

THE USE OF GIS AND REMOTE SENSING IN STREET NAMING

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Abstract

This paper employed the use of Geographical Information System and Remote Sensing techniques in the production of street name map of Mubi. It also highlights the new opportunities offered these techniques on functional street naming for economic growth in internet business and items delivery. The study makes use of Quick Bird as base map in street naming. Through CorelDraw, the raster image was converted to Tagged Image File Format (TIFF) and exported to ILWIS. A final map was produced through Georeferencing using tie points, digitizing and street naming input in ARGVIEW software. From the results obtained, it indicates that streets were named after; 1) areas to which they lead to, 2) towns and cities that are extremely far with no connection, and 3) names of famous or distinguished persons. The paper advocated for the full utilization of GIS and Remote Sensing for street naming that can be of use to tourists, and would enhance economic growth on internet based location of items delivery.

Key Words: GIS, Remote Sensing, Street Guide

Introduction

The lack of proper addressing systems especially of functional street names in most Nigerian Cities has a deep-rooted problem in the absence of proper urban planning and design principles. The need to grow towards global economy, which is based on the presence of functional addressing system, seems neglected in the day-to-day transactions in Mubi. Therefore, the addressable objects that buyers and sellers mostly use must be those, which are persistent to urban change and are able to create the strongest mental image in the observers mind, namely the streets.

A street name is an identifying name given to a street. The street name usually forms part of the address system of the residence of that locality (though addresses in some parts of the world, notably most of Japan, make no reference to street names). Buildings are often given numbers along the street to identify them.

The names given to streets play an important role in the general character of any particular city. In the same way that the human body is made up of many parts, a city is an aggregate of its streets, neighbourhoods, suburbs and landmarks.

The development and application of geographic information system (GIS) and remote sensing has contributed a new window in spatial planning. Street naming is one of the new opportunities offered by GIS and remote sensing techniques. Uluocha (2007) defined geographic information system as “an orderly assemblage of computer-based hardware, software, geographically referenced data, procedures, and

humanware (personnel) configured to handle all forms of spatial data to satisfy the geographic information needs of the user”. Zarzcki (1992) also defined geographic information system as “a computerized system for the collection, storage, retrieval, processing and presentation of spatially referenced data”. Ndukwe (2001) defined remote sensing as “the science of detecting or monitoring the chemical or physical properties of an object without being in physical contact with the object (target)”. Many streets are named for the type of landmarks, commerce or industry that were present along the street when it was constructed. This practice rarely happens in modern times, but many of those named years ago are still common.

Some streets are named after famous or distinguished individuals, sometimes people directly associated with the street, usually after their deaths. Bucharest's Soseaua Kiseleff was named after the Russian reformer Pavel Kiselyov who had the road built while Russian troops were occupying the city in the 1830s; its Strada Dr. Iuliu Barasch is named after a locally famous physician whose clinic was located there.

Most major roads in a city around the world particularly in the UK, Australia, the northeastern US, and southern Ontario, Canada got their names from the town to which they lead. However, there are also many examples of streets named after a city that is many miles away and has no obvious link to the street.

In the United States, most streets are named after numbers, landscapes, trees (a combination of

landscapes and trees such as "Oakhill" is used often in residential areas), or the surname of an important individual (in some instances, it is just a commonly held surname such as Smith) (U.S. Department of Commerce, Bureau of the Census, Geography Division, 1993).

On coming to a city, the first thing a visitor notices is its character. The names on various streets form part of the persona of the city. One should be able to glean the kind or mix of the populace of a city from the names assigned to its streets. In some cases, old cities open up new areas where the bulk of non-indigenes reside and feel at home. A good example is the development of Sabongaris (new settlement) in various parts of Nigeria. Most of the southerners living in the north could be found in the Sabongaris, while northerners residing in the south also inhabited the Sabongaris. Expedient as that development was, it has been argued by some that it hindered full integration of the non-indigenes with their hosts.

This study intends to use remote sensing and geographic information system for the production of street guide map of Mubi metropolis, Adamawa state, Nigeria.

Study Area

The study area is geographically located between Latitudes 10°30' and 10°05'N and Longitudes 13°10' and 13°30'E North of the Greenwich Meridian (Figure 1). It lies on the west bank of the Yedseram River, a stream that flows north into Lake Chad, and is situated on the western flanks of the Mandara Mountains which form its both drainage system and relief. The area is bounded internationally by Cameroon and within the state by Michika to the east, Hong to the west and Maiha to the south. Also, it occupies an area of 192,307km and has a population of 260,009 people (National Population Census, 2006).

Probably founded in the late 18th century by the Fulani people, Mubi remained under the jurisdiction of the sultanate of Mandara until conquered by Modibbo Adama. By the 1820s the peoples of Mubi and the surrounding area were incorporated into Adama's Fulani kingdom of Fumbina, later called Adamawa; in the 1890s they were subjected to slave raids by Adamawa's emir Zubairu. The town was taken by German forces in 1903 and served as a frontier post and administrative centre of German Kamerun until its capture by the British in 1914. Mubi and its surrounding region were placed in the British Cameroons by a League of Nations mandate in 1922. In 1961 it became part of Nigeria (Sardauna province) (Mubi, 2012). Mubi is a town in Adamawa state, Nigeria. The major tribes are Fulanis from Digil as well as the Fali People from Vimtim. Names like Nuhu Auwalu Wakili are very common in the state. The Nuhu Wakili's family is the ruling family in the town. It is home to the state university, Adamawa State University, Mubi (ADSU, 2012).

Mubi exhibits both dry and wet tropical climate type. The dry season begins in November and ends in March, while the rainy season runs from April to October each year. Rainfall annually is about 900mm with highest frequencies in July and August. Temperature ranges from warm to hot throughout the year but experience cool period between November and February with gradual increase in January to March. The relative humidity of the area is low but begins to rise from April to August maximally (Adebayo, 2004).

The vegetation zone of the study area is within the sudan savanna belt of Nigeria and is referred to as the cambretaceous woodland savanna (Areola, 1983). The natural vegetation is altered by human activities for farming and building from the naturally about 70% of grasses and weeds with few scattered woody plant.

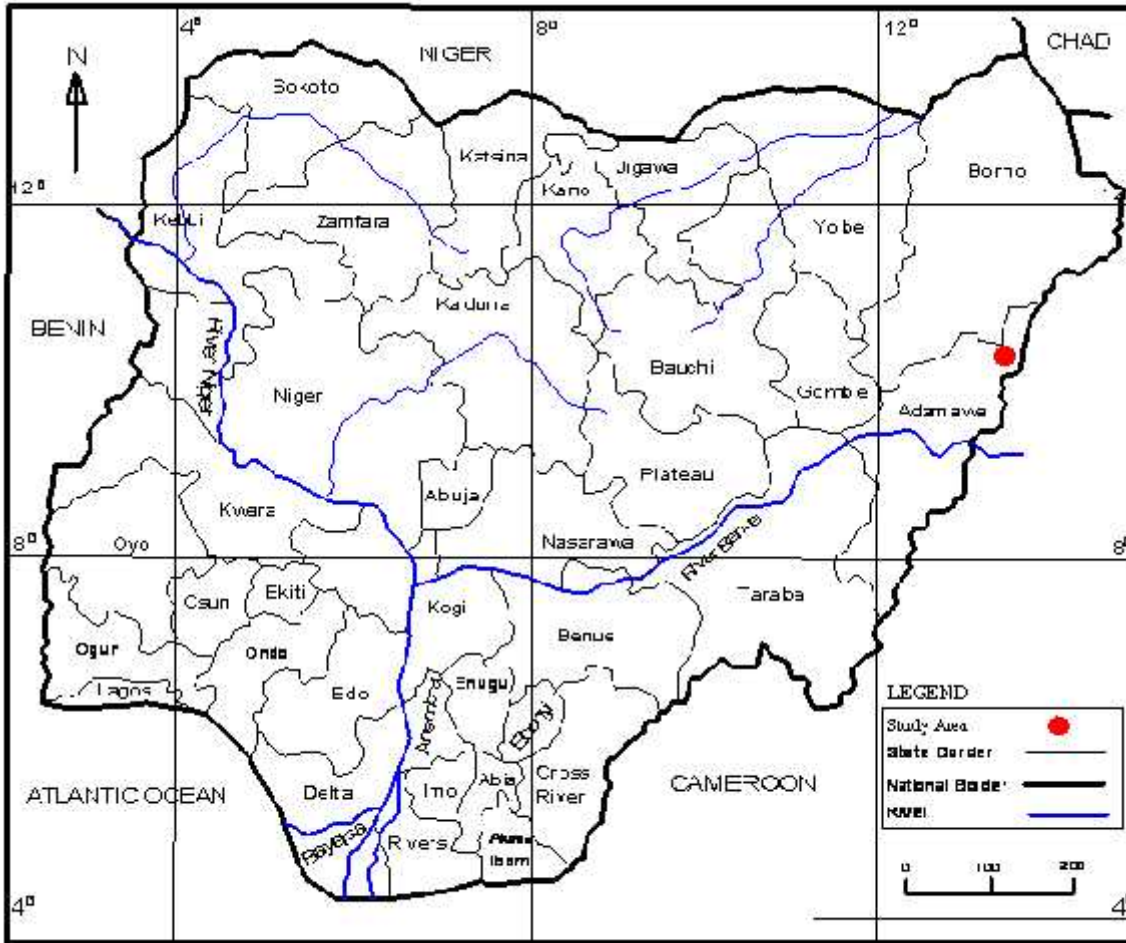


Figure 1: Map of Nigeria showing the study Area
Source: (ADSU, 2012)

Methodology

Data

The data used consisted of:

- Quick Bird image of Mubi town, obtained from geography department, Adamawa state University, Mubi
- Coordinates of four prominent points within the study area were obtained with the use of Global Positioning System (GPS). The points and their coordinates are Police Station Roundabout (310504mE, 1135173mN), Maiha Junction along Ahmadu Bello Way (308684E, 1135661mN), G.R.A. Roundabout (311033mE, 1136819mN) and Kaban Junction along Maiha Road (308802mE, 1133532mN).
- Names of streets, obtained by field work.

Equipment and Software

1. Equipment

The equipment consisted of:

- Acer (Aspire 3680) laptop computer (Celeron M).
- HP Photosmart (C5500 Series) printer, scanner and photocopier.
- Garmin 12 channel GPS receiver (hand held).

2. Software

The software consisted of:

- Microsoft Word
- CorelDraw 11
- ILWIS 3.1 Academic
- ARCVIEW 3.2 a

Conversion of Image into TIF

The satellite image that is on CD plate, was inserted into the computer via CD Rome, opened with CorelDraw software and converted into Tagged

Image Format (TIF) after which is exported to ILWIS software for further processing.

Georeferencing and Resampling

The image was imported into ILWIS software after which the coordinates (Northings and Eastings) of the

four points were used as tie points to georeference the image. After the georeferencing, the image was resampled and exported to ARCVIEW software for digitizing and compilation (see figure 2).



Figure 2: Georeferenced and resampled image of Mubi metropolis.

Digitizing the streets

The streets in the study area (Mubi metropolis) were identified on the image and digitized using ARCVIEW software. Each street category and the

water bodies within the study area were digitized as independent thematic layers (see figures 3, 4, 5 and 6).

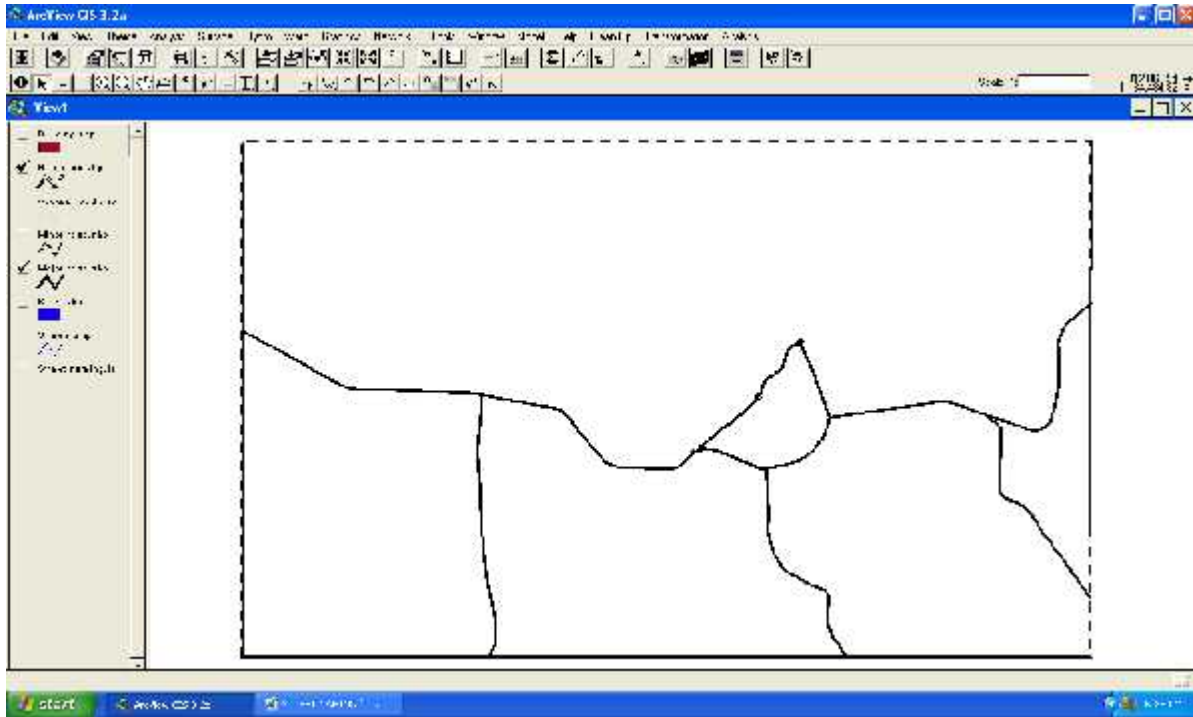


Figure 3: Digitized major roads of Mubi metropolis.

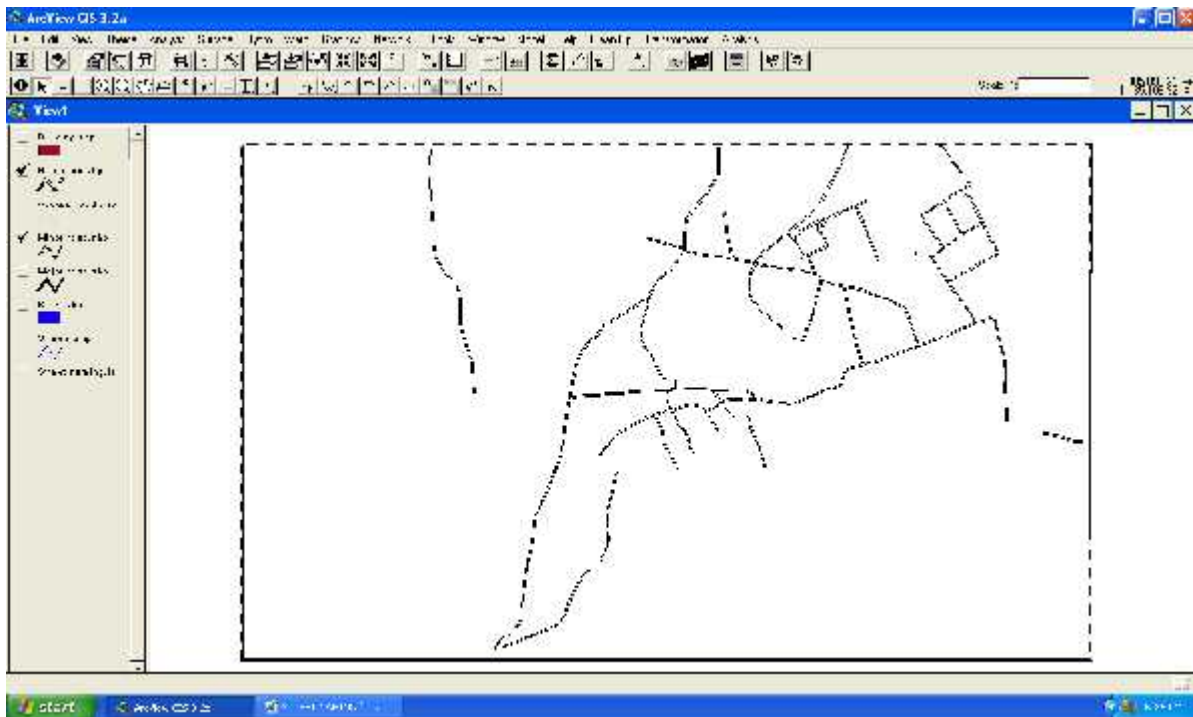


Figure 4: Digitized minor roads of Mubi metropolis.

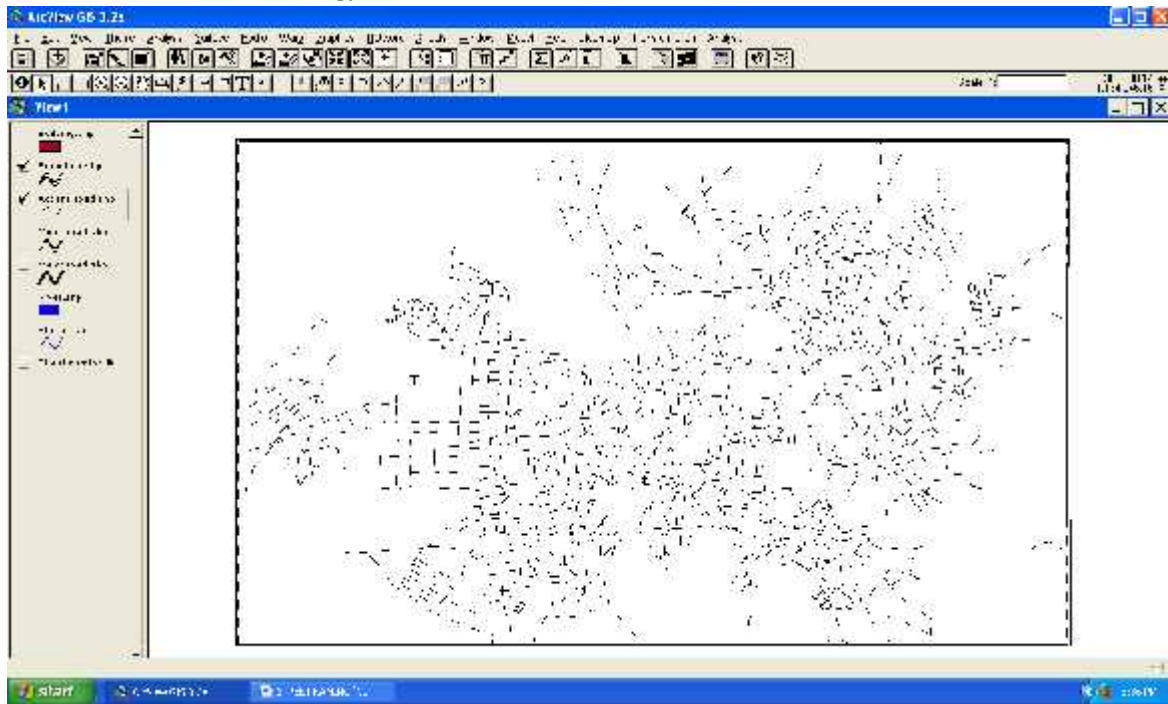


Figure 5: Digitized access roads of Mubi metropolis.

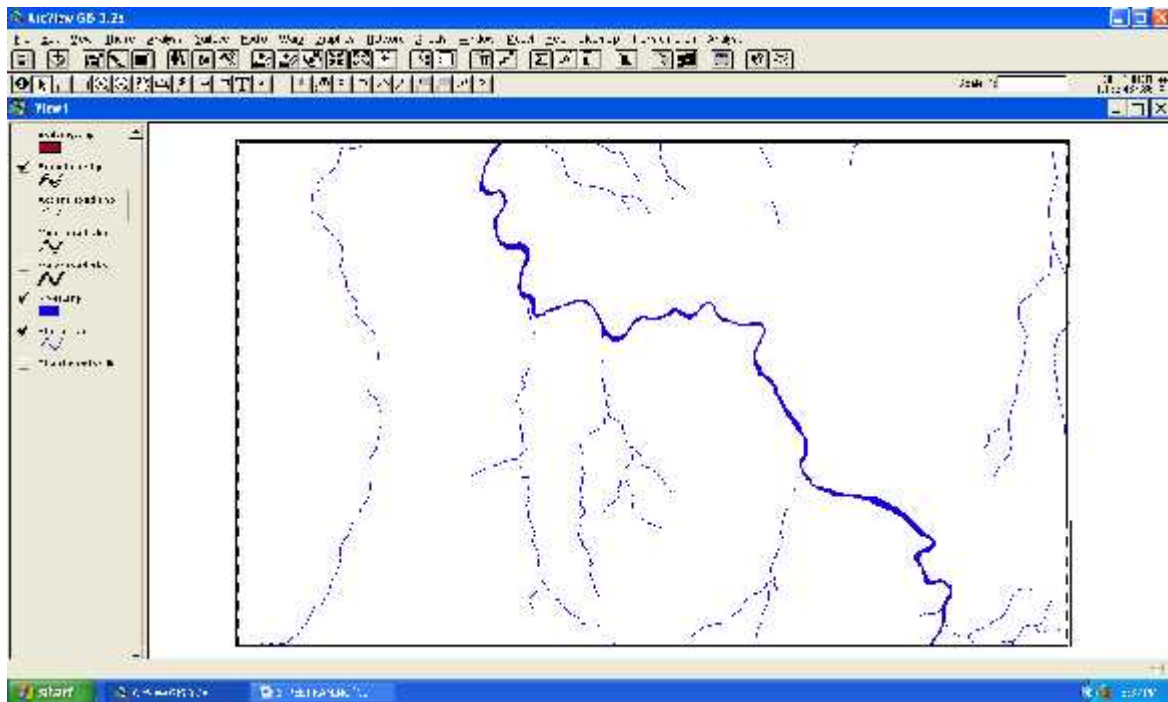


Figure 6: Digitized water bodies of Mubi metropolis.

Naming the streets

The names of the streets, obtained by field work, were written on the streets with the aid of a sketch made during the field work which made it possible to place appropriate names on appropriate streets.

roads, minor roads access roads and water bodies), was compiled by superimposing all the layers on one another to form a composite map (see figure 7). Appropriate map details such as the north arrow, linear scale, customized legend and grid lines were later added to form the final streets' names map (see figure 8).

Compiling the streets' name map

The map, produced in four different layers (major

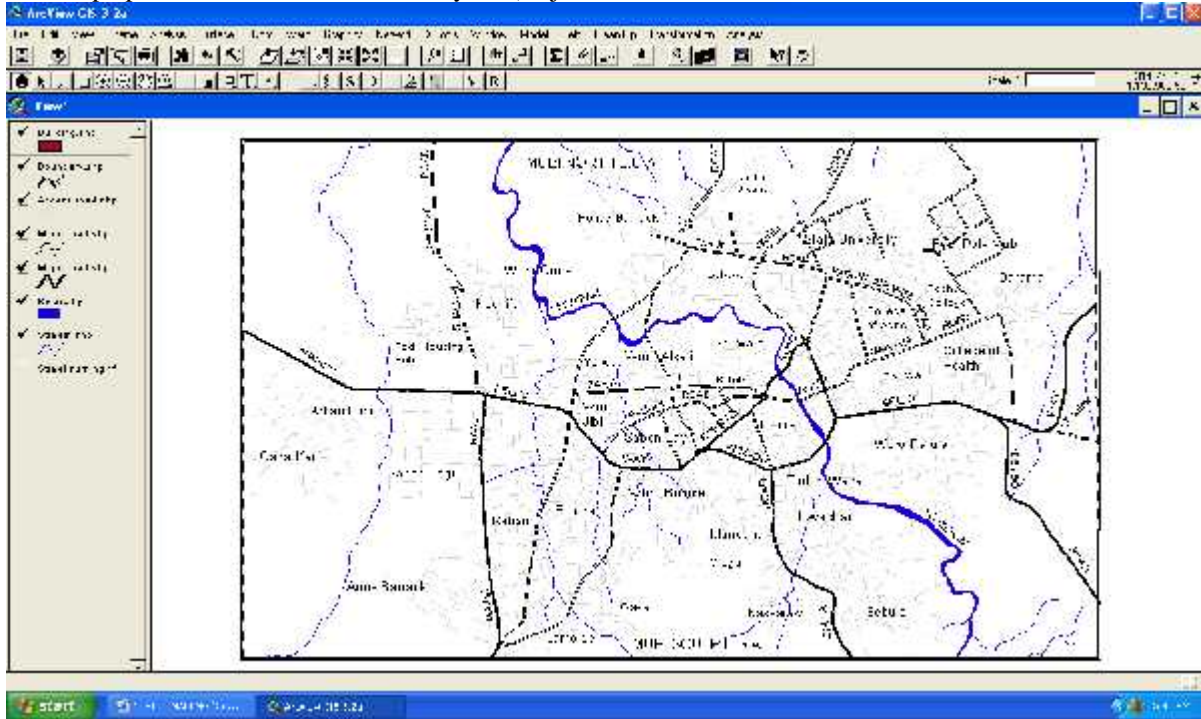


Figure 7: Superimposed roads and water bodies of Mubi metropolis.

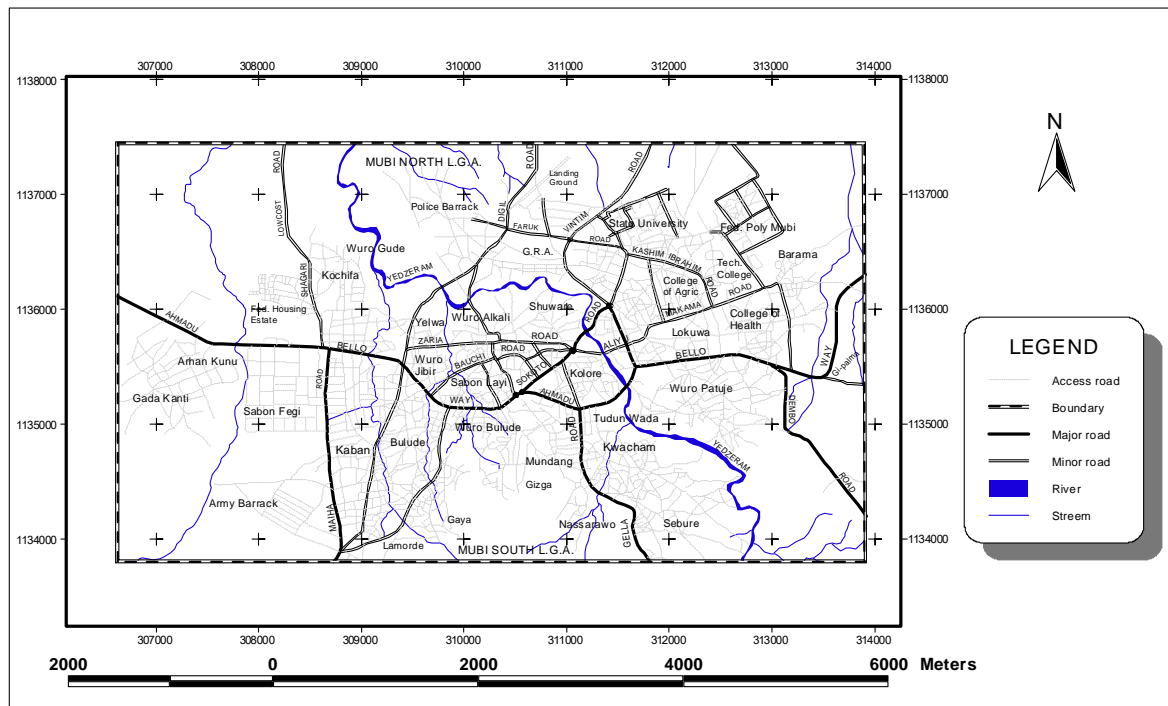


Figure 8: Compiled street naming map of Mubi metropolis.

Results and Discussion

The streets (roads) within Mubi metropolis for the first time were named in this study. Based on map, it can be seen that some of the streets are named after the towns to which they lead (e.g. Maiha, Gella, Vintim, etc.), some are named after some cities that are many kilometers away and has no link to the streets (e.g. Bauchi, Kano, Zaria, etc.), some are named after some famous or distinguished individuals (e.g. Sir Ahmadu Bello, Sir Kashim Ibrahim, etc.), etc.

The roads are categorized into three groups based on their pixel size on the satellite image. Roads comprising 3 pixels or more are categorized as major roads, roads with 2 to 3 pixels are categorized as minor roads and roads with 1 to 2 pixels as access roads.

It can be seen that the final street naming map consists of grid lines (represented by tick marks). The values of the grid lines are as a result of registering the map onto Universal Transverse Mercator (UTM) Projection System. The grid lines will make it possible to compute bearing and distance between any point or feature on the map and another point or

feature outside the map (if the UTM coordinates of that point or feature are known). The map is available in hard copies and soft copies for future use.

Conclusion and Recommendations

The aim of this study, which was using remote sensing and GIS techniques for street naming in Mubi metropolis, has been accomplished. The street naming map will serve as a guide to planners, census workers, immunization teams and visitors in locating their destination which will in turn improve the general well being of the dwellers of the town.

Remote sensing and GIS are a new technology that provoked a dramatic change in the management of spatially referenced data, which is a change from analogue to modern digital system. It is therefore recommended that ministries, organizations and professionals concerned with street naming should adopt the new technology in order to reduce the cost and time consuming associated with the classical approach and also to increase their efficiency. Also, the research is recommended to users of GIS product in service delivery especially in Mubi.

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