

CHAPTER 5

Perspectives of Urban Sprawl: The Conflated Issues and Realities

Idowu, O. O; Shaibu, S. I; Raheem, W. A, & Martins, V. I.

Introduction

Urbanization is a continuous, universal and inevitable process of urban development. As observed by different scholars, the rapid urbanization of the world is quite alarming both in the developed and developing countries (Ewing, 1997; Sudhira et.al. 2004; Jat et.al. 2008; Olujimi, 2009). Idowu & Olaniyan (2009) considered the increasing world population and stressed that the phases of urban settlements have changed, because most of the semi-urban areas and medium-sized towns have been turned into full urban town. Urban development across the world is translated into stressful urban dynamics, with rapid development of informal households and concentration of poor families at the peri-urban areas.

Urban sprawl has no definite universal definition, but contentiously used to describe a wide variety of the undesirable aspects of urban growth, resulting in a poor environment, uncontrolled development and much unplanned suburbanization (Cillier, 2010; Noor & Rosni, 2013). Urban sprawl is a phenomenon widely discussed, but poorly understood, because it means different things to different people. Several studies have labeled urban sprawl as being obviously popular, contentious and surrounded by controversy (Torrens, 2008; Aljoufie et al., 2013; Aguda & Adegboyega, 2013). The major part of this chapter rely on literature; reviewing the conflated issues regarding urban sprawl and its realities across the world. Purposefully, a study on the changes in the built-up area of Minna between 1972 and 2015 was presented to establish the reality of urban sprawl in the town of Minna. This paper stands to educate on the process and product of urbanization and urban growth in Nigeria, particularly in Minna. Also, exhibits the distinct components that often contribute to theoretical confusion and analytical complexity.

Theories of Urban Structure /Urban Sprawl

Theories are fundamental principles representing the reality. In every research, theories have their own position of relevance in explaining the true urban phenomenon. Idowu (2017) has observed the frequent use of classical descriptive theories: Burgess (1925), Hoyt (1939) and Harris and Ullman (1945) in explaining the urban structure in several urban studies (Figure 1 - 3). Similarly, other relevant theories known as modified descriptive theories of urban structure: Vance's urban-realm theory (1964), Mann's theory of urban structure (1965), Kearsley theory (1983) and White's theory of 21st century city (1987) (Figure 4 - 7) have been explored to explain urban structures in relations to the emergence of urban sprawl (Cellier, 2010).

Furthermore, combination of the efforts of Alonso (1964), Muth (1969) and Mills (1967) have been use to explain the concept of urban residential location and urban sprawl development as shown in Figure 8. In order to have a clear understanding about urban sprawl is, Idowu (2016) highlighted some features promoting it from the aforementioned theories, which simply referred to as urban sprawl wheel (Figure 9).



Figure 1 Burgess Theory (1925)

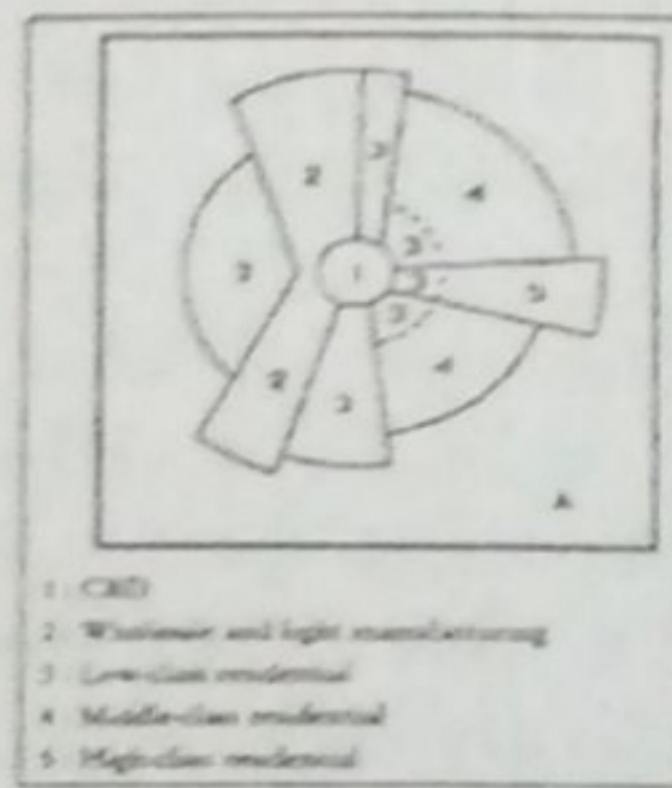


Figure 2 Hoyt's Theory (1939)

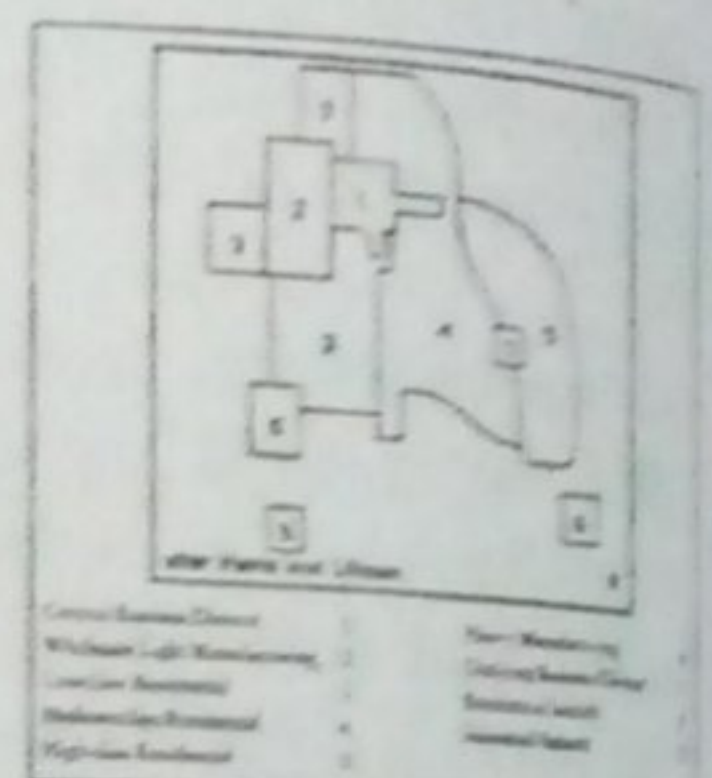


Figure 3 Harris and Ullman (1945)

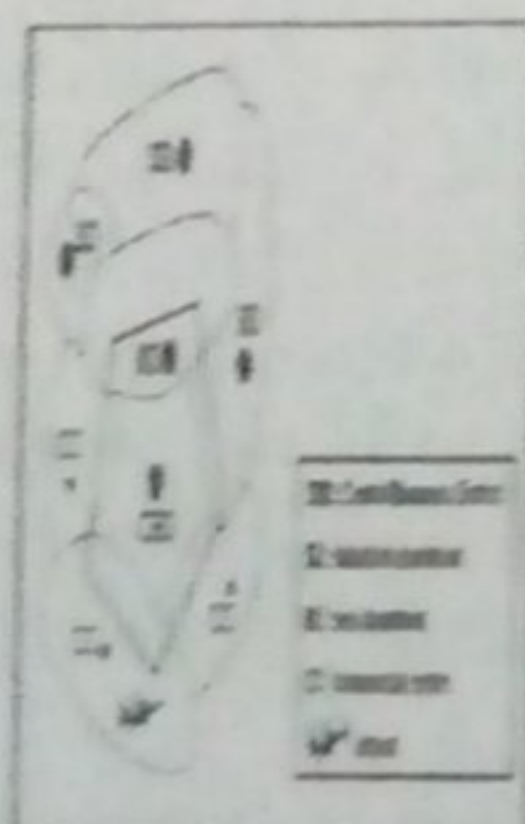


Figure 4 Vance's Urban-realm Theory (1964)

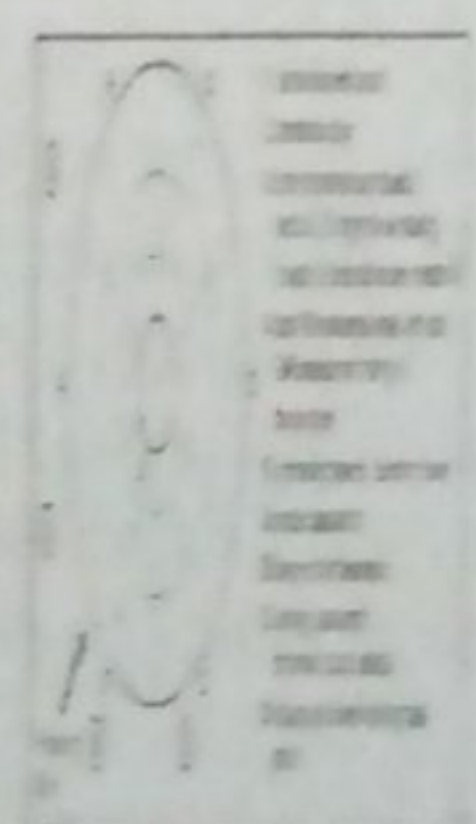


Figure 5 Mann's Theory (1965)



Figure 6 Kearsley modified Burgess Theory (1983)



Figure 7 White's Theory of the 21st Century City (1987)

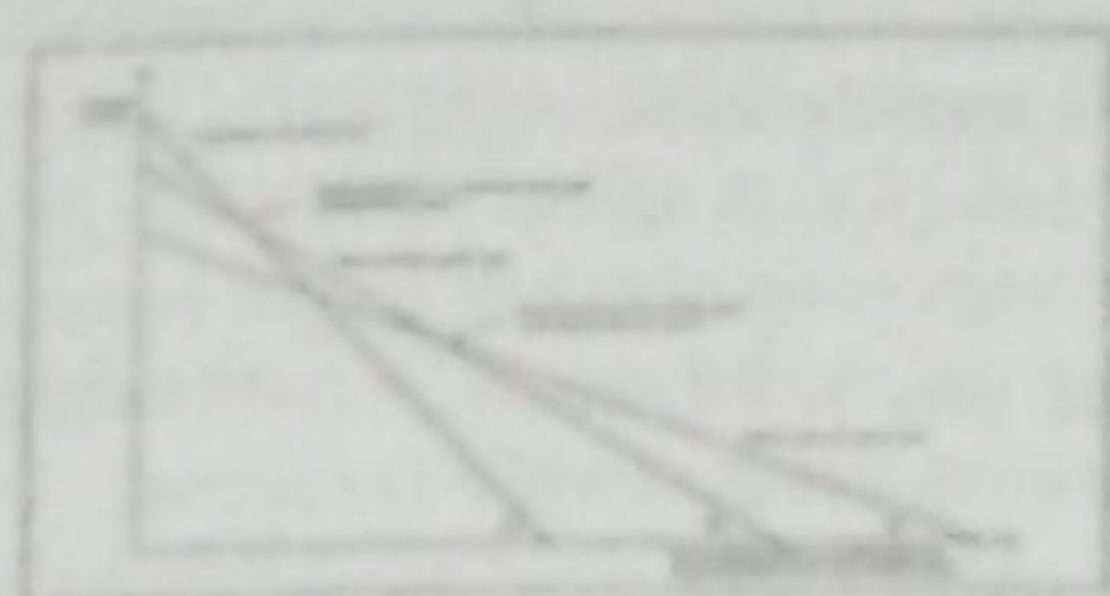


Figure 6. Measurements and Land Value Theory



Figure 7. Urban Sprawl Pattern
Source: Sierra, 2004

Conflated Issues about Urban Sprawl

The issues that are central to every debate about urban sprawl are: definitions, characteristics, causes, measurements, impact, consequences and the control strategies. However, the divergent of views about what sprawl is or is not, has made the subject a major debatable topic in several urban studies literature. Meanwhile, this section reveals the opinions and the criticisms of different scholars regarding the subject matter.

Definitions

There are divergent of thoughts and opinions on what urban sprawl is all about. Several definitions have been given by different authors and few of these definitions are include:

Richmond (1995) defines it as an act of decentralized land ownership and fragmentation of authority on land use and disparity in fiscal capacities of local government. Ewing, et al., (1997) defines it as the combination of three characteristics: leapfrog or scattered development, commercial strip development, and large expanse of low density of single use development. Sierra Club (1998) considered urban sprawl as the low density development beyond the edge of service and employment, which separates where people live from where they shop, work, recreate and educate, thus requiring cars to move between zones. Pendall (1999) defines urban sprawl as unplanned, uncontrolled, and uncoordinated single-use development that does not provide for an attractive and functional mix of uses and/or is not functionally related to surrounding land uses and which variously appears as low density, ribbon on the strip, scattered, leapfrogs or isolated development. Ewing, et al. (2002) defines sprawl as low density with residential, shopping and office area that are rigidly segregated, a lack of thriving activity centres and limited choices in travel routes. The European Environment Agency (EEA, 2000) opined sprawl as the physical pattern of low-density expansion of large urban areas, under market conditions, mainly in the surrounding agricultural areas. Burchell & Mukhej (2003) admitted that sprawl as a low density occupation phenomenon, a leapfrog

development in which urban growth occurs in a discontinuous leaving urban void and spreading into rural areas or urban fringe.

Characterization

Characterizations of sprawl are not similar across the world. For in the developed countries, the development patterns of low density Europe and Asia cities are significantly denser than in American. While in many developing countries, characterization of sprawl is useful, because urbanization has its different drivers and appears in different form. Torrens (2008) observed the diversity and some key features distinguishing urban sprawl in urban studies literature (Table 1). These include: growth; social and aesthetic attributes; decentralization; accessibility; density characteristics; fragmentation; loss of open space; and dynamics. Obviously, these features only serve as the bases to describe the outlook of urban sprawl. Expectedly, several authors have characterized urban sprawl in the best suitable pattern to their environment (Torrens 2008; Olujimi, 2009; Hamidi & Ewing 2014).

Table 1: The Varying Characterization of Sprawl in Urban Studies Literature

Name of Author	Characterization Indicators								
	Growth	Social	Aesthetic	Decentralization	Accessibility	Density	Open Space	Dynamics	Cost
Audric, et al. (1990)		*							
Bar & Richardson (1994)						*			
Banfield et al. (1999)									
Burdell et al. (1998)	*		*		*	*			*
Calhoun, et al. (2001)			*						
Chalphan Jr. (2003)							*		
Duang, et al. (2000)			*						
El Nasser & Overburg (2001)						*		*	*
Ewing et al. (1997)		*		*	*	*	*	*	*
Ewing, et al. (2002)		*		*	*	*	*	*	*
Farley & Frey (1994)		*				*			
Galster (1991)		*				*			
Galster, et al. (2001)	*			*	*	*		*	*
Gordon & Richardson (1997a)						*		*	*
Gordon & Richardson (1997b)						*		*	*
Hesse & Lathrop (2003a)						*	*		
Hesse & Lathrop (2003b)			*	*	*	*	*		
Hesse (2004)			*	*	*	*	*		
HOD (1998)				*	*	*			*
James Duncan & Associates et al. (1985)						*			
Lang, (2001)						*			
Ludermann (1967)						*			
Lensing (1962)			*	*	*	*			
Malpezzi (1999)				*	*	*			
ODI (1991)			*	*	*	*			
Pesser (1988)						*			
Pondall (1998)						*		*	*
Real Estate Research Corporation (1971)						*			
Sierra Club (1998)				*	*	*	*		
Sudhoo et al. (2001)						*	*		

Source: Torrens 2008.

Causes

Urban sprawl has multiple causes (Frank et al., 2000). Several authors have maintained that, urban sprawl cannot be attributed to just a single cause, because the causes are obviously multiple and interrelated. For instance, rapid urbanization and growing population demand for peri-urban land, high income, efficient transportation system and weak physical planning laws and regulations (Franz et al., 2006; Olujimi, 2009). The (9) causes of urban sprawl which are: rent gradient; growing affluence, due to the cheap price of land, the cost of transportation; differences in government services and attitudes; racial discrimination and segregation; easy availability and accessibility to land at the suburban area; tax policy; and land use /town planning regulations. Based on the presentations of different scholars, there are remarkable degrees of agreement concerning the causes of sprawl, unlike the wide divergence of views noticed on the definitions (Frank, et al., 2000; Okewole, 2002; Franz et al., 2006; Olujimi, 2009; Aguda & Adegboyega, 2013).

Measurement

Numerous attempts have been made in measuring urban sprawl, (Ewing et al., 1997; 2002; Franz et al., 2006; Torrens, 2008; Alabi, 2009; Aguda & Adegboyega, 2013). The Smart Growth Movement (SGM) developed one of the earliest methods which involved drawing of pictures of urban sprawl areas from the planning perspective and creating different factors and measure the spread (The Sierra Club, 1998; Ewing et al., 2002). This system of measurement was considered unrefined and characterized with failure, because it neglected the land use interaction (Ewing et al., 2002). Other techniques fashioned by different scholars' involved categorizing approach based on two densities related factors (The Sierra Club, 1998); the approach based on exploring the cost and benefits of urban sprawl (Downs 1999); and by exploring the causes of urban sprawl (Knap et.al, 2005). Apparently, significant progress was recorded when multi-factors and descriptive techniques were implored in measuring sprawl (Galster et al. 2001; Frenkel et al. 2004; Alabi, 2009; Ade & Afolabi, 2013; Aguda & Adegboyega, 2013).

Torrens & Alberti (2000) applied multidimensional approaches in measuring urban sprawl, combining spatial related indices and adopting a broad methodology concept. This methodology accommodates all characteristics of urban sprawl that can be measured and track in the space – time dynamics (Torrens, 2008). Efforts were made in subsequent urban studies, by applying this technique for better results (Ewing et.al.2002). Based on complexity of urban sprawl, the analysis of land use changes

(visual sprawl pattern) gives a better approach to how urban sprawl is being measured. The application of remote sensing and GIS techniques in urban sprawl analysis has become a major field of research all over the world (Sudhira et al. 2004, Agada & Adegboyege, 2013). Remote sensing and GIS techniques are physical expression methods, which can identify pattern, extent, nature and rates of urban sprawl. The application of Remote Sensing and GIS provide an alternative for urban sprawl to be effectively mapped, measured and monitored.

Impacts

Impacts of urban sprawl are multifaceted, reflecting in all the disciplines. On a broad perspective, impacts of urban sprawl can be classified based on its cost, influence on infrastructure and on the environment (Downs, 1999, Frank et al. 2000; Johnson, 2001). Recent studies have admitted that urban sprawl, has a potential threat against sustainable development, with a range of negative impact on urban landscape (Franz et al. 2006; Savaman & Ilangoran 2010 Polidoro et al. 2011). Impact of urban sprawl can be classified into the following:

- a. Impact of sprawl on economic efficiency: this focuses on the strong influence of market forces in creating sprawl. Economists expect sprawl to produce economic efficiency in the absence of market failures (Downs, 1999, Ewing et al. 1997). The increase in infrastructure costs is associated with the development of sprawling area.
- b. Impacts of sprawl on transportation: the enormous influence of the automobile is widely acknowledged as a cause of sprawl (Ewing et al. 2002, Galster, 2001). As the travel time increases, the cost of transportation also increases.
- c. Impacts of sprawl on the environment: the environmental impacts of urban sprawl are seemingly numerous and well documented. These include: loss of environmentally fragile lands, reduced regional open space, greater higher pollution and energy consumption, decrease in aesthetic appeal of the landscape, reduced diversity of species, increase runoff of storm water and risk of flooding, removal of soil vegetation and ecosystem fragmentation (Kahn, 2000; Johnson, 2001). Impact of sprawl on land use, on planning and management of cities and on social cohesion. Also, the impact of sprawl is highly felt on infrastructure.

Consequences

incompatible neighborhoods, business and industrial corridors, transportation options and quality of life resources (Kelsey, 2001). This concept is regarded as urban design approach to regulate the negative impact of urban sprawl and common in America and Europe and some parts in Asia. Compact city strategy is a concept of a city with relatively high-density, mixed-use city, based on an efficient public transport system and dimensions that encourage walking and cycling. This strategy assumed that through intensification of development within the city, many problems related to urban sprawl could be overcome. It was designed primarily to reduce the use of private cars and to minimize the loss of open countryside.

Realities of Urban Sprawl

The global experience of urban sprawl is common, though its characteristics and impacts vary across the world. During the second half of the 20th Century, urban sprawl has become a mass phenomenon throughout the western world. The interest of many on this phenomenon has made it a popular subject of discourse by several researchers. Historically, the use of the term was traceable to Earle Draper of Tennessee Valley Authority in 1937. Earle Draper used the term "Sprawl" in the context of a national conference of planners in America (Wassmer, 2002; Bernhardt, 2007). Several scholars and public commentators through seminars, debates, conferences and symposiums, extensively have discussed the incidence of urban sprawl in the cities across the world.

For instance, several reports on the emergence and the growth of urban sprawl across America cities are well documented (Gordon & Richardson, 1997; Ewing, 1997; Ewing et al., 2002; Downs, 1999; Sierra Club, 2000; Galster et al., 2001). Also, Torres (2008), acknowledged the continuous growing of the American cities both in sizes and population. The spread of urban sprawl in Washington-Baltimore, Texas, Virginia, New York, New Jersey and other cities have been reported frequently by these authors. Similarly, Europe is one of the world's highest densities of urban agglomeration, with over 75% of the population residing in urban area (Oueslati et al., 2015). At a much faster rate, the size of cities like London, Madrid and others, in Europe are rapidly increasing than their populations. A study by pan-European organization has observed that the evidences of urban sprawl are the result of the European Union (EU) policies and funding (EEA, 2006).

The Latin-America region is one of the most urbanized continents in the world, with about 84% of its population living in the urban town and cities. According to Torres (2011), this region has experienced a momentary

urbanization process between 1950 and 2000, with about 75% of the people living in the cities. Consequently, most urban areas and large cities in Latin America are facing three major nature of growth, fast growth, informal households and concentration of poor families. Notable cities experiencing such rapid growth include Chile, Cancun in Mexico, Camisea in Peru, Bolovia and Macae, Mato and Grosso in Brazil. The observations of the scholars in respect to urban sprawl in Asia have identified the severity of urban sprawl in the past decades, forming a scattered development and land fragmentation.

In Africa, Olurin (2003) firmly reported that the effects of population dynamics in African cities have produced miseries that are often difficult to comprehend. Olujimi (2009), Aguda & Adegboyega (2013), Adaku (2014) with several others have reported on urban sprawl in Africa. Most of the authors in this region have attributed urban sprawl to bad governance system and poor planning strategy. For example, urban developments in Africa are characterized by rapid population increase and overcrowding of low-income districts; particularly in places like Lagos, Cairo, Kinshasa, Tunis, Ibadan, Kano and Enugu.

Urbanization and Urban Sprawl in Nigeria

Nigeria is one of the most rapidly urbanizing countries in the tropical Africa (Olorunfemi, 1979). Indeed, the high population recorded in the cities and towns in Nigeria predated the country's independence in 1960 (Olorunfemi, 1979). Primarily in Nigeria, the process of urbanization attributed to the changes in the socio-political, economic improvement and demographic transformation has given rise to urban sprawl.

The sprawling nature of most of the cities and towns in Nigeria has, therefore, received attention from several scholars (Okewole, 2002; Olujimi, 2009; Alabi, 2009; Aguda & Adegboyega, 2013). These studies have to a large extent attributed the unguided and unsystematic urban expansion in many Nigerian cities and medium-size towns across the country to the rapid rate of urbanization. Studies in Lagos, Ibadan, Oshogbo, Akure, Ilorin, Ogbomosho, Enugu, Kano, Kaduna, Abuja, Lokoja, Port-Harcourt, Aba, Onitsha, Calabar, Warri and Benin, and many others have been characterized with rapid peri-urban expansion and urban sprawl (Olujimi, 2009; Aguda & Adegboyega, 2013). The factors encouraging peri-urban expansion and urban sprawl have largely been linked to increase in population of people living in the cities, which has put pressure on the peri-urban space.

The present conditions of cities in Nigeria are products of many forces or factors. The forces or factors that encourage suburban development are the same forces or factors that determined the development within any urban area. A study by Olujimi (2009) confirmed that the result of the economic forces and the innovativeness in the development of the housing facility evidently, influenced self owned residential houses by families, along with the development of shops for commercial purposes in the suburb. Concomitantly, the parcels of land hoarded, are being developed without a layout design or building approval. This, however, promotes haphazard growing of suburbs, which later became compacted and return as slum neighbourhoods. The inability of government to effectively develop the land acquired is another factor encouraging sprawl neighbourhoods in Nigeria. The bottleneck attached to the payment of compensation has necessitated the release of land to individual, groups or association, to develop it without reference to the precautionary building standards, planning regulations and building approval.

Reality of Urban Sprawl in Minna

Minna was linked with rail lines in 1905 and this gave the town a comparative advantage over other towns within the region such as Kotangora, Bida and Zungeru, as a major nodal point for many farm produce. The relocation of colonial officials from Bida to Minna in 1924 gave Minna a face lift and it became the Regional Administrative Headquarters. The colonial administration in 1928 constructed the Zungeru – Paiko road. These developmental processes became the platform for the emergence of a new urban centre, to be linked by a newly constructed road. Construction of Bosso Dam in 1949 and the connection of Minna with electricity in 1956 propelled rapid increase in population prior to Nigeria independence.

At the post independence era, Minna became more attractive to people and government. The political and social development activities that preceded and followed the independence directly influenced both the economic and spatial activities of Minna. The town further received a change in political status, when it became the capital of Niger State in 1976, coupled with location of the both federal and state institutions in the town.

Changes in the built-up area of Minna between 1972 and 2015

This section is important as it reveal the periodical changes in the built-up area between 1972 and 2015. The data employed are topographical map of Minna in 1972, township map of Minna in 1979, the processed satellite

imageries of Minna in 1986, 1996, 2006 and 2015 and neighbourhoods' demarcation map.

Figure 10 shows the changes that occurred in the built-up area of Minna. Expectedly, there has been a tremendous increase in the land development between 1972 and 2015. From a mere 368.3 hectares in 1972, Minna has increased to 11,913.2 hectares by 2015. A sharp increase in the areal extent of the town occurred between 1979 and 1986; from 893.7 hectares to 4,368.7 hectares, respectively. Table 2 reveals the details of the magnitude of changes within the periods covered by the study. For instance, between 1972 and 1979, the spatial area of Minna increased by 143%, but remarkably between 1979 and 1986 when the increase was 388.8%. This rapid change can be attributed to the rapid population increase, as a result of the new status of the town. The town drastically grew between 2006 and 2015. Indeed there was an increase of 102% in less than a decade.

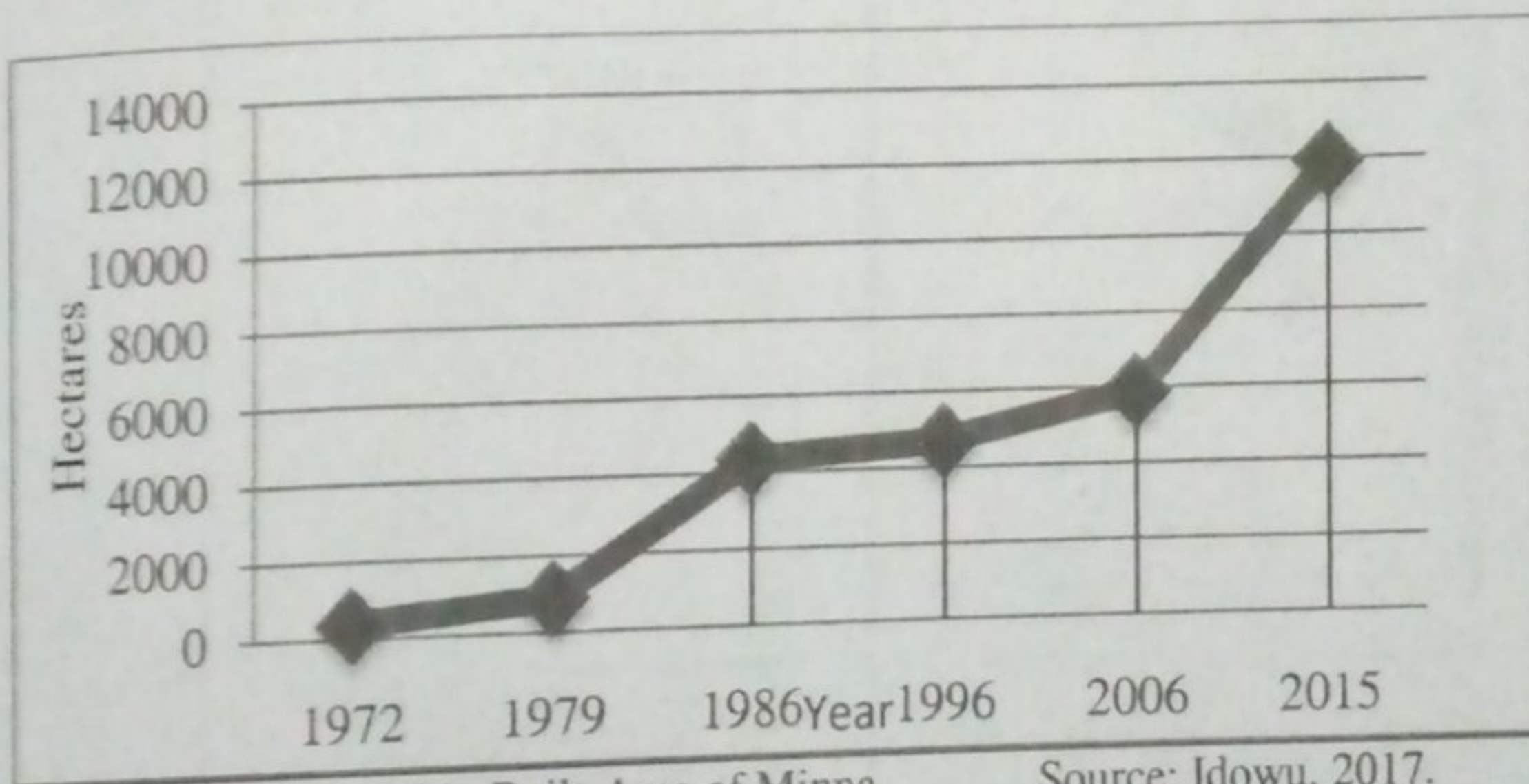


Figure 10: Trend in Built-Area of Minna Source: Idowu, 2017.

Table 2: The Built-up Area of Minna: 1972 - 2015

Year	Land Area (Ha)	Area Changes (Ha)	% Increase	Remark
1972	368.31	-	-	-
1979	893.74	+525.43	142.66	Increase
1986	4,368.70	+3,474.96	388.81	Increase
1996	4,706.50	+337.8	7.73	Increase
2006	5,904.50	+1,198.00	25.45	Increase
2015	11,913.20	+6,008.70	101.76	Increase
1972 - 2015	-	+11,444.89	2,443.87	Increase

Note: The sign + indicate the gain in the areal extent. Source: Idowu, 2017

Generally, Idowu (2017) reported that Minna was thirty-two times its size in 1972; thirteen times its size in 1979; thrice its size in 1986 and its present situation of Minna in 2015 because of the decentralization of functions outside the core areas of the city. Figure 11-16 exhibit a periodical sprawled pattern of development in Minna. As observed, the areas are characterized by expanse of land that are unused, the pattern of development, mixed uses, high or low density as the warrant, low concentration and low proximity, scattered and uncoordinated leapfrog development. All these are evidences, establishing the fact that urban sprawl is inevitable and is a reality in Minna.

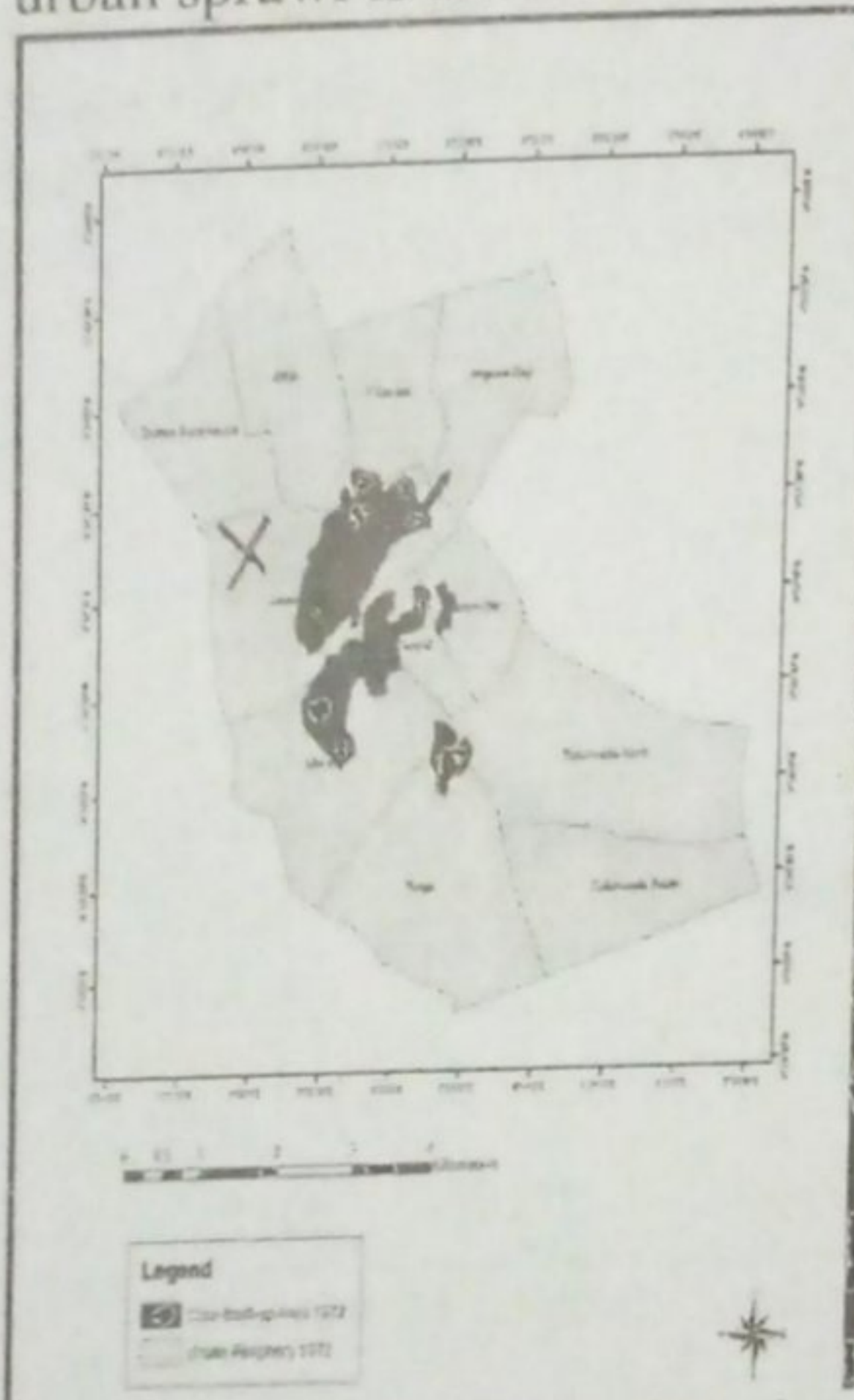


Figure 11: Peri-urban Development of Minna in 1972

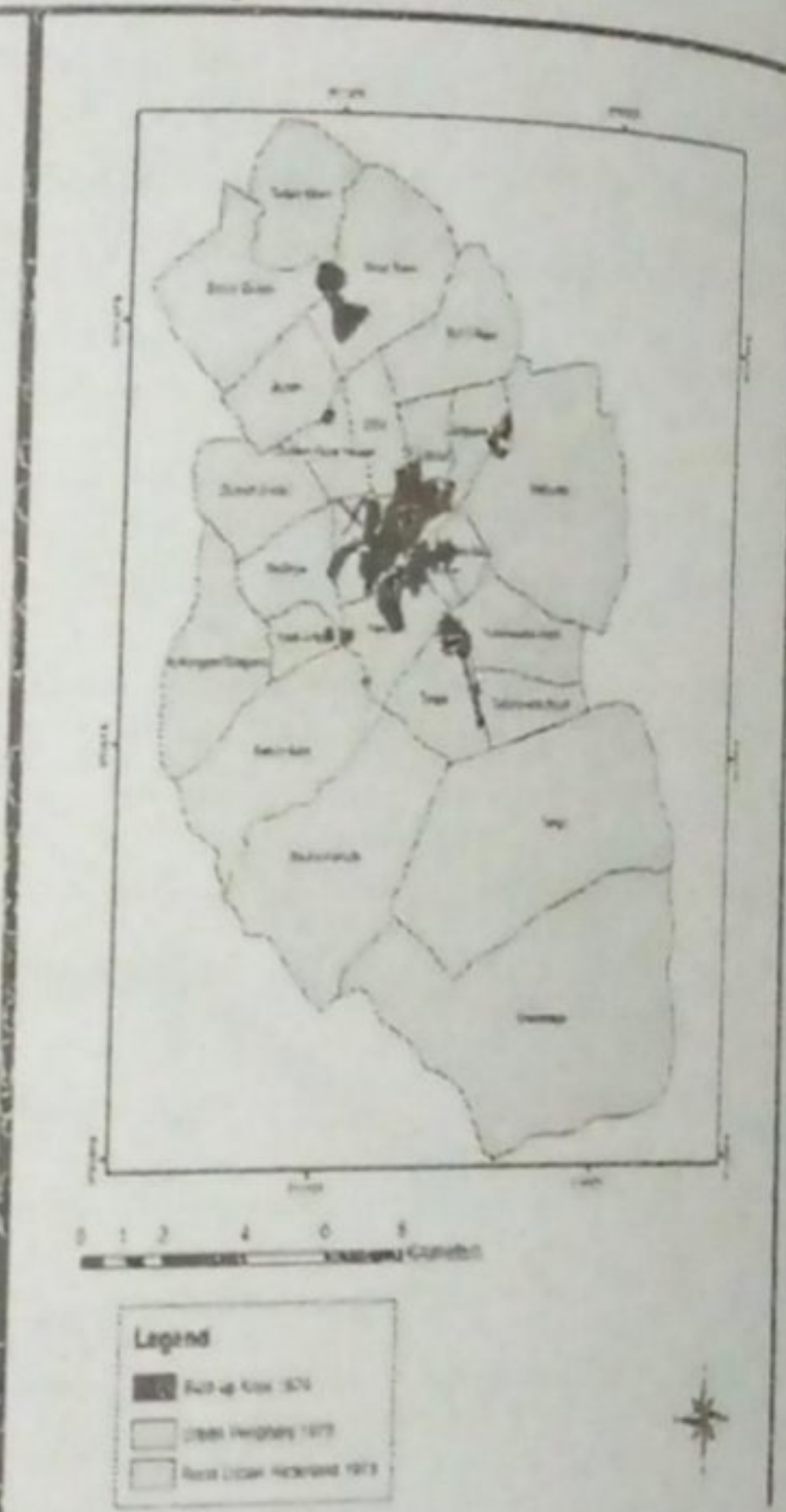


Figure 12: Peri-urban Development of Minna in 1979

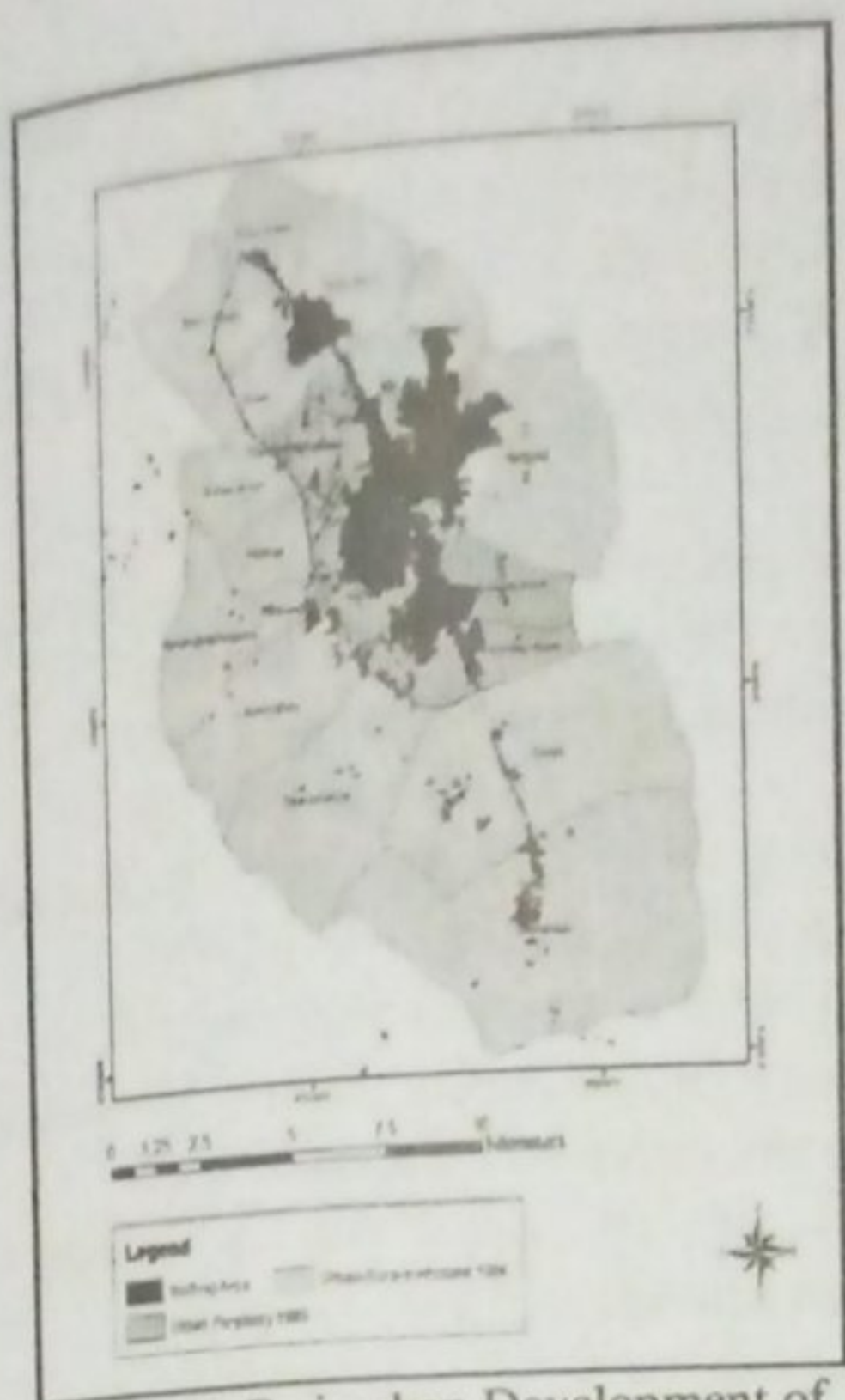


Figure 13: Peri-urban Development of Minna in 1986



Figure 14: Peri-urban Development of Minna in 1996

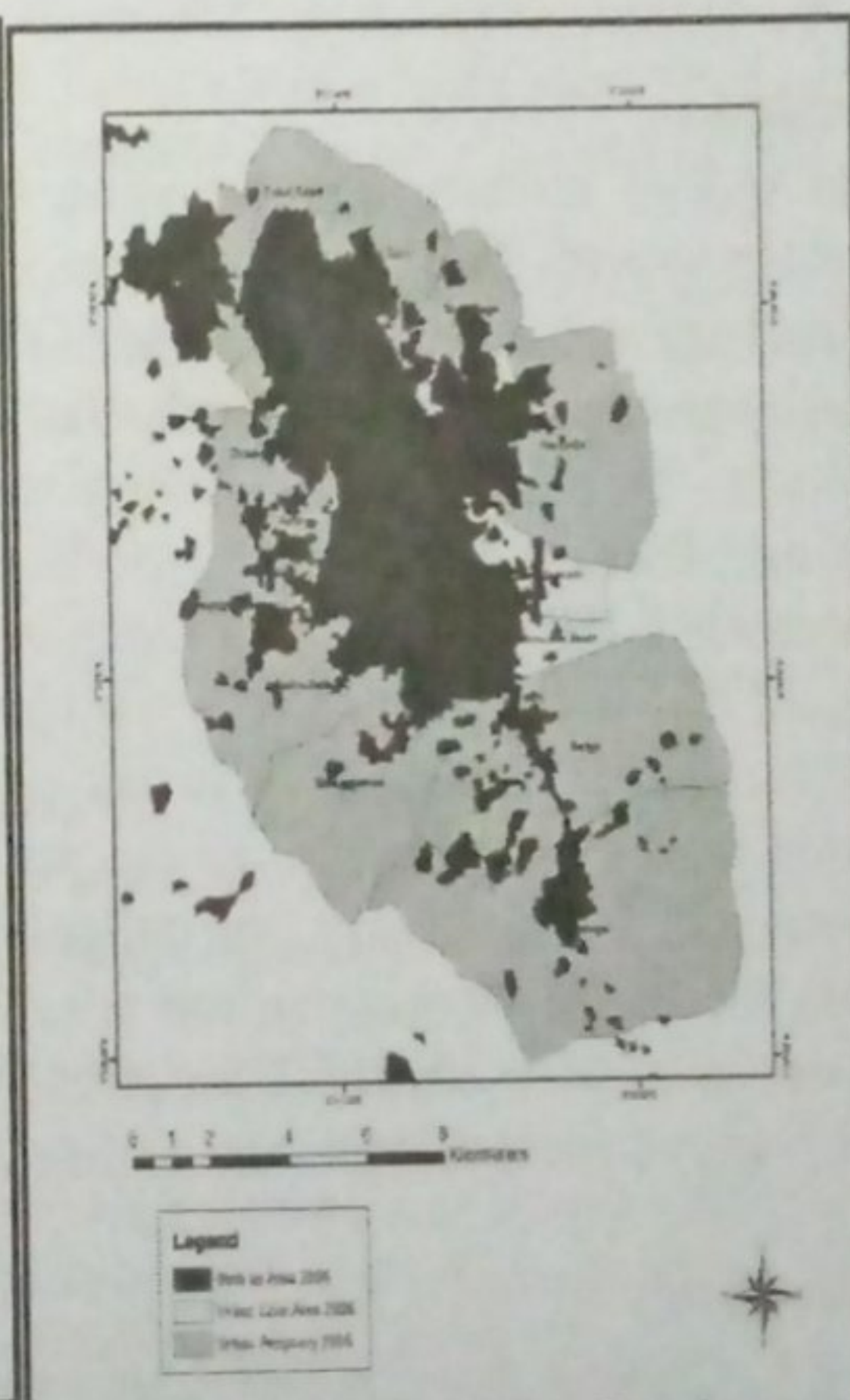


Figure 15: Peri-urban Development of Minna in 2006

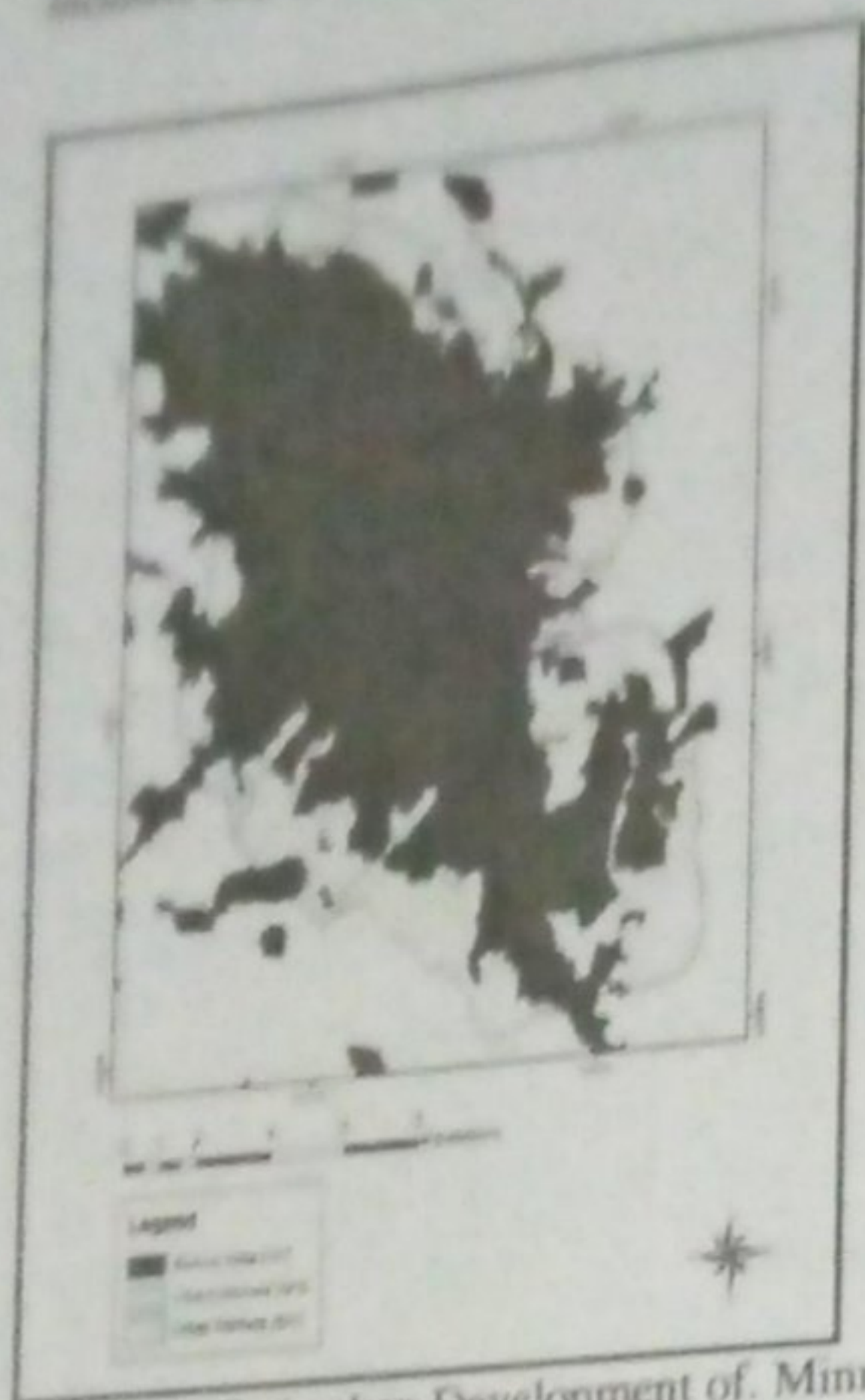


Figure 16: Peri-urban Development of Minna in 2015.

Conclusion

Urban sprawl remains a contending spatial problem in most of the cities across the world. This chapter focused on the conflated issues and realities of urban sprawl across the world. Obviously, there are several efforts to unravel the term, urban sprawl, but to no avail, as there is no definite definition, in spite of its loading values and the wide referencing in planning literature. Other aspects, such as characteristics, causes, measurement, impact and consequences have received a much attention of scholars, but which still remain contentious. Nevertheless, the argument of scholars about urban sprawl in no doubt has created avenues for further researches to be conducted on the subject and establish the reality of the phenomenal. Supportively, the magnitude in the changes in built-up areas reveals the sharp increase in the areal extent of Minna from a mere 368.3 hectares in 1972 to 11,913.2 hectares in 2015. The pattern of growth of the peri-urban areas establishes the reality of urban sprawl in Minna.

References

- Adaku, E. (2014). Urban Sprawl: A view from Developing and Developed Countries. *African Journal of Geography and Regional Planning*, 1 (6): 193 – 207. Accessed from www.internationalscholarsjournals.org.
- Ade, M. A. & Afolabi, Y. D. (2013): Monitoring Urban Sprawl in the Federal Capital Territory of Nigeria Using Remote Sensing and GIS Techniques. *Ethiopian Journal of Environmental Studies and Management*, 6(1): 82 - 95.

- Aguda, A. S. & Adegboyega, S. A. (2013). Evaluation of Spatio-Temporal Dynamics of Urban Sprawl in Osogbo, Nigeria Using Satellite Imagery and GIS Techniques. *International Journal of Multidisciplinary and Current Research*, Sept/Oct 2013 issue. accessed online at <http://ijmcr.com>.
- Alabt, M. O. (2009). Urban Sprawl, Pattern and Measurement in Lokoja, Nigeria. *Theoretical and Empirical Researches in Urban Management*, 4 (13): 158–164.
- Aljoufie, M. Brussel, M. Zuidegeest, M. & Maarseveen, M. (2013). Urban Growth and Transport Infrastructure Interaction in Jeddah between 1980 – 2007. *International Journal of Applied Earth Observation and Geoinformation*, 21: 493 – 505.
- Almeida, B. (2005). A GIS Assessment of Urban Sprawl in Richmond, Virginia. Being a M.Sc. Thesis in Geography Submitted to the faculty of Virginia Polytechnic Institute and State University.
- Alonso, W. (1964). *Location and Land Use: Toward a General Theory of Land Rent*, Harvard University Press, Cambridge.
- Ambarwati, L., Verhaeghe, R., PEL, A. J. & Arem, B. (2014). Controlling Urban Sprawl with Integrated Approach of Space-Transport Development strategies. The 9th International Conference on Traffic and Transportation Studies (ICTTS'2014), Accessed from Science Direct website, *Procedia – Social and Behavioural Sciences*, 138: 679 – 694.
- Arbury, J. (2005). From Urban Sprawl to Compact City: An Analysis of Urban Growth Management in Auckland. Being a Master of Science Thesis, University of Auckland, portal.jarbury.net/thesis.pdf. Assessed on 3/5/2015.
- Basawaraja, R., Chari, K. B., Mise, S. R. & Chetti, S. B. (2011). Analysis of Impact of Urban Sprawl in Altering the Land-use, Land-cover Pattern of Raichur City, India, Using Geospatial Technologies. *Journals of Geography and Regional Planning*. Available online at: <http://www.academicjournal.org/JGRP>.
- Bengston, D. N., & Youn, Y. C., (2006). Urban Containment Policies and the Protection of Natural Area: The Case of Seoul's Greenbelt. *Journal of Ecology and Society*, Vol. 11: Accessed from <http://www.ecologyandsociety.org/vol11/iss1art3/>.
- Bernhardt, J. (2007). *Urban Sprawl: Origin and Environmental Consequences*. Being a Master Thesis, Spatial Planning Department. European Spatial Planning. <https://www.diva-portal.org/smash/get/diva2:833363/FULLTEXT01.pdf>. Download on 8/9/2015.
- Bhatta, B. (2010). *Analysis of Urban Growth and Sprawl from Remote Sensing Data: Advances in Geographic Information Science*. Springer-Verlag Berlin Heidelberg. <http://www.springer.com/978-3-642-05298-9>.
- Burchell, R. W. & Mukherji, S. (2003). Conventional Development versus Managed Growth: The Cost of Sprawl. *American Journals of Public Health*, 93(9): 1534 – 1540.

- Burgess, E., (1925) *The Growth of the City: An Introduction to a Research Project*
In Park, R. E., Burgers, E. W. and McKenzie R. D (eds.) *The City*.
University of Chicago Press, Chicago.
- Cervero, R. (2000). *Shapeless, Spread Out, Skipped Over and Scattershot: Sprawl*
Sweep in Globe, *The World Paper*, March/April, 2000: 5 - 6.
- Cillier, D. P. (2010). *The Development and Use of Land Use Suitability Model in*
Spatial Planning in South Africa. Being an M.sc Thesis Submitted to
Potchefstroom Campus of the North West University, South Africa.
- Cobbinah, P. B. & Amoako, C. (2014). *Urban Sprawl and the Loss of Peri-Urban*
Land in Kumasi, Ghana. *International Journal of Social, Behavioural,*
Educational, Economic and Management Engineering. 8(1): 313 - 322.
- Downs, A. (1999). *Some Realities about Sprawl and Urban Decline*, *Journal of*
Housing Policy Debate, 10: 955 - 974.
- European Environmental Agency (EEA), (2000). *Down to Earth: Soil Degradation*
and Sustainable Development in Europe, a Challenge for 21st Century.
Environmental Issue Series. 16. Copenhagen.
- European Environmental Agency (EEA), (2006). *Urban sprawl in Europe: The*
Ignored Challenge EEA Report No 10/2006 European Commission/Joint
Research Centre. EEA, Copenhagen.
- Ewing, R. H. (1997). *Is Los Angeles - Style Sprawl Desirable?* *Journal of American*
Planning Association, 63(1): 107 - 126.
- Ewing, R. H., Pendall, R. & Chen, D. (2002). *Measuring Sprawl and its Impact*.
S.G.American, Assessed
<http://www.smartgrowthamerica.org/sprawlindex/MeasuringsprawlPDF>
- Feng, L. (2009). *Applying Remote Sensing and GIS on Monitoring and Measuring*
Urban Sprawl: A Case Study of China. Institute for Regional Development
Planning, University of Stuttgart.
- Frank, N., White, S., Peng, Z., Harris, K. & Sanders, W. (2000). *Exploring Sprawl:*
Findings of a Comprehensive Review of the Literature Related to Sprawl or
What do we really know?. Being a paper presented at the Association of
Collegiate Schools of Planning, Atlanta, Georgia, 2nd - 5th
November, 2000.
- Frenz, G., Maier, G. & Schrock, P. (2006). *Urban Sprawl: How useful is this*
Concept? In ERSA conference papers from European Regional Science
Association. Accessed from [www-sre.wu-](http://www-sre.wu-wien.ac.at/ersa/ersaconfs/ersa06/papers/105.pdf)
[wien.ac.at/ersa/ersaconfs/ersa06/papers/105.pdf](http://www-sre.wu-wien.ac.at/ersa/ersaconfs/ersa06/papers/105.pdf).
- Frenkel, A. & Ashkenazi M. (2008). *The integrated Sprawl Index: Measuring the*
Urban Landscape in Israel. *Annals of Regional Science*, 42: 99 -121.
- Galster, G., Hanson, R., Wolman, H., Coleman, S., & Freihage, J. (2001). *Wrestling*
Sprawl to the Ground: Defining and Measurement an Exclusive Concept.
Housing Policy Debate, 12: 681 - 717.
- Gillham, O. (2002). *The Limitless City: A Primer on the Urban Sprawl Debate*.
Washington D.C. Island Press.
- Hamidi, S. & Ewing, R. (2014). *A Longitudinal Study of Changes in Urban Sprawl*
between 2000 and 2010 in United State. *Journal of Landscape and Urban*
Planning, Assessed from Science Direct Site,
www.elsevier.com/locate/landurbplan.

- Harris, C., & Ullman, E., (1945). The Nature of Cities. *Annals of the American Academy of Political and Social Science*, 242: 7 – 17.
- Hirsch, W. Z. (1973). *Urban Economic Analysis*. McGraw-Hill Book Company, New York.
- Hoyt, H. (1939). The Structure and Growth of Residential Neighbourhoods in American Cities. Washington, D.C. Federal Housing Administration.
- Idowu, O. O. & Olaniyan, O. A. (2009). An Assessment of the Changing Phases of Minna City-Centre. *International Journal of Architecture and Environment (ARCHISEARCH)*, 1 (2): 34 – 41.
- Idowu, O. O. (2016). Urban Sprawl Development in Minna, Niger State. Staff/ Students' Seminar, Department of Geography and Environmental Management, University of Ilorin, Ilorin Kwara State.
- Idowu, O. O. (2017). Spatio-Temporal Analysis of Peri-urban Development in Minna, Niger State. A Ph.D. Thesis submitted to Department of Geography and Environmental Management, University of Ilorin, Ilorin Kwara State.
- Jat, M. K., Garg, P. K. & Khare, D. (2008). Modelling of Urban Growth using Spatial Analysis Techniques: A Case Study of Ajmer City, India. *International journal of Remote Sensing*, 29 (2): 543 – 567.
- Johnson, M. P., (2001). Environment Impacts of Urban Sprawl: A Survey of the Literature and Proposed Research Agenda, *Journal of Environment and Planning A*, 33: 717 – 735.
- Kearsley, G. W. (1983). Teaching Urban Geography: The Burgess Model. *New Zealand Journal of Geography*. 75: 10 -13.
- Knaap, G., Song, Y., Ewing, R. & Clifton, K. (2005). Seeing the Elephant: Multi-disciplinary Measure of Urban Sprawl. *Journal of Planning Literature*, 1 – 46.
- Kumar, M. & Tripathi, D. K. (2014). Spatial Monitoring of Urban Growth of Nagpur City (India) Using Geospatial Techniques. *Journal of Settlements and Spatial Planning*, 5(2): 91 - 98.
- Laraba, R. S. & Shola, L. I. (2013). Monitoring Urban Sprawl in Greater Karu Urban Area (Gkua), Nasarawa State, Nigeria. *Journal of Environment and Earth Science*. 3(13): 1 -9.
- Liu X & Jiang, B. (2011). A Novel Approach to the Identification of Urban Sprawl Patches to Based on the Scaling of Geographic Space. *International Journal of Geomatics and Geosciences*, 2 (2): 415 – 429.
- Masek, J. G., Lindsay, F. E., & Goward, S. N. (2000). Dynamics of Urban Growth in the Washington DC Metropolitan Area Between 1973-1996, from Landsat observations. *International Journal of Remote Sensing* 21 (18): 3473-3486.

- Mills, E. S. (1999). The Brawl over So-called Sprawl. In *Illinois Real Estate Letter*, 1-7.
- Muth, R. F. (1969). *Cities and Housing: The Spatial Pattern of Urban Residential Land Use*. Third Series: Studies in Business and Society. University of Chicago Press, Chicago.
- Noor, N. M. & Rosini, N. A. (2013). Determination of Spatial Factors in Measuring Urban Sprawl in Kuantan Using Remote Sensing and GIS. ASEAN Conference on Environment-Behaviour, Hanoi Architectural University, Hanoi, Vietnam 19 - 22 March 2013.
- Studies Social and Behavioural Sciences Accessed from Science Direct website www.sciencedirect.com.
- O'Sullivan, A. (2009). *Urban Economics*. McGraw-Hill Education (Asia) 7th Edition.
- Okewole, E. A. (2002). Controlling Urban Sprawl in Developing Countries through Effective Urban Governance. A Seminar Paper at the Department of Urban and Regional Planning, Obafemi Awolowo University, Ile-Ife.
- Oladele, B. M. & Oladimeji, B. H. (2011). Dynamics of Urban Land Use Change with Remote Sensing: Case of Ibadan, Nigeria. *Journal of Geography and Regional Planning*, 4(11): 632 - 643. Assessed from www.academicjournal.org/JGRP.
- Olorunfemi, J. F. (1979). *Inter-censal Population Estimation and Urban Land use Changes in Nigeria*. Being a PhD. Thesis Submitted to the Department of Geography, University of Bristol, United Kingdom.
- Olujimi, J. (2009). Evolving Strategy for Mapping Urban Sprawl in Nigeria. *Kamla-Raj Human Ecology*, 25 (3): 201 - 208.
- Olurin, T. A (2003). Gender Participation and the Environmental Planning and Management (EPM) Process: A Case Study of Water Supply in Bodija Market, Ibadan. *Journal of the Nigerian Institute of Town Planners*, 17: 1- 18.
- Onokerhoraye, A. G., & Omuta, G. E. D. (1986). *Urban Planning and System*. Geography and Planning Series of Study Notes. University of Benin.
- Oueslati, W., Alvanides, S. & Garrod, G. (2015). Determinants of Urban Sprawl in European Cities. *Urban Studies*, 52(9): 1594 - 1614.
- Pacione, M. (2005). *Urban Geography: A Global Perspective*. 2nd Edition. Routledge, New York.
- Pendall, R. (1999). Do Land Use Controls Cause Sprawl? *Journal of Environment and Planning B*, 26(4): 555 - 571.
- Polidoro, M., Lolo, A. & Barros, M. V. F. (2011). Environmental Impacts of Urban Sprawl in Londirina, Parana, Brazil. *Journal of urban and*

- Environmental Engineering (JUEE), 5 (2): 73 - 83. Download from www.journal-uee.org.
- Richmond, H. R. (1995). *Regionalism: Chicago as an American Region*. John D and Catherine T. MacArthur Foundation Chicago.
- Savannan, P. & Ilangoran, P. (2010): Identification of Urban Sprawl Pattern for Madurai Region using GIS. *International Journal of Geomatic and Geosciences*, 1(2): 141 - 149.
- Sebego, R. J. & Gwebu, T. D. (2013). Pattern, Determinants, Impact and Policy Implication of Spatial Expansion of an African Capital City: The greater Gaborone Example. *International Journal of Sustainable Built Environment*. 2: 193 - 208.
- Sierra Club, (1998). *Sprawl: The Dark Side of American Dream: The Cost and the Consequences of Suburban Sprawl*. The Sierra Club Francisco Assessed from: www.sierraclub.org/sprawl/report98/.
- Sierra Club, (2000). *The Cost of Sprawl*. <http://www.sierraclub.org/sprawl/community/cost.asp>.
- Song, Y. And Zenou, Y. (2006). Property Tax and Urban Sprawl: Theory and Implications for US Cities. *Journal of Urban Economics*. 60: 519 - 534. Accessed from: www.sciencedirect.com.
- Sudhira, H. S., Ramachandra, T. V., Karthik S. R. & Jagadish, K. S. (2003). Urban Growth Analysis Using Spatial and Temporal Data. *Journal of the India Society of Remote Sensing*, 31(4): 209 - 309.
- Sudhira, H. S., Ramachandra, T. V. & Jagadish, K. S. (2004). Urban Sprawl Metrics, Dynamics and Modeling Using GIS. *International Journal of Applied Earth Observation and Geoinformatics*, 5: 29-39. Accessed from www.Elsevier.com/locate/jag.
- Terzi, F. & Kaya H. S. (2011). Dynamic Spatial Analysis of Urban Sprawl through Fractal Geometry: The Case of Istanbul. *Journal of Environment and Planning B: Planning and Design*, 38: 175 - 190.
- Torrens, P. M. (2008). A Toolkit for Measuring Sprawl. *Journal on Application of Spatial Analysis*, 1: 5 - 36.
- Torres, H. (2011). *Environmental Implications of Peri-urban Sprawl and the Urbanization of Secondary Cities in Latin America*. A Technical Note by the Inter-American Development Bank.
- Vance, J. E. (1964). *Geography and Urban Evolution in the San Francisco Bay Area*. Berkeley: Institute of Government, University of California.
- Vollmer, L. (2006). Sprawl Prevention in Germany: Building Land Analysis with GIS. *Geoeasenanza*. 11(1).
- Wassmer, R. W. (2002). *An Economist's Perspective on Urban Sprawl, Part I: Defining Excessive Suburbanization in California and Other Western States*," Sacramento, CA: California Senate Office of Research. Available