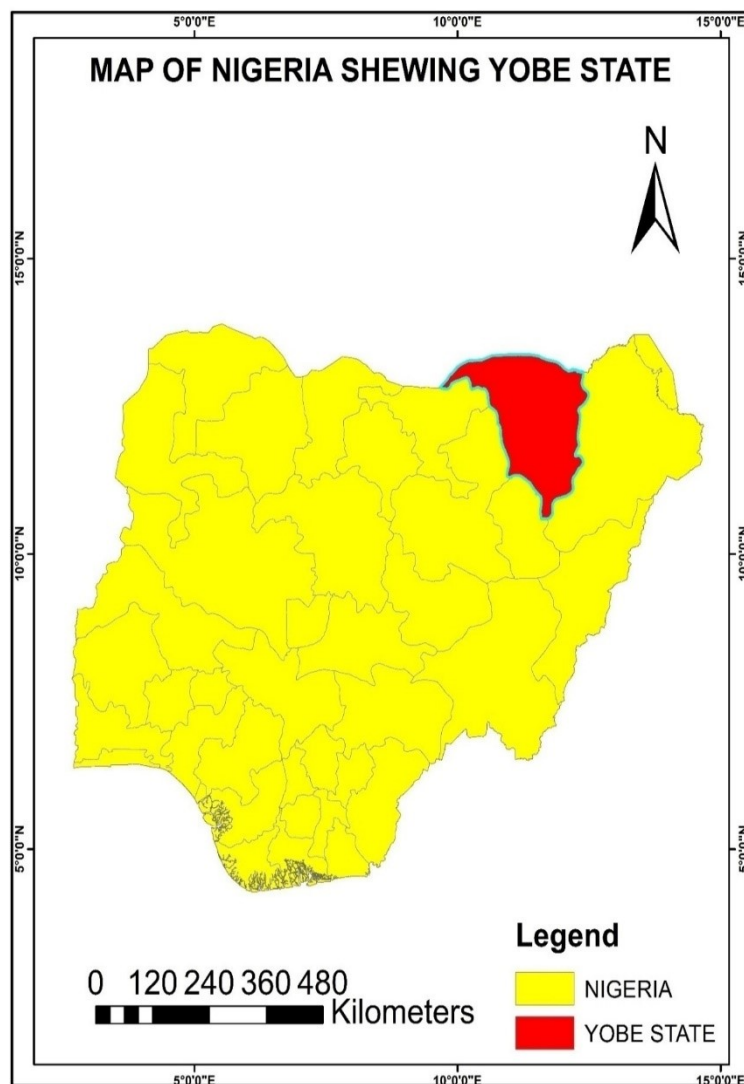


Figure 1: Map of the Study Area

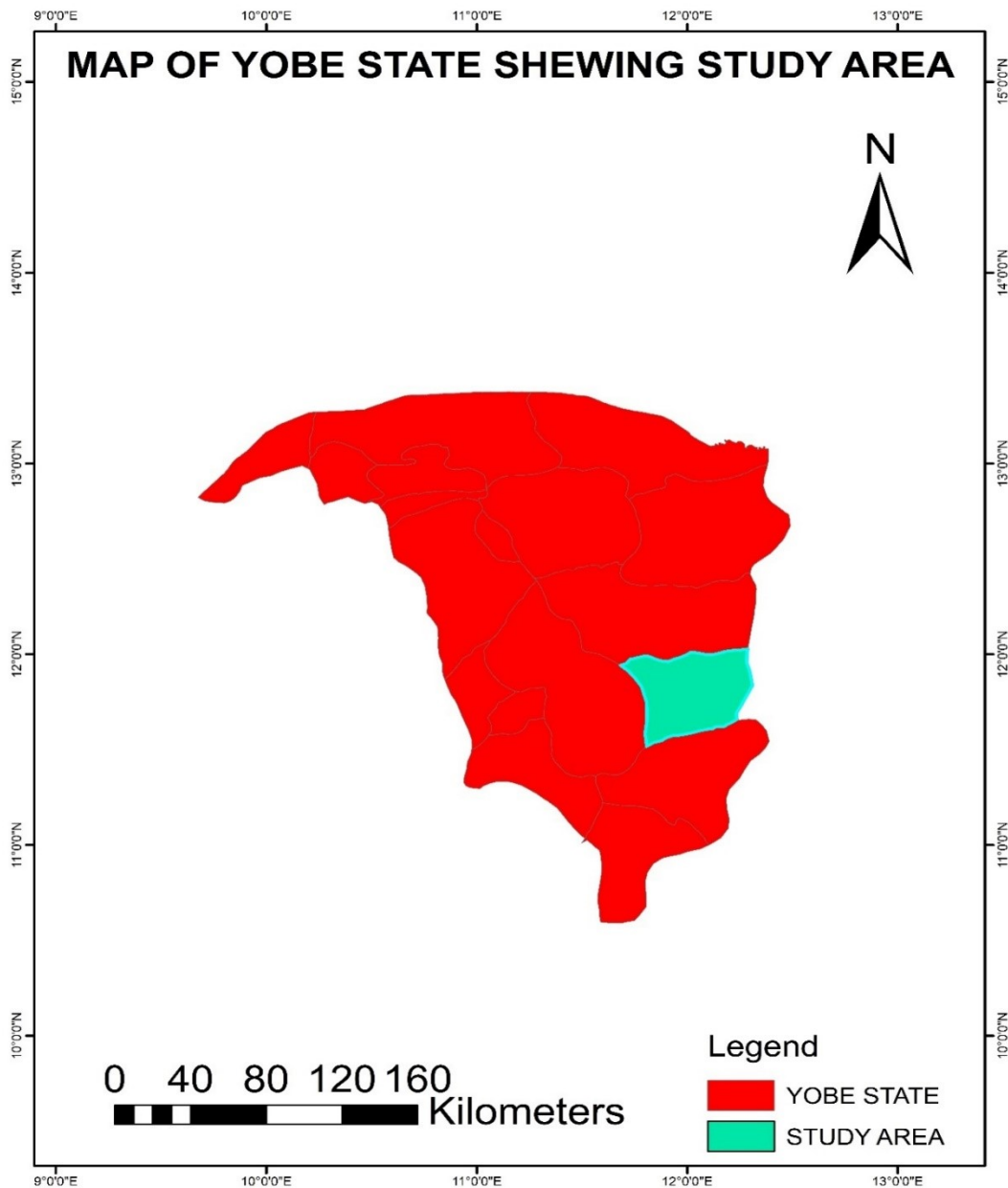


Figure 2: Map of the Study Area

Data Set and Methods

Satellite imagery of 2015 was downloaded from SAS Planet at height resolution and saved. The image can only be viewed in ArcMap. Spatial data (coordinates) of features were extracted from the image of the area while other important features that were not on the image were updated. The attribute data such as names of streets, roads and so on were also obtained from field observation/social survey. The acquired satellite image

was then imported into ArcMap software. The image was already mosaic and georeferenced during downloading from Sans Planet as shown in the figure below.

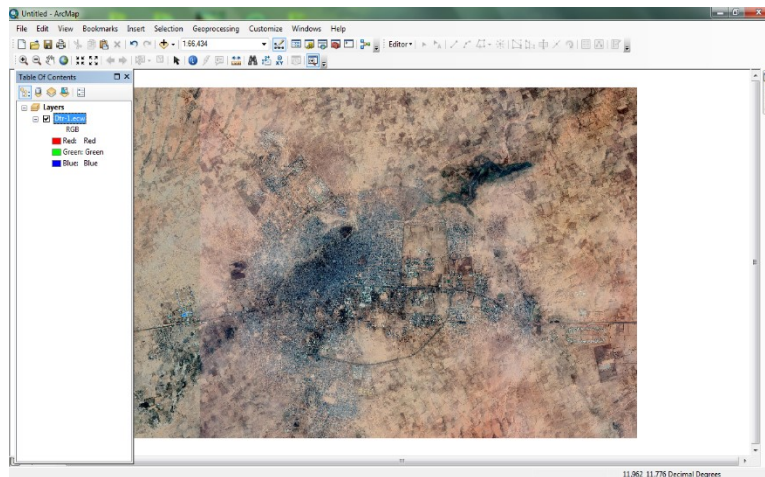


Figure 3: Satellite Image of Damaturu

Digitizing

After downloading the image from Sans Planet then the image was lunch into ArcMap environment. The required resolution to suitably identify features on the ground was obtained in the

downloaded satellite imagery. The extent of the study area was digitized on-screen as in the figure below.

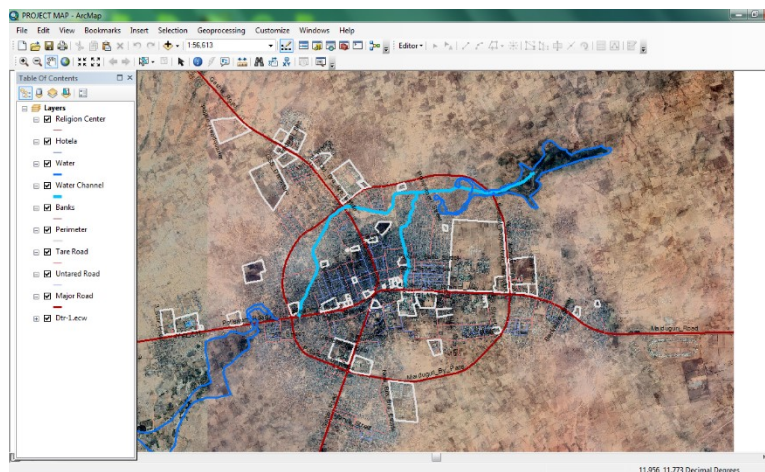


Figure 4: Digitizing the Image of Damaturu

In achieving this task, layers were created for various features on the image and appropriate properties were also created for them. The features that were digitized for the purpose of this study

include roads, prominent features such as schools; religion centers offices, financial institutions and hotels. The technique of layering is a very important aspect. Layering enables a particular feature to be placed in its own unique layer; for example, all tarred roads were placed in a tarred roads layer. The software allows layers to be turned on and off as required. This enabled a set up layers of details and allows only those of particular interest to be selected and plotted. This is easily achieved by turning off all unwanted layers and turn on all the required layers. In other to digitize the features on the satellite image, manual method of on-screen digitizing was adopted.

Map Editing

The map editing is the process of eliminating errors that were introduced during the process of Digitizing. The errors were corrected for intersection self-overlaps and Dead Ends.

- i. Intersection error: is where the traced line was overlaid on another traced line without a node.
- ii. Dead End: This is where a traced line was not properly connected to another line.

Linking Attribute to Graphic

This study forwarded to produce possibilities for spatial data queries and feature classification. Therefore, the attributes were automatically linked to the graphic in ArcMap environment. After digitizing, the attributes of the features were then scored under the fields that were earlier created in the Arc catalogue. The features are:

- a. Hospitals
- b. Hotels
- c. Banks
- d. Perimeter
- e. Un-tarred roads
- f. Tarred roads
- g. Major roads
- h. Lake
- i. Water channel

Results and Discussion

A street guide map of Damaturu metropolis was updated and the map was produced. The produced map contains the comprehensive list of locations and names of important features in Damaturu. In addition, the digitized satellite imagery produced in this research work could serve as an image map whenever it is needed; also the comprehensive list of the streets and relevant attributes of features were join together and produced the street guide map of Damaturu. This can be serving as an important database for any work that relate to this research in the state. The results of this work were shown in the figures and table below.

Table 1: List of attribute data

NAME	TYPE
GROUP ONE	
Waziri Ibrahim by-pass	By-pass
Malari by-pass	By-pass
Nasarawa by-pass	By-pass

NAME	TYPE
Ali marami by-pass	By-pass
Maiduguri by-pass	By-pass
Gashua road	By-pass
Potiskum road	High way
Maiduguri road	High way
Gujba road	High way
GROUP TWO	
G.R.A	Tarred road
Gaat hotel	Tarred road
Low-cost	Tarred road
Jerusalem	Tarred road
Government house	Tarred road
Zango	Tarred road
Nasarawa	Tarred road
Shagari	Tarred road
Bidigari	Tarred road
One million road	Tarred road
Old market	Tarred road
Poly	Tarred road
Nayinawa	Tarred road
Gonge	Tarred road
Jauro	Tarred road
Abubakarmaraya	Tarred road
Damakasu	Tarred road
Bubagaladima	Tarred road
Kabarma	Tarred road
Ladabi	Tarred road
New foundation	Tarred road
Injiwaji	Tarred road
Nasiruhassan	Tarred road
Timber	Tarred road
Layin PS	Tarred road
Ibrahim Damaturu	Tarred road
Waziri Ibrahim	Tarred road
Maisandari	Tarred road
Old bra-bra	Tarred road
New bra-bra	Tarred road
Federal secretariat	Tarred road
Ministry of works	Tarred road
YSU T.H	Tarred road
3 Star hotel	Tarred road
Abattoir	Tarred road
Alajari	Tarred road
Pawari	Tarred road

NAME	TYPE
GROUP THREE	
Tijjanimusatumsa	Un-tarred road
Gonisandakusir	Un-tarred road
Abba galadima	Un-tarred road
Classic hotel	Un-tarred road
Ibrahim alkali	Un-tarred road
Sambo maimagani	Un-tarred road
Ajari grave yd	Un-tarred road
Jagwal	Un-tarred road
Kwanankwadayi	Un-tarred road
Bindigari	Un-tarred road
Malam tijjani	Un-tarred road
Tsmiyarlilo	Un-tarred road
Ajari	Un-tarred road
Alajari	Un-tarred road
Gini baba	Un-tarred road
Bindigari	Un-tarred road
GROUP FOUR	
Water	Water channel
GROUP FIVE	Bank
FCMB	Bank
Stanbic bank	Bank
Zenith bank	Bank
Polaris bank	Bank
GT bank	Bank
Unity bank	Bank
First bank	Bank
Access bank	Bank
UBA bank	Bank
Fidelity bank	Bank
Keystone bank	Bank
GROUP SIX	
Government house	Perimeter
House of assembly	Perimeter
State secretariat	Perimeter
High court	Perimeter
Police headquarter	Perimeter
Police station	Perimeter
Ministry of works	Perimeter
Federal secretariat	Perimeter
GSM village	Perimeter
Family support	Perimeter
YSU T.H	Perimeter
Specialist hospital	Perimeter

NAME	TYPE
Primary schools	Perimeter
Gonge	Perimeter
Bulabulum	Perimeter
Ajari	Perimeter
GROUP SEVEN	
Gaat	Hotel
Zadia	Hotel
Classic	Hotel
Lale	Hotel
Titte	Hotel
Rahama	Hotel

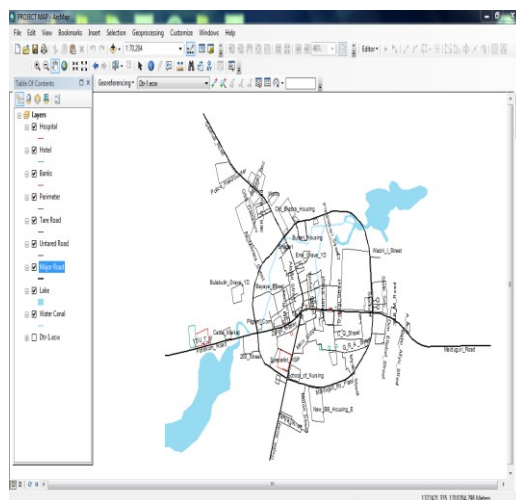


Figure 6: Digitized image of Damaturu metropolis

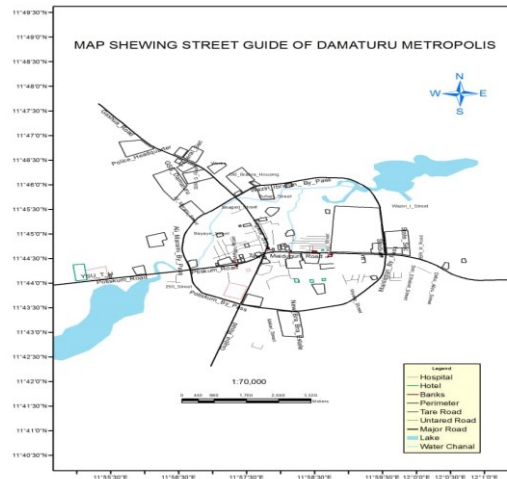


Figure 7: Street Guide Map of Damaturu

Discussion

Figure 5 shows the print screen of satellite image of Damaturu metropolis. Figure 6 shows the print screen of the digitized image of the study area. Figure 7 shows the street guide map of Damaturu metropolis. Table 1 shows the List of attribute data of the various features within the study area. At the end of the study, the street guide map of Damaturu metropolis was produced showing roads and other features that were captured and labeled within the study area.

Conclusion

In this study, it is obvious that there are lots of changes in Damaturu metropolis. Some of the un-tarred roads are now tarred; also some of the road names in the study area were changed when compared with the existing street guide map of the study area. It

can be said boldly in this study that street mapping using remote sensing data and GIS techniques is very important and preferable because it save time, cost and it is faster than conventional method.

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