IOSR Journal of Environmental Science, Toxicology and Food Technology (IOSR-JESTFT)
e-ISSN: 2319-2402,p- ISSN: 2319-2399.Volume 13, Issue 2 Ser. II (February. 2019), PP 55-61
www.iosrjournals.org

Mapping of Infrastructures in UYO Metropolis

Adeponle B.J
Advance Space Technology Applications Laboratory, Uyo P.M.B 1223 Uyo, Akwa Ibom State
Corresponding Author: Adeponle B.J

Abstract: *There is a correlation between the extent of infrastructural development of a nation and her economic growths. Lack of basic infrastructural development programme affect virtually all sectors of the economy and impedes feasible economic empowerment. Infrastructure is the underpinning on which strong national development is built. Therefore, any nation that desires to accomplish any significant economic development must invest more on provision and maintenance of basic infrastructural facilities. Digital image processing was carried out using Land sat ETM image to generate settlement, drainage pattern & road network and to determine the percentage of the settlement distribution & spatial location of road network within Akwa-Ibom state. The result of the classified image of 2013 Land sat indicates that the built up areas cover for 61,200.00 hectares in total ground area, while cultivation areas cover for 10,800.00 hectares. However, vegetation areas and water bodies cover for 18,000.00 hectares and 64,800.00 hectares respectively while the wetland cover for 21,600.00 hectares as represented. The utilities map produced will provide clearer and more precise information about the spatial distribution of various infrastructures in Akwa ibom state. It is expected that this paper is going to serve as a catalyst that will arouse the interest of the governments at all levels, and the people of the country in infrastructural development.*

Keywords: *Sustainable Development, Mapping, Infrastructures, Proximities.*

Date of Submission: 13-02-2019 Date of acceptance:28-02-2019

I. Introduction

Infrastructure is basic physical and organizational structures needed for the operation of a society or enterprise, or the services and facilities necessary for an economy to function. It can be generally defined as the set of interconnected structural elements that provide framework supporting an entire structure of development. It is an important term for judging a country or region's development.

The term typically refers to the technical structures that support a society, such as roads, schools, water supply, electrical grids, telecommunications, public transportation, fire station, airports, hospitals and public space. The physical components of interrelated systems providing commodities and services essential to enable, sustain, or enhance societal living conditions.

Infrastructure contribute to economic growth (acting through both demand and supply).in an aggressive sense, the character and the availability of infrastructure and utilities influence the marginal productivity of private capita; public investment complement private investment. At the microeconomic level, this effect of infrastructure is seen specifically through. Reduced cost production-infrastructure hence affects, profitability levels of output, income and employment, particularly for small medium scale enterprises. It also has impact on the cost and service quality in international trade (trade logistics), which determines competitiveness in export/import markets (kessids 1993).this is a major reason why goods produced in Nigeria are very expensive which water down the ability of the country to compete in the international market.

Infrastructure provision in Nigeria is at crossroads in spite of its being critical to the economic productivity. When infrastructure is lacking both quantitatively and qualitatively in any area, resort will be to self help. According to survey report on infrastructure and household by the Akwa-ibom state government office of statistics 2010, 70% of household in uyo rely on street vendors and private neighbourhood for water supply and only about 39% treat their water for safe drinking. The survey also indicated that 53 % of household experience unexpected interruption in electricity power supply. Daily, and between 27% - 47% experience damage to their household appliances due to fluctuating voltage. According to Otegbulu (2012), majority of household rely on vended and well water for daily use. This source of water is not so hygienic and hence is unfit for consumption. In addition, poor road condition constraint movement of goods from one point to the other, while poor drainage systems has worsened the problem of flooding in most parts of the country.

Basically, in the whole African continent, infrastructure related problems account for an average 2 percent decline in economic growth per annum. All the 48 countries in sub-Saharan Africa with over 800 million people produce approximately the same power as Spain with only 45 million people. Bridging Africa's

infrastructure gap as a means of overcoming the continent's several developmental challenges cannot be overstated.

Better roads and rail systems can enable increased intra-continental trade and investment; increased power generation enhance the productivity of business and manufacturing; better communication services can facilitate financial transaction; access of clean water and sanitation improves the general health of the population, thus enabling more people to work and contribute productively to the economy. (Sanusi Lamido Sanusi, 2012).

Infrastructure can be described as facilities and services which enhance the physical, social and economic development of a nation and her people. According to Adeyinka et al (2011) ''infrastructure can assume several meanings, and it covers transport, building, power, health, tourism, communication facilities, land and country planning, demographic structure control, etc. the manner in which provision of this basic infrastructure are dispensed to meet the demand of public in general will determine the level of economic activities and in turn, the overall development of a nation. Adeyinka et al (2011) described infrastructure as ''wheel of economic activity'' infrastructure helps to determine the success of manufacturing and agricultural activities. Investments in water, sanitation, energy, housing, and transport also improve lives and help reduce poverty. And new information and communication technologies promote growth, improve delivery of health and other services, expand the reach of education, and support social and cultural advances. (World Bank).

The launches of the NigeriaSat-2 have brought space technology to the door step, which has enabled researchers to locate position and spatial distribution of these facilities at a glance. In line with this, the NigeriaSat-2 imagery will be used in locating and mapping of infrastructures, facilities in Akwa ibom state.

II. Study Area

Akwa Ibom State is one of the oil rich states in the Niger Delta Region of Nigeria. Located in the south-eastern coast of Nigeria, Akwa Ibom State was created on September 23, 1987 from the former Cross River State of Nigeria. The State is wedged in between Rivers, Abia and Cross river States and the Republic of Cameroon to the Southwest, North, East and Southeast respectively while the Bight of Bonny bordered the State to the South. It lies between latitudes 4°32' and 5°32' north of the Equator, and longitudes 7°28' and 8° 25' east of the Greenwich Meridian. According to NPC (2006), Akwa Ibom State has a total Land area of 6,187 km2, which represents 0.67% of the total land mass of Nigeria. The State has 31 Local Government Areas with Uyo, Eket, Ikot Ekpene, Abak, Etinan, Ikot Abasi and Oron being the most developed urban centres. According to the 2006 National Population Census result, Akwa Ibom State had a total population of 3,920,208 persons out of which 87.89 percent constitutes rural population while 12.11 percent forms the urban population (NPC 2006). The most striking characteristic of the population of Akwa Ibom State is its crude density. When compared with other states in the south-south and southeast, the region is one of most densely settled state. In fact, apart from Imo and Anambra States, Akwa Ibom State is the most densely populated state with densities as high as 634 persons per square kilometre in Nigeria (NPC 2006).

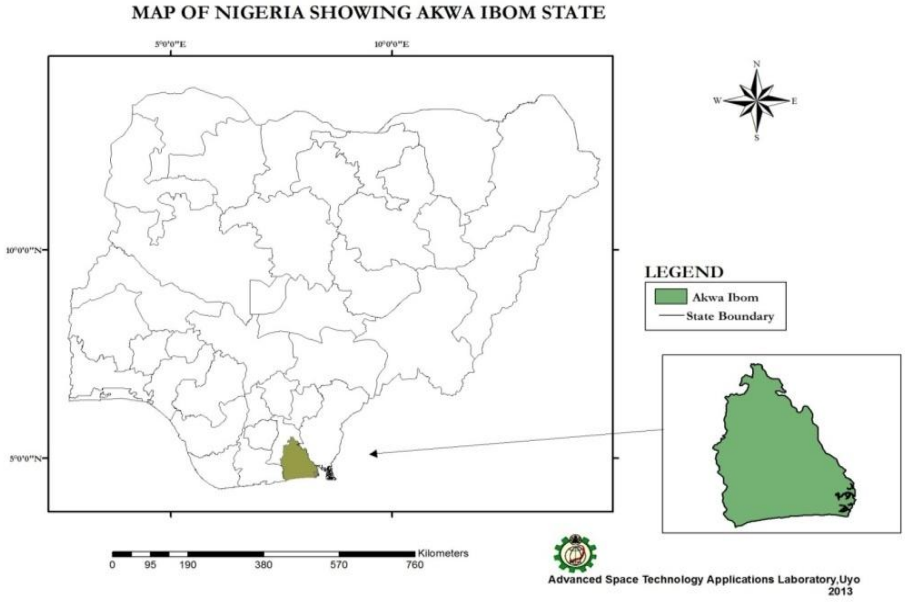

Fig. 1. Map of Nigeria Showing Akwa-Ibom State

III. Materials And Method

Landsat 7 ETM+SLC imagery of the study area would be gotten from USGS. Topographical maps, Land use/Land cover maps and other GIS base data showing road network, water supplies, public transportation, telecommunication, public health care and school would be acquired.

Reconnaissance survey would be carried out and GPS reading of infrastructure would be taken for point map creation. Land use/ Land cover map showing terrain features such as roads, power station, bridges, Airports, parks, hospitals and other land use feature would be used to delineate the study area and undesired feature would be cleaned up from the map.

Landsat 7 ETM+SLC imagery would be processed and enhanced using ARCGIS, ILWIS and ERDAS9.2 software and raster images would be generated.

GIS data base such as land use land cover map, roads, school, parks, public spaces and infrastructural base map, would be overlaid with the raster image to create a utilities map of the study area.

IV. Data Source And Methodology

Satellite Data

The satellite remote sensing data will be acquired from Landsat 7 ETM+SLC imagery with the following specification; Multispectral optical data (high resolution) and 30M (medium resolution).

Secondary Data

The following are the secondary data to be used:

- Satellite imagery of Landsat 7
- Land use/Land cover map of the study area from USGS
- Topographical maps

Software Packages

- ILWIS3.3 GIS Application software
- ERDAS9.2 GIS Application software
- ARCGIS Application software

INSTRUMENTATION

- Global Positioning System (GPS)
- Computer work station
- Digital camera
- Measuring tape

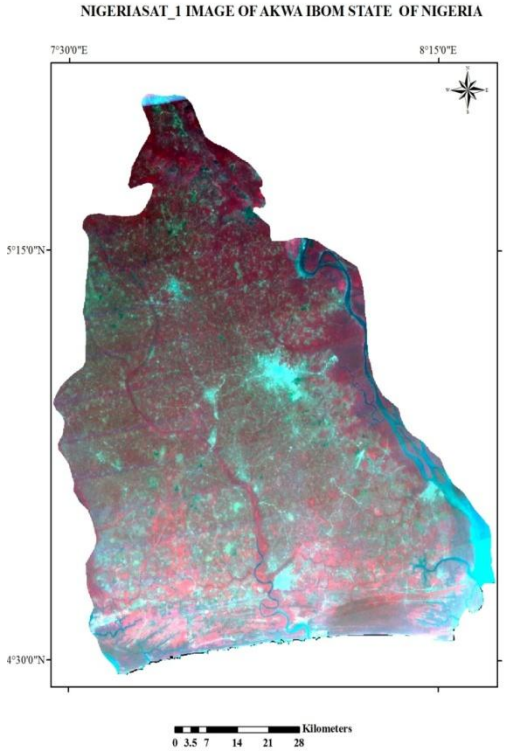

Fig.2. NigeriaSat_1 Image of Akwa-Ibom State

METHODS

- Importing and converting of Topographic and geological data into ILWIS environment
- Geo-referencing and digitizing of data
- Generation of drainage, settlement and road network
- Analyze the spatial pattern of the infrastructures and utilities
- Statistical analysis was carried out
- Layers were overlaid for the final layout base map

V. Results And Discussions

This study illustrates the successful implementation of GIS in the generation of spatial information such as base map infrastructure to show the prospects in the state, spatial location of roads, drainage pattern, settlement distribution and local government boundary in Akwa-Ibom state. The drainage pattern of the stream network in the watershed have been observed as mainly dentritic type which indicates homogeneity in texture which is of immense utility in river basin evaluation for the management of natural resources for mitigation of the impact of natural disasters for achieving sustainable development.

The result of the classified image of 2013 indicates that the built up areas cover for 61,200.00 hectares in total ground area, while cultivation areas cover for 10,800.00 hectares. However, vegetation areas and water bodies cover for 18,000.00 hectares and 64,800.00 hectares respectively while the wetland cover for 21,600.00 hectares as represented.

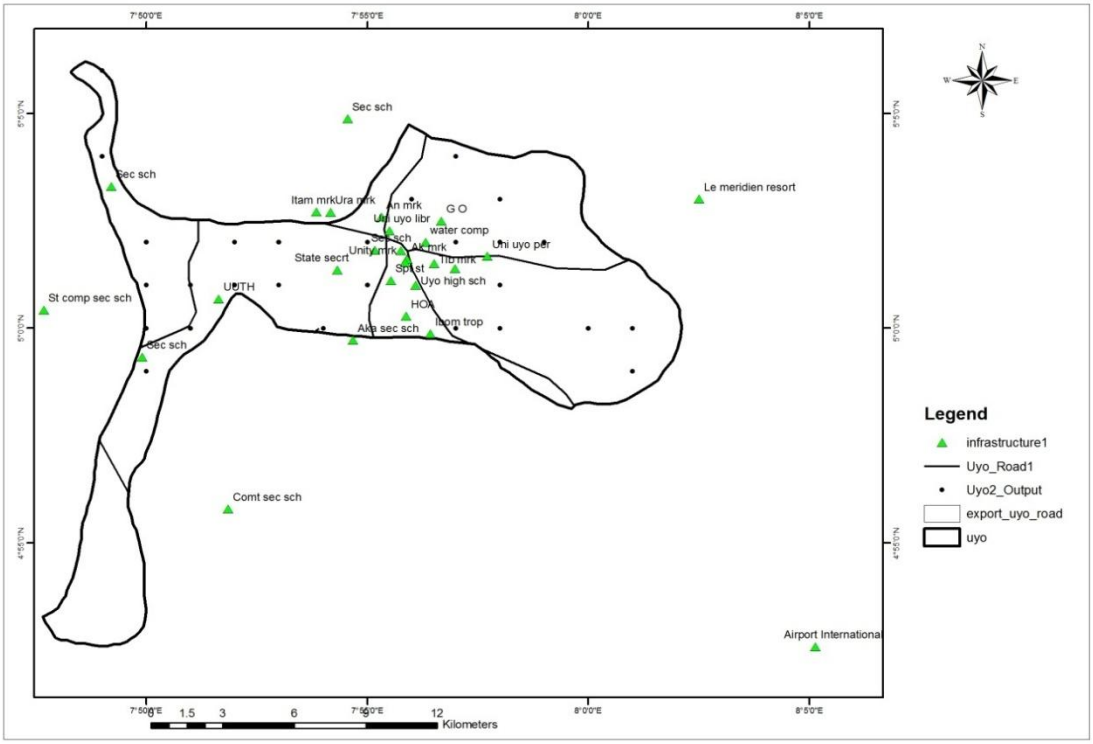

Fig. 3. Map of uyo showing infrastructures in the state

Table 1. Showing GPS Reading of Infrastructures in Uyo Town

Name	X	Y
University of uyo library,pavilion	5.037917	7.925227
Ibom tropicana entertainment	4.99795	7.940577
Raffia city plaza	5.175182	7.71229
Le meridien ibom hotel &goif resort	5.050132	8.041805
Akwa ibom airport International	4.876514	8.085684
University of uyo teaching hospital	5.011442	7.860739
University of uyo permanent site	5.02802	7.961997
Akwa ibom state secretariat	5.022731	7.905486
Akwa ibom water company Ltd	5.033463	7.938739

Governor office	5.041692	7.944676
Akwa ibom house of assembly	5.004765	7.931483
Sports stadium	5.018627	7.925715
Unity international market	5.030243	7.929487
Akpan ndem market	5.026909	7.931691
Timba market	5.025125	7.94191
Annex market	5.043205	7.922188
Uraifia market	5.045097	7.902952
Itam market	5.045181	7.897499
Akpan andem market	5.026836	7.931686
Secondary school	5.030397	7.919567
Secondary school	5.081288	7.909462
Aka ofot secondary school	4.995394	7.911295
Adiaha obong secondary school	5.023183	7.949896
Uyo high school	5.016698	7.935011
Secondary school	4.988918	7.831826
Secondary school	5.055121	7.820204
Community secondary school	4.929918	7.864246
Saint comprehensive secondary school	5.007101	7.794802
E- Library uyo	5.025552	7.930996

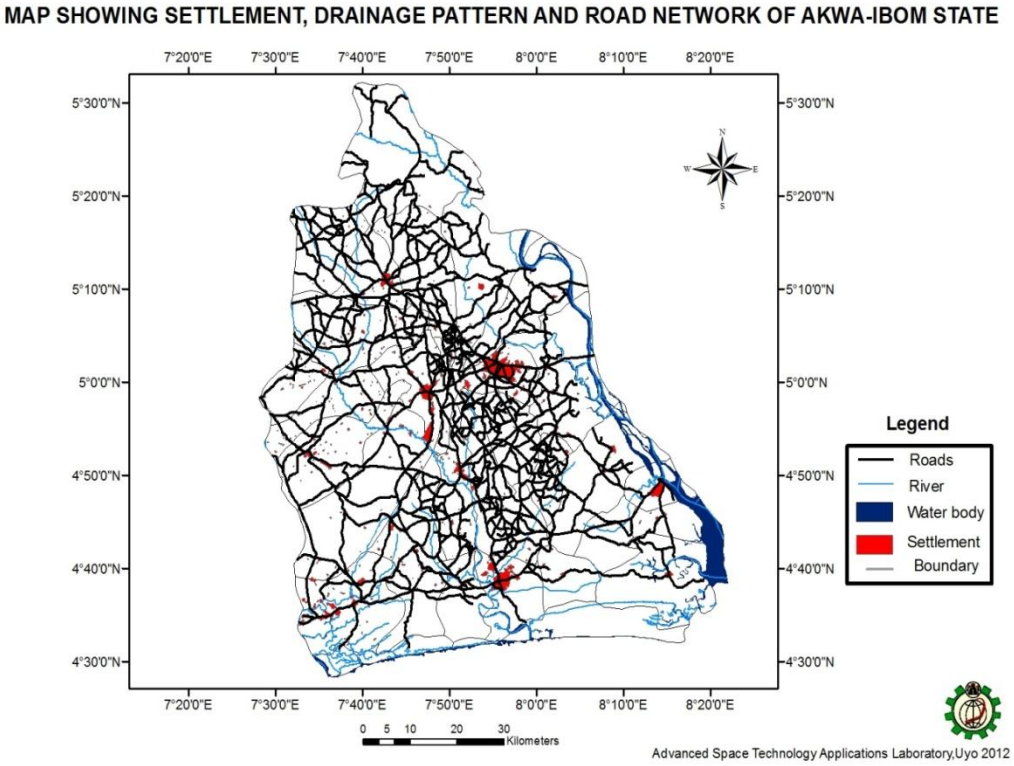

Fig.4. Map Showing Settlement, Drainage Pattern And Road Network Of Uyo Town

The settlement, drainage pattern and road network were overlaid on the land suitability image for further analysis from fig.4., it was discovered that areas of very high suitability were also identified due to its proximity/accessibility to road networks which is a vital factor for any government, estate developer or individual that aspires to engage in infrastructure development as this can likewise to describe of the areas described as of high suitability. Such areas will accumulate a high appreciation in value majorly expressed in monetary terms to an individual or estate developer.

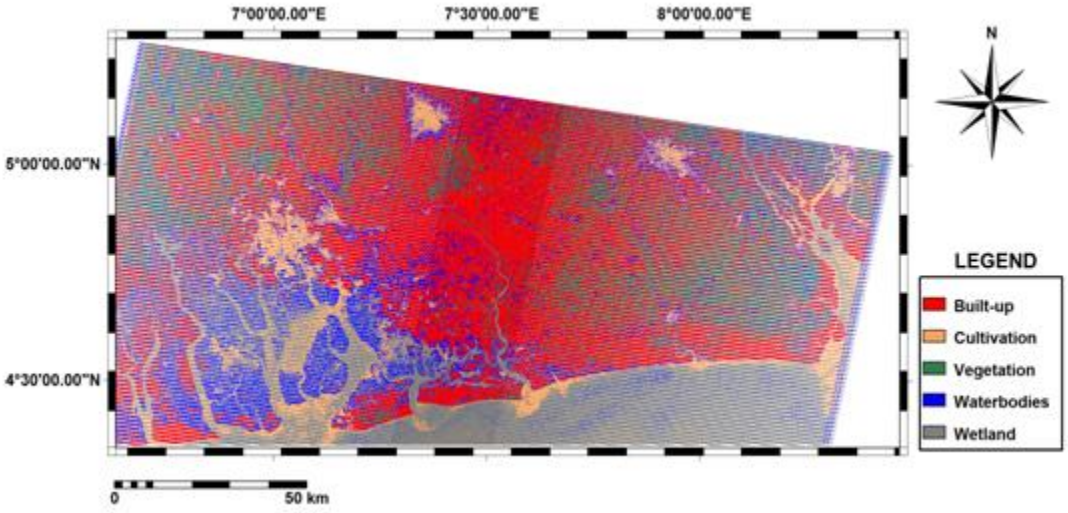

Fig.5. Land use/land cover map of UYO town

The result of the classified Landsat image of 2013 in fig 5, indicates that the built up areas cover for 61,200.00 hectares in total ground area, while cultivation areas cover for 10,800.00 hectares. However, vegetation areas and water bodies cover for 18,000.00 hectares and 64,800.00 hectares respectively while the wetland cover for 21,600.00 hectares as represented in fig 6.

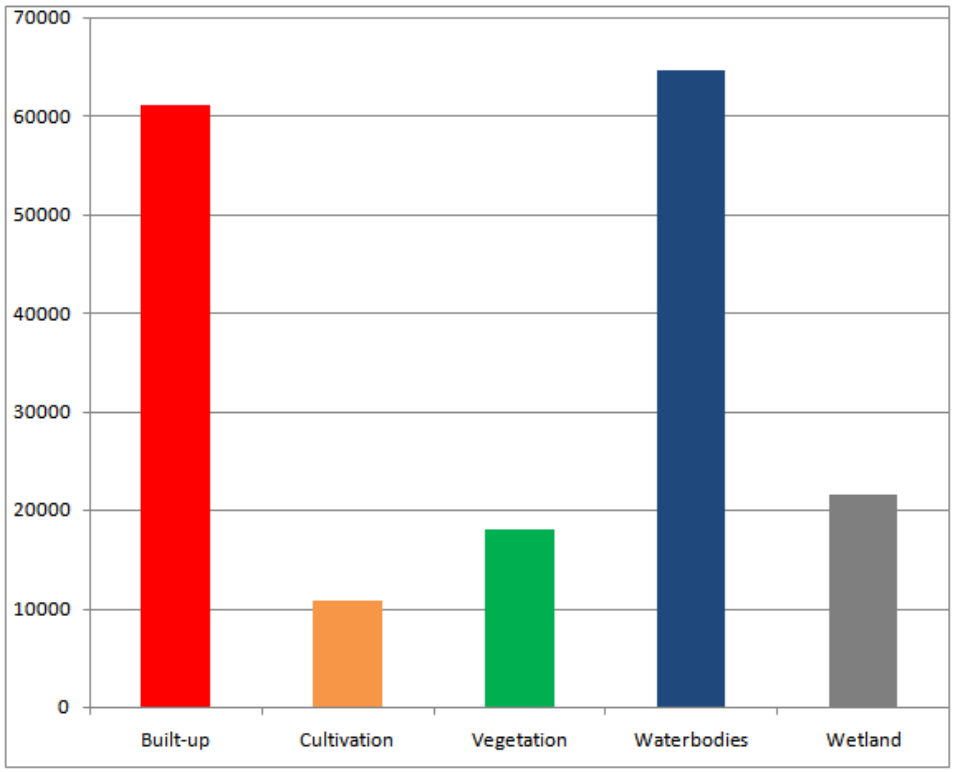

Fig.6. Histogram showing land utilization within the Uyo

VI. Conclusion

Remote Sensing and GIS have proved to be an important leverage towards understanding spatial trends and generation of spatial distribution of infrastructures in uyo metropolis. Sharing information is the best way of validating information.This study illustrates the successful implementation of GIS in the generation of spatial information such as base map infrastructure to show the prospects in the state, spatial location of roads, drainage pattern, settlement distribution and local government boundary in Akwa-Ibom. The drainage pattern of the stream network in the watershed have been observed as mainly dentritic type which indicates homogeneity in

texture which is of immense utility in river basin evaluation for the management of natural resources for mitigation of the impact of natural disasters for achieving sustainable development.

Efficient location of facilities, especially publicly-owned facilities, is the goal of both the public decision maker and the government in general. That notwithstanding, achieving this feat has constituted an intractable problem over the years. Geographical Information System has enviable capacity to store capture, store, analyse and output geographical data in a way that is helpful in many decision-making contexts. By the use of GIS, current study has revealed serious spatial inequality in the distribution of both private and public infrastructure in the study area. Such spatial inequality must be avoided given its enormous financial and time implications in accessing and utilizing these facilities.

The utilities map produced will provide clearer and more precise information about the spatial distribution of various infrastructures in uyo town.

References

[1]. Abdu J.B (2011).National Economic Empowerment Development Strategy & Poverty Reduction in Nigeria: A Critique
[2]. Adelakun, S. (2008).Travel to the most populated black nation on earth Nigeria
[3]. Adeyinka et al (2011).The Nigerian National Economic Empowerment and Development Strategy (NEEDS): A Critical Assessment
[4]. Ayodele, A. (2008). IMF Forecasts 9 Percent Growth for Nigeria. All Africa.com
[5]. Aliyu, Y.A. Sule, J.O and Youngu, T.T (2012). Application of Geospatial Information System to Assess the Effectiveness of the Millennium development goal Target in Amac Metropolis-Abuja, Nigeria. *Research Journal of Environmental and Earth Sciences* 4(3): 248-254, 2012. Maxwell Scientific Organization.
[6]. Albert, A. (2002). Outline Geography of Urhoboland. University of Ibadan, Nigeria. Unpublished.
[7]. Ayeni, A.J and Adelabu, M.A (2011). "Improving Learning Infrastructure and Environment for Sustainable Quality Assurance Practice in Secondary Schools in Ondo State, South-West, Nigeria," International Journal of Research Studies in Education, Vol. 1, No. 1, 2012, pp. 61-68.
[8]. C. P. Lo and Albert K. W. Yeung (2007). Concept and Technique of Geographic Information Systems, Pearson Prentice, Upper Saddle River, New Jew jersey.
[9]. Central Bank of Nigeria (2006). Economic & Financial Review.Vol.44/3 September
[10]. Daniel, P. and Hopkinson, M. (2009). The Geography of Settlement
[11]. Jensen J. B.(2009). Remote Sensing of the Environment. An Earth Resource Perspective (2nd Edition).
[12]. Kanth, T. A. and Hassan, Z. U. (2012). Morphometric Analysis and Prioritization of Watersheds for Soil and Water Resource Management in Wyler Catchment Using Geo- spatial Tools. International Journal of Geology, Earth and Environmental Sciences. Vol. 2 (1)
[13]. Michael, N.D. (2004). Fundamentals of Geographic Information System. 2nd (ed.), Washington: John Wiley Sons Inc.
[14]. Ola, C.S. (1977). Town and Country Planning Laws In Nigeria. University Press Ibadan.
[15]. Sparks, B. W. (1973). Geomorphology: Geographies Advanced Study. 2nd (ed.), New York: Longman Inc.
[16]. Tomlinson R.F. (1997). Current and potential uses of GIS. International journal of GIS.
[17]. www.Akwa-Ibom state.gov.ng

Adeponle B.J. " Mapping Of Infrastructures In Uyo Metropolis." IOSR Journal of Environmental Science, Toxicology and Food Technology (IOSR-JESTFT) 13.2 (2019): 55-61