

Analysis of Land Use Changes in the Central Area of Jos Town, Nigeria

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Abstract:

This paper analyzes the spatio-temporal changes in land uses as a result of regeneration activities occurring in the central area of Jos, Plateau State, Nigeria. This involves analyzing land use changes and activity patterns within the central area as well as examining the impacts of such changes as a basis for sustainable planning and management of the processes of change in a rapidly growing third world city. Though, the processes of physical change are desirable, it leads to a number of problems such as congestion and inadequate parking space; inadequate utilities, poor waste management and environmental degradation. The local planning institutions (Ministry of Lands, Surveys & Town Planning & Jos Metropolitan Development Board) makes decisions for the town and the local community without the latter being consulted and hence bringing about uncoordinated changes within the central area of the state capital.

Key Words: Jos, Central Area, Land Use, Changes, Urban Regeneration

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I. Introduction

The high rate of urbanization in both developed and developing countries has created a range of physical, demographic and economic challenges in many cities over the years¹. The level of urbanization globally is projected rise to 56.7 percent within the next two decades, with almost the entire urban growth taking place in developing countries². Numerically, this represents an increase of 1.5 billion people between 2000 and 2025. Today, the fastest urbanizing region in the world is Africa, with an urban population that is expanding at double the rate of the world as a whole². Over the last decade it had become hard to ignore the almost continual process of development and building that had characterized the inner areas of many cities and towns. Cities are never finished products; land uses change, plots are redeveloped, the urban area itself expands and, occasionally, shrinks. Pressure to change land uses could come about for a number of reasons, whether it be changes in the economy, environment, social need, or a combination of these³. Physical challenges include poor urban infrastructures, outdated buildings and transportation technology etc. Demographic challenges include on the other hand migration, ageing and diversification of lifestyles. While economic challenges include globalization, deregulation of markets and rise in unemployment. These challenges create a lot of pressure for change/improvement in urban areas.

Jos, the capital of Plateau State is situated approximately on latitude 9.6 degrees North and Latitude 8.5 degrees East. The city lies close to the geographical center of Nigeria. Jos metropolitan area is made up of two main local government areas, Jos North and Jos South. However, with recent expansion of the city it has extending in to Bassa Local Government Area to the north, and Jos East Local Government Area to the East. During British colonial rule it was an important centre for tin mining. With an altitude of 4,062 feet (1,217 m) above sea level, it enjoys a more temperate climate than much of the country (average monthly temperatures range from 70° to 77°F or 21° to 25°C).

Jos was established in 1915, as a tin transportation camp but started earlier as a mining camp at Naraguta⁴. Its early history is closely linked to the prosperity of the mining industry, which led to the continuous growth of the city. The town had continued to grow in spite of decline in mining activities in the 1960s and 1970s due to its administrative role as provincial headquarter of Bauchi-Plateau Province and the capital of the defunct Benue-Plateau and now Plateau state. It receives numerous migrants from within the state and other parts of the country who flock into the town for the purposes of employment, education and commerce resulting to the spatial expansion of the built-up area of the town. The pressure of growth is evident in the central area of Jos, through efforts by both public and private sectors to find a niche and to thrive in the ever-bustling town. The central area fundamentally performs the function of providing various services/facilities to the inhabitants of the urban area of Jos such as political (administrative offices), social (such as event centres, cinemas, libraries, theatre) and economic (such as banks, shops, markets). However, recent growth is not based on any

sustainable planning strategies, and the central area has not been able to cope with the pressures of growth and changes in land uses and activities. It is lamentable that in spite of modernization and advancement in technology, the central area of Jos is in such a state of chaos due to congestion and poor coordination of activities.

Land is needed to meet a multiplicity and variety of human needs and to serve numerous, diverse purposes. Land use concerns the function or purpose for which the land is used by the local population and can be defined as the human activities which are directly related to land, making use of its resources or having an impact on them⁵. Chapin and Kaiser stated that land use at territorial scales involving large land areas⁶. There is a strong predisposition to think of land in terms of yields of raw materials required to sustain people and their activities. At these scales, 'land' is a resource and 'land use' means 'resource use'. The above definitions of land use refer mostly to larger, territorial scales while at the urban scale, interest is focus on use potential of the land surface. At the urban scale, emphasis is more on the use potential of the land's surface for the location of various human activities⁶.

When the users of land decide to employ its resources towards different purposes, land use change occurs producing both desirable and undesirable impacts. The analysis of land use change is essentially the analysis of the relationship between people and land. Change in the uses of land occurring at various spatial levels and within various time periods as a result of interactions between environmental and human dynamics. The magnitude of land use change varies with the time period being examined as well as with the geographical area. Moreover, assessments of these changes depend on the source, the definitions of land use types, the spatial groupings, and the data sets used. Level, of detection and measurement of change depends on the spatial scale; the higher the spatial level of detail, the larger the changes in a real extent of land use and land cover which can be detected and recorded⁷.

Land use change is driven by a variety of bio-physical and socio-economic forces which relate differently to one another in different spatial and temporal settings. The bio-physical drivers include characteristics and processes of the natural environment such as: weather and climate variations, landform, topography, and geomorphic processes, volcanic eruptions, plant succession, soil types and processes, drainage patterns, availability of natural resources. The socio-economic drivers as is the case with the central area of Jos comprise demographic; social, economic, political and institutional factors and processes such as population and population change, technology and technological change, the family, the market, various public sector bodies and the related policies and rules, values, community organization and norms, property regime.

The impacts of land use change are broadly categorized into two; environmental and socio-economic. The impacts of land use Change are usually distinguished according to the spatial level on which they manifest themselves into global, regional and local impacts (urban area). Land use change causes a multitude of environmental impacts at the lower spatial levels like in the central area which include poor environmental quality and pollution.

The socio-economic impacts of land use change are equally significant and give rise to serious concerns especially in the central area of Jos. The issue of conversion of residential land uses to commercial uses has been on the increase in the central area of Jos.

Impacts of land use change are usually assumed to be negative. This is not always true for two reasons. Firstly, whether an impact is positive or negative depends on the spatial and temporal scale concerned. Secondly, human mitigating forces, such as environmental and social regulation and policies, land restoration projects and similar actions may impede the negative influences of human driving forces and, thus, mitigate if not eliminate, the unwanted consequences of land use change.

II. Material and Methods

It has often been observed and quite accurately that no single research methodology is intrinsically better than any other⁸. Many authors therefore call for a combination of research methods in order to improve the quality of research⁹. Equally, some institutions have tended to adopt a certain "house style" methodology¹⁰. This seems to be almost in defiance of the fact that, given the richness and complexity of the real world, a methodology best suited to the problem under consideration, as well as the objectives of the researcher, should be chosen¹¹. In this research, what may be characterised as methodological monism have been avoided, that is, the insistence on using a single research method but a combination of positivist and interpretivist approaches were employed. This is due to the believe that all methods are valuable if used appropriately, and that research can include elements of both if managed carefully. Therefore, both the qualitative and quantitative approaches were adopted and given the nature of this research, descriptive surveys, reviews and case studies were used for this study.

The study area was delineated, bordering to the north by Mango Street, to the south by Challenge Bookshop and Constitution Hill road, to the east by Bauchi and Gangare Roads, to the west by Dodo Street, West of Mines and Kura Roads. It covers a total area of 183.37 hectares. A coding system was developed to

provide a standard system by which units of land could be categorized within the study area. Each land use was coded according to actual use, providing an alpha-numeric coding structure that has three levels of details. The high-resolution Quick Bird satellite images of 2005 and 2010 provided the basis for a 100% (797 properties) land use survey and analysis of physical changes in the study area. For this study, a 100% survey was conducted for the land use survey¹². Both qualitative and quantitative (statistical) techniques were employed in analyzing the data. Beyond visual observation, the statistical technique gave accurate measures in quantitative terms.

III. Result

Land Use Changes and Activity Patterns

Early Jos was planned and built to meet the colonial administrative and economic needs when tin mining was at its peak. The colonial town was planned based on the grid iron pattern during the colonial period with the rail terminal centrally and strategically located for easy movement of people, agricultural goods and mineral resources. The area around the rail terminal and the market had continued to be the centre of commercial activities from the colonial period to date. The study of the existing land use is intended to provide a broad strategic overview of Jos central area up to 2014. This helped in developing a strategy that could collectively provide a vision or visions which could help the future direction of the central area, which presently covers an area of 183.37 hectares. For this purpose, the central area was identified as not simply the retail core, but most of the city's first order commercial, public and recreational activities, together with some residential and industrial activities that are located in the central area. This section presents the data that were collected on these changes, the drivers of change and its management. Discussion of findings is also done to show the level and direction of the central area regeneration efforts in the past almost 15 years.

Changes in Land Uses, 2005-2014

A property survey was carried out to determine the type of use for each property for the period, 2005 to 2014. This was achieved by conducting a survey of all the properties within the delineated central area. With the help of satellite images and interviews with the residents/business owners, the history of properties that had undergone changes in form of regeneration were determined. The key findings of the survey are summarized in Tables 1 and 2 and the key land use elements in the central area are presented diagrammatically in Figures 2, 3 and 4.

From the field survey, the central area covers a total area of 183.37 hectares. The land use distribution of the central area of Jos shows that commercial land use occupies more space than other land uses during the period under study, with a total of 65.47 hectares in 2005, 68.94 hectares in 2010 and 70.01 hectares in 2014. This gives a total change in land use of 5.87 hectares representing 3.31% change. It is important to note the steady increase in commercial land uses during the period under study. A similar trend, though with a lesser degree of increase could also be noted for mixed uses, with a total of 12.78 hectares in 2005, 13.43 hectares in 2010 and 13.44 hectares in 2014. This gives a total change in 51 properties representing 6.84% change. On the other hand, the reverse is the case for residential, open spaces and recreational land uses which declined during the period under review. Public and semi-public uses showed fluctuations with periods of increase and decrease in the total area devoted to these.

Table 1 shows a steady increase in the area coverage by commercial land use. This number is dominated by small retail and service stores which covered a total area of 13.32 hectares in 2005, 14.56 hectares in 2010 and 15.13 hectares in 2014. This gave a total change in land use of 1.87 hectares representing 3.31% change. However, of particular importance is the increase in the number and area covered by banks; bureau de changes, eateries and drinking establishments especially along Ahmadu Bello way and Rwang Pam Streets. Their location along these streets showed the preference of these commercial establishments for the most central locations in order to maximize profit, better accessibility to customers and to be strategically located to take advantage of the changes that were taking place. A total change in land use of 8.91 hectares representing 14.58% was calculated for commercial land uses, which showed that Jos was a leading commercial nerve centre of Plateau State.

Table 1 also reveals the changes in public and semi-public land uses with a total of 40.15 hectares in 2005, 40.16 hectares in 2010 and 39.90 hectares in 2014, which gives a total change in land use of -0.25 hectares representing -0.62% change. This shows a little decline in the area covered by this land use over the years under study, which could be attributed to increasing pressure of commercial land uses and the need to relocate from the central area due to increased congestion and high rental values. It is important to note the changes taking place with many churches moving into the central area, for example, the former New Era Cinema was converted to a church. The highest in terms of land area coverage is the Jos Specialist Hospital 13.39 hectares. This constitutes about one third of the total area coverage of public and semi-public land uses in the central area. This is followed by Museums/Art Galleries covering 8.12 hectares, dominated by the Jos Museum and the Professor Bentu Arts Theatre (under construction) respectively.

Table 1. Land Use Changes in the Central Area of Jos, 2005-2014

Land Use	2005		2010		2014		Change 2005-14 (Ha)	Percentage Change 2005-14
	Area (Ha)	%	Area (Ha)	%	Area (Ha)	%		
Commercial	61.10	34.42	66.76	36.85	70.01	38.18	8.91	14.58
Industrial	0.66	0.37	0.85	0.47	0.85	0.46	0.19	28.79
Mixed	12.78	7.20	13.43	7.41	13.44	7.33	0.66	5.16
Open Space & Recreational	7.04	3.97	5.42	2.99	5.31	2.90	(1.73)	(24.57)
Public & Semi Public	40.15	22.62	40.16	22.16	39.90	21.76	(0.25)	(0.62)
Residential	18.33	10.33	16.13	8.90	15.42	8.41	(2.91)	(15.88)
Circulation	37.44	21.09	38.44	21.22	38.44	20.96	1	2.67
Total	177.50	100.00	183.37	100.00	183.37	100.00	5.87	3.31

Source: Musa & Dung-Gwom 2018

Table 2. Number of Properties Covered by Various Land Uses 2005-2014

Land Use	2005		2010		2014		Change 2005-14 (No)	Percentage Change 2005-14
	No	%	No	%	No	%		
Commercial	306	41.02	351	44.83	383	48.05	80	26.14
Industrial	3	0.40	6	0.77	6	0.75	3	100
Mixed	116	15.55	140	17.88	133	16.69	17	14.66
Open Space & Recreational	12	1.61	9	1.15	7	0.88	(5)	(41.67)
Public & Semi Public	67	8.98	68	8.68	69	8.66	(2)	(2.94)
Residential	242	32.44	209	26.69	199	24.97	(43)	(17.77)
Total	746	100.00	783	100.00	797	100.00	51	6.84

Source: Musa & Dung-Gwom 2018

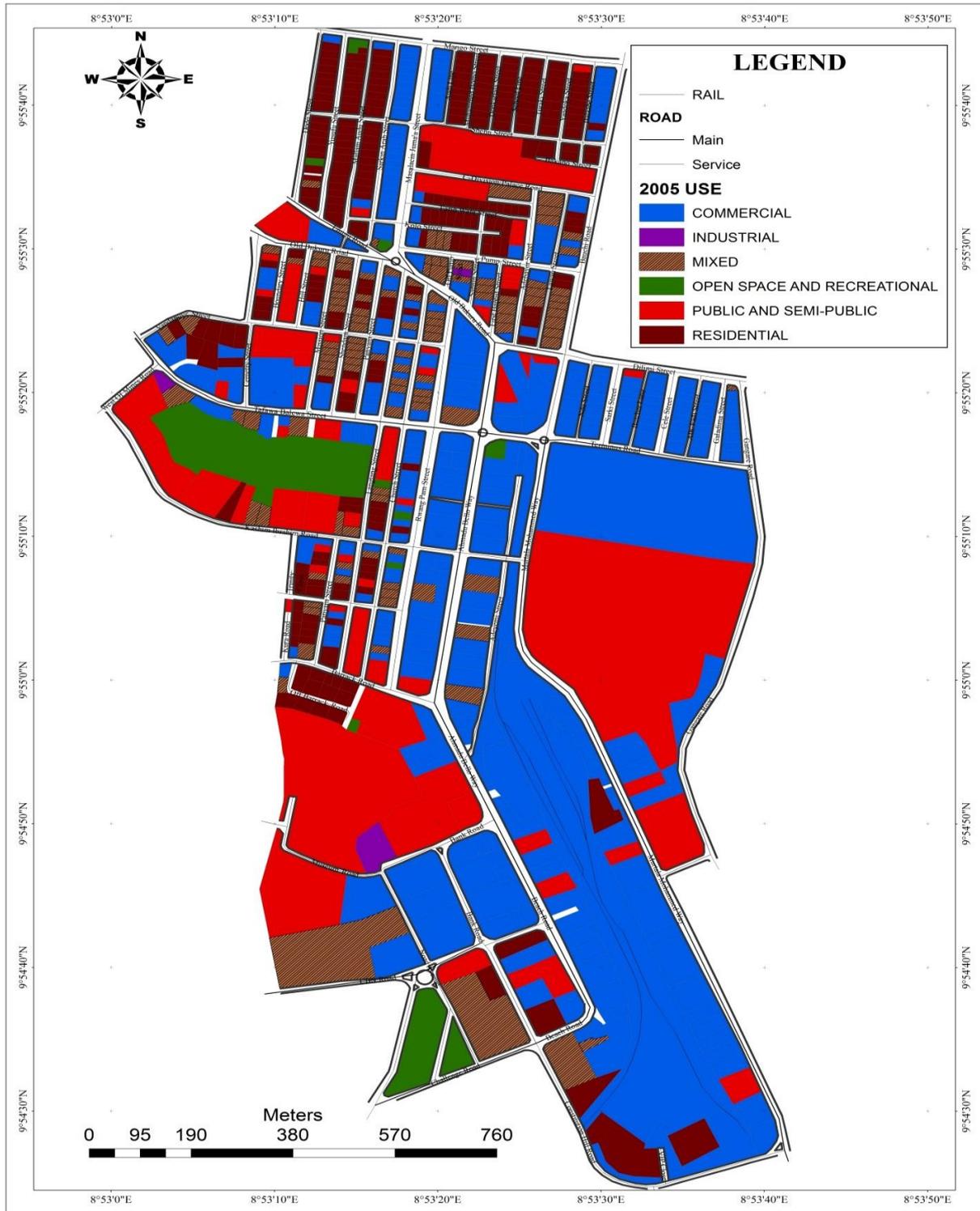


Figure 1: Land Uses in the Central Area of Jos, (2005) Using Jos Satellite Image 2005

Source: Musa & Dung-Gwom 2018

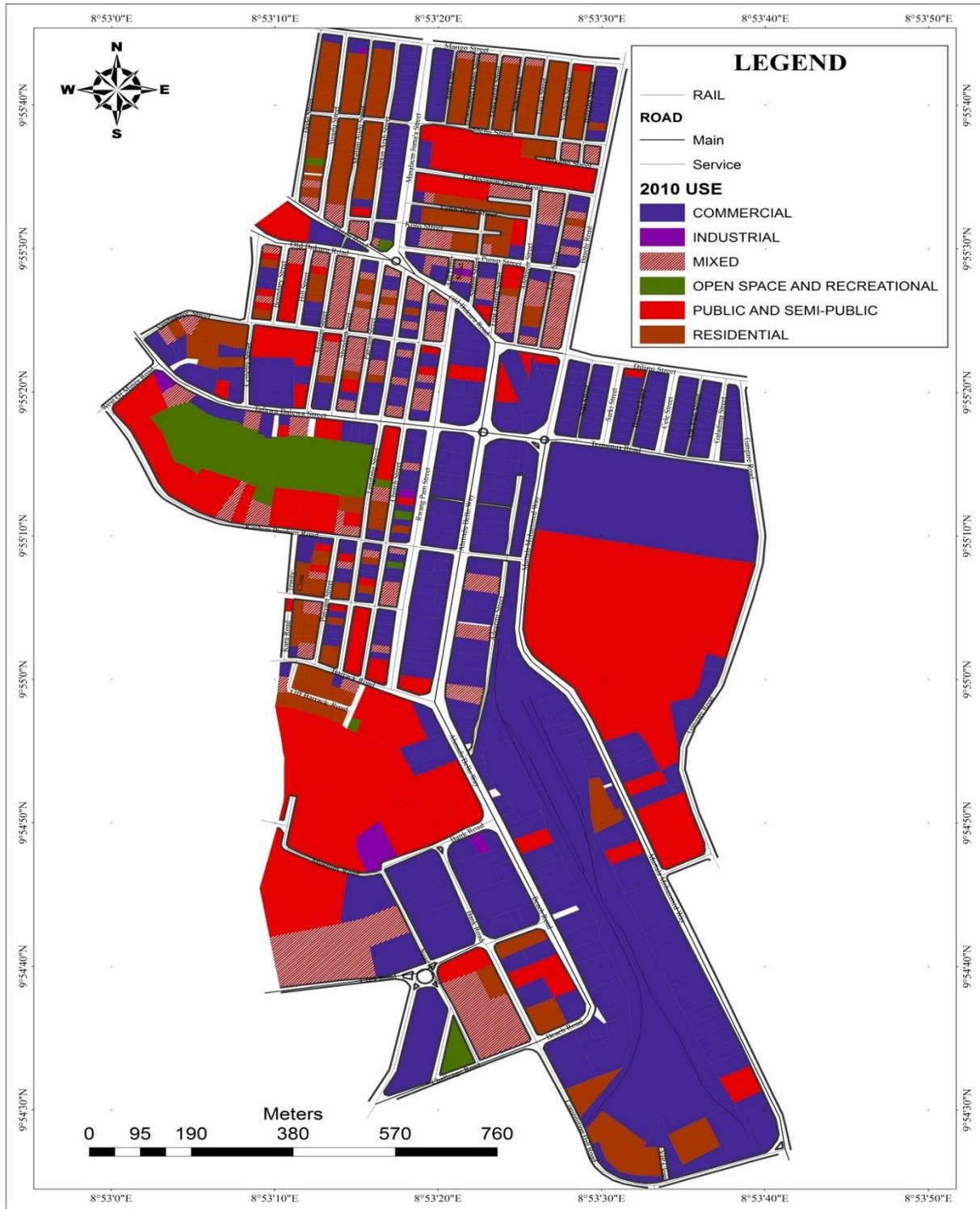


Figure 2: Land Uses in the Central Area of Jos (2010) Using Jos Satellite Image 2010.
 Source: Musa & Dung-Gwom 2018.

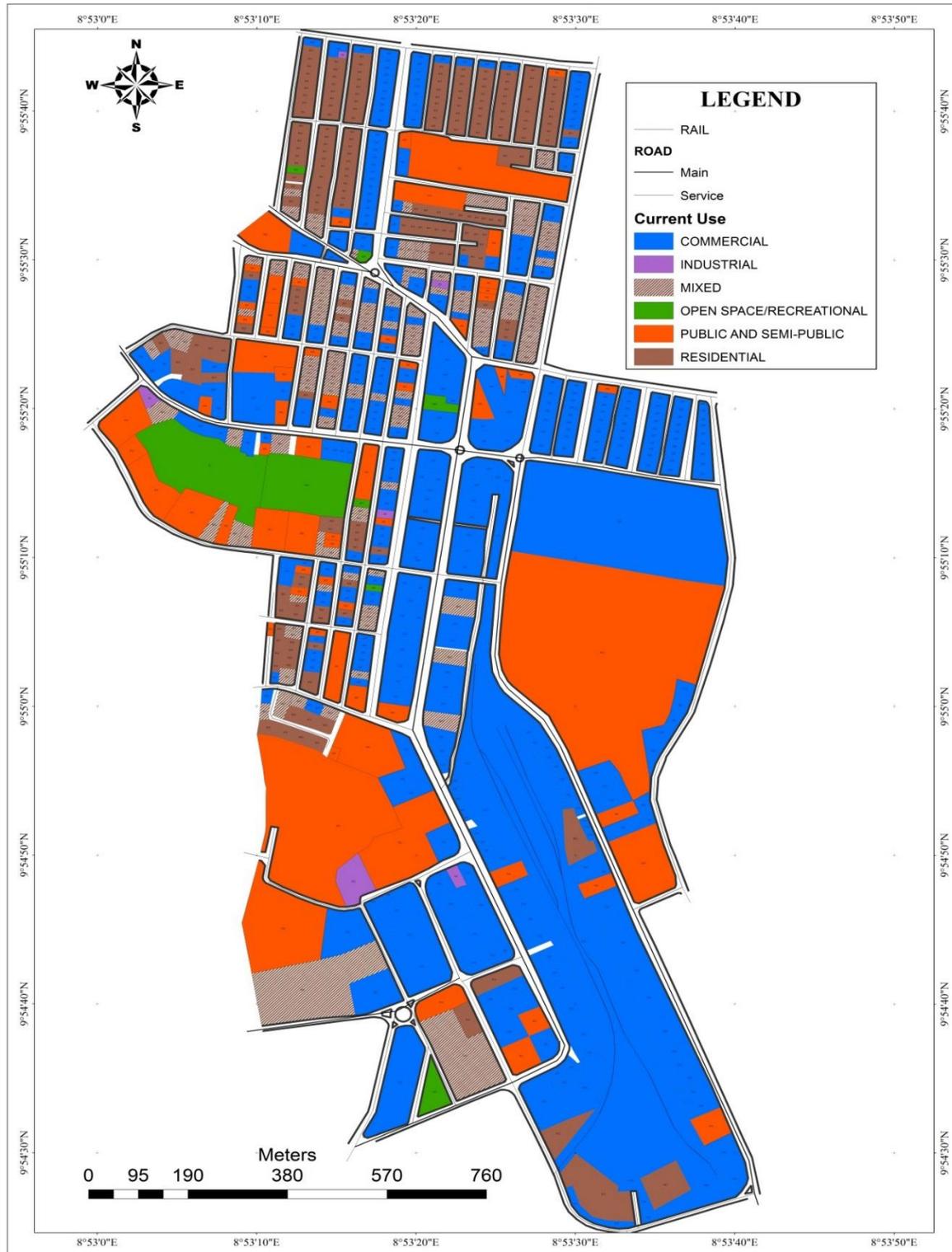


Figure 3: Land Uses in the Central Area of Jos, (2014) Using Jos Satellite Image 2014.
 Source: Musa & Dung-Gwom 2018.

Detailed analysis of residential land use, which covered an area of 18.33 hectares in 2005, 16.13 in 2010 and 15.42 in 2014, showed a steady decline giving a total change in land use of -2.91 hectares representing -15.88% changes. This revealed a progressive decline in residential land use which was an indication that residential buildings were giving way to other land uses. These changes could be attributed to the gradual but steady pushing out of residential land uses; mostly by commercial land uses in a process known as invasion and

succession leading to the consolidation of the commercial land uses in the central area¹². Most of these changes are not regulated by the public planning authority like the Jos Metropolitan Development Board. Even major structural changes to the buildings went unnoticed. This clearly shows that the effectiveness of the planning authority is fast declining. Compound type residential use constitutes the bulk of the changes, it covers more land area in 2005 (10.56 hectares), but declined to 8.77 hectares in 2010 and 8.40 hectares in 2014 respectively, which is a decline of up to 20.45%. It is important to note that residential land uses are located around the periphery of the central area. This is a strong indication of the changes taking place in the central area and its dynamic nature. Other land uses were gradually and categorically pushing residential land uses to the edge of the central area.

Mixed land uses mark the zone of transition. The process of change in most cases is gradual, leading to increase in the number of properties whose functions have inclined towards the provision of first order goods and services in the central area. Primarily residential with commercial land uses top the list in terms of land area with an area of 5.92 hectares in 2005, 7.29 hectares in 2010 and 6.46 hectares in 2014 respectively, which gives a total change in land use of 0.54 hectares representing 9.12% change. This is an indication of the gradual process of invasion and succession from residential land use to commercial, public and semi-public land uses. However, it is important to note that offices with commercial land uses experienced the highest growth. A total growth of 0.66 hectares was experienced for mixed land uses which constitutes 5.16%.

Table 1 also show the land area devoted to open space and recreational land uses in the central area. The table revealed that recreation is not a prime land use in the city centre of Jos. Most of the land uses in this category are open lands in commercial areas with a total of 4.89 hectares in 2005, 3.37 hectares in 2010 and 3.31 hectares in 2014. This shows a total decline in recreational land use of -1.58 hectares representing 32.31% change. However, it is important to note the decline of 24.57% in open spaces and recreational land uses experienced between 2005 and 2014.

The analysis of industrial land uses shows that no manufacturing and processing is taking place within the central area. The industrial land uses are GSM Towers, Telephone Exchange Station, and Electric Transmission Substation took up a total area of 0.66 hectares in 2005, 0.85 hectares in 2010 and 2014, which gave a total change in land use of 0.19 hectares representing a total change of 28.79% change. This shows an increase over the period of study, which is due to increase in GSM transmission sub-stations with 380% increase due to their need to occupy central locations for maximum profit.

Impacts of the Regeneration Activities and Land Use Changes

Various impacts have been identified as a result of the changes taking place in the central area of Jos. In Britain, Tsenkova identified a number of common challenges that appeared in most localities and these common elements remain the core issues for urban regeneration¹³. These include; economic restructuring, unemployment, social deprivation and exclusion, as well as problems related to obsolete infrastructure, contaminated land and environmental pollution. Some of the impacts these changes in central area of Jos were:

a) Inadequate parking spaces

One of the major challenges of the changes in the central area was that of parking space. In an effort to maximize profit, most developers do not make provision for adequate parking within their premises and as a result of this motorists resort to on-street parking, thereby significantly reducing the roads capacity and leading to traffic congestion.

Movement of traffic into and from the central area is very chaotic with vehicles always parked on the sides of the roads, leaving only one lane route for moving traffic (See Figure 4). This was mainly as a result of the nature of development of the commercial and office buildings with inadequate parking space within buildings thus contributing to the chaos within the central area. Added to this is the encroachment on the railway terminal through the construction of shops and stalls on rail tracks.

Figure 4 show the traffic congestion in the central area with on-street vehicle parking which have totally taken one lane of the dual carriage road, leaving the other lane for vehicular movement. Similarly, the pedestrian walk-ways have been taken over by road side traders. This scenario was observed along major roads within the central area.

Table 3 which presents responses from the field survey revealed that most of the respondents described parking space in the central area as inadequate (73.31%), only 21.43% of the respondents described the parking space as adequate, while 3.76% of the respondents described the parking space as very adequate, while 1.50% of the respondents were not sure of the condition of parking space. Inadequate parking space in the central area was due to the fact that, there was no officially designated parking space within the area. The motor park at the Jos Main Market had been closed down since the market got burnt in February 2002 and the motor park behind ECWA Good News Church along Ahmadu Bello Way had since been converted in to shops. Unauthorized car parks operated along Ahmadu Bello Way for passengers travelling to Bukuru and Barkin Ladi; with commercial

vehicles picking passengers anywhere along the streets. This, further affected the free flow of traffic in the central area.



Figure 4: Traffic, Parking Condition and Road side Trading along Ahmadu Bello

Way in Jos Central Area.

Source: Site Visit, June 2019.

Table 3. Parking Condition in the Central Area

Parking Space	Frequency	Percentage
Very adequate	10	3.76
Adequate	57	21.43
Not adequate	195	73.31
Not sure	4	1.50
TOTAL	266	100.00

Source: Musa & Dung-Gwom 2018

b) Traffic and circulation

In examining traffic impacts, it is helpful to understand that the rapid expansion of the city and improper transport planning had produced significant traffic congestion in the central area of Jos. This had resulted in financial costs to the urban residents due to lengthy travel times to work in the central area and higher transaction costs to business in moving goods and services.

The impact of the traffic congestion of the central area on residents and property owners is presented in Table 4 and Figure 4, which revealed that 49.62% of the respondents described traffic condition in the central area as congested, 24.44% as very congested. This shows the seriousness of the negative traffic condition in the central area. This was attributed to the growth of the city, increase in car ownership and concentration of commercial activities and services in the central area. The city did not have planned districts and neighbourhood shopping centres. There were a few markets within the metropolis, for example, the newly built Rukuba Road Market and the older Laranto Market, New Era Market, Nasarawa Market and the Bukuru Market. These Markets had become very congested and do not have parking facilities, except the Rukuba Road Market. Most shoppers still preferred to do their shopping in the central area due to the diversity of goods and services it offers, its quality, vitality and the attractiveness of the central area.

Table 4. Traffic Condition in the Central Area

Traffic Condition	Frequency	Percentage
Very congested	65	24.44
Congested	132	49.62
Not congested	61	22.93
Not sure	8	3.01
TOTAL	266	100.00

Source: Musa & Dung-Gwom 2018

c) Environmental quality

There was the inability of the city management authorities to cope effectively with waste disposal. Large volumes of solid waste were generated from business premises. The Plateau Environmental Protection Agency which was established to coordinate refuse disposal activities in Jos could not cope with the situation. This was worsened by illegal occupation of road reservation and pedestrian walkways by hawkers. (See Figure 5)



Figure 5: Shops and Stalls Constructed on Rail Track in Jos Central Area.

Source: Site Visit, June 2019.

Poor waste management is a very glaring problem in the central area of Jos. Rapid population growth in the city has placed immense pressure on solid waste management systems¹⁴. Solid waste is generated in almost all parts of the central area and solid waste management becomes complicated as the city grows bigger. Refuse is dumped in an unsatisfactory and haphazard manner without sanitary considerations (see figure 6). The four dino bins provided in the central area, located along Murtala Mohammed Road, Bank Road, and two on Rwang Pam Street are not adequate considering the quantity of solid waste generated daily; with some resorting to dumping of refuse on the road median. The failure of the waste management system could contribute to water pollution, environmental degradation and the spread of communicable diseases and fatalities. Most of the rivers and streams in the metropolis are heavily polluted with garbage and refuse of all sorts. This is largely attributed to the informal waste management by wheel barrow boys, which ends up in the steams and public open spaces.

The refuse dump in Figure 6 is located on the median of the dual carriage road along Ahmadu Bello Way where no refuse bin exists. This situation is not ideal, couple with lack of prompt clearance by the relevant agency (PEPSA). This creates serious environmental problem and high risk to the health of the people more especially the traders within its vicinity.

Response to noise and air pollution is presented in Table 5. Noise pollution has also been identified as one of the environmental problems in central area. This is as a result of discharge of effluents and emission from automobiles. Noise generated by vehicular circulation is a serious impediment to the quality of life and health of the urban population. Air pollution is one of the key contributors to disease and fatalities globally and is a significant problem in urban areas in Nigeria¹⁴. 73% of the respondents said that air pollution was a significant environmental problem in the central area.

Table 5. Level of Noise and Pollution in the Central Area

Noise and Pollution	Frequency	Percentage
Very low	10	3.76
Low	30	11.28
Not sure	31	11.65
High	102	38.35
Very high	93	34.96
TOTAL	266	100.00

Source: Musa & Dung-Gwom 2018



Figure 6: Refuse Dump on the Central Median of Ahmadu Bello Way in Jos Central Area.

Source: Site Visit, June 2019.

Without the implementation of counteracting measures an increase in noise and air pollution is the likely outcome of increase traffic generation and growth in the city's area and economy. Increasing traffic levels in the past 20 years has also added to the air pollution. A safe, attractive and healthy living environment is the desire of the residents of the central area. This is in consonance with the goals of the New Urban Agenda.

d) Security

One of the key impacts of the regeneration process and its uncoordinated nature has to do with the challenges related to the general in-security of the area, mostly due to the emergence of Boko Haram and other radical Islamic groups in the last decade. The city centre had experienced two twin bomb blasts in June 2013 and also in December 2014 which resulted to loss of lives and properties in the central area. Another bomb and gun attack were experienced in July 2015 at a mosque along Dilimi Street during Ramadan tafsir which led to attack on ECWA Goodnews Church along Ahmadu Bello Way and other churches near the scene of the attack

with great loss of lives and properties. Table 6 presents the response on the security in the central area which shows that 75.94% of the respondents believed is inadequate.

Table 6 Security in the Central Area

Security	Frequency	Percentage
Very adequate	10	3.76
Adequate	50	18.80
Not adequate	202	75.94
Not sure	4	1.50
TOTAL	266	100.00

Source: Musa & Dung-Gwom 2018

IV. Discussion

Land use changes have been on the increase during the period under study. Though, the process of physical change is desirable, the result shows that it has led to a number of problems such as congestion, inadequate parking space, inadequate utilities, poor waste management and environmental degradation. The propelling forces for the changes in the central area of Jos have been the increase in commercial activities, occasioned by demographic, social and economic forces that have occurred in the last 20 to 40 years.

A unique trend was identified for the various land uses within the central area; with commercial land use dominating both in terms of land area coverage from 61.10 hectares (34.42%) in 2005 to 70.01 hectares (38.18%) in 2014, and the number of properties from a total of 347 properties (43.54%) in 2005 to 383 properties (48.05%) in 2014. A similar trend was also observed for other land uses with the exception of residential land use which had shown a steady decline in terms of area coverage from 18.83 hectares in 2005 to 15.42 hectares in 2014.

There is a strong competition for space between the various land uses within central area, with commercial uses gradually increasing in both number and areal extent while residential land uses were pushed out to the periphery and other adjoining areas. The study of the spatio-temporal changes in land uses presents a different approach and insight into central area studies and presents a better way of forecasting and planning for challenges in Nigerian cities.

The analysis of the land use distribution in the central area indicated a constant process of change, adaptation, infiltration and consolidation. Varying degrees of concentration and dispersion of different land uses indicate that the existing planning efforts could not produce satisfactory results in terms of balanced development of different parts of the central area. Planning and management of the processes of change had not been consciously encouraged over the last few years. There was therefore the need for a better approach in the management of the process of change in order to ensure that the central area was free of chaos.

It was also found that while some land uses such as commercial and mixed uses were increasing at a steady pace, others such as residential, open space and recreational uses were on a steady decline. Residential uses were being pushed to the periphery of the central area or other parts of the city. This could be attributed to the increase in demand for commercial, public and semi-public space in the central area. This has been further worsened by the fire that gutted Jos Main Market in 2002. The market has not been rebuilt 18 years after the fire incident.

It is expected that the population of Jos city would continue to increase significantly during the next few years thereby multiplying the need for different types of central area uses. Since most of these facilities would be provided by both the government and the private sector, their availability and distribution should be planned properly. Absence of proper planning of the central area could lead to bring further physical deterioration in the environment of the city centre and increase planning challenges in terms of its economic viability, attractiveness, safety and security.

V. Recommendations

- 1) The state government should play a leading role and provide strong leadership, ensuring that positive synergies arise from different strategies and programmes of central area regeneration and change.
- 2) Similarly, increased public investment by the Federal, State and Local Government in electricity, water, waste management and sanitation should be a top priority in order to attract more private sector investments in the central area.

- 3) Both government and private investments in residential housing should be encouraged by providing low interest loans and highly subsidized ground rent in order to discourage continuous decline and increase the vitality of the central area especially at night.
- 4) The State Government should acquire land at good locations to provide well organized refuse collection points that are off the busy streets.
- 5) The Jos Main Market should be reconstructed by the State Government and the large parking space within its vicinity put in to use. In view of the dwindling economic and financial fortunes of the state government, a private consortium should be approved for the reconstruction of the main market.
- 6) Additional parking spaces especially high-rise parking be provided through public and private sector investment to discourage on street parking in the central area.
- 7) Sustainable central area regeneration should be the goal for the central area of Jos, which is about achieving a balance between several objectives (physical development, environmental quality, economic and social developments) over time and spatial horizons.

VI. Conclusion

The study shows a strong competition for space between the different land uses within the city centre and its dynamic nature, with commercial uses gradually increasing in both number and area while residential land uses are pushed out to the periphery and other adjoining areas. Study of the spatio-temporal changes in land uses presents a different approach and insight into city centre studies. Thus, a better way of forecasting and planning. The results also showed that the regeneration process is mostly private sector led, with the sector regenerating 341 properties (93.43% of the total properties regenerated in the city centre) covering 50.61 hectares (58.54% of land area of regenerated properties) in the city centre of Jos during the study period.

Market forces had a major influence in motivating private sector investment decisions. The high demand for shops and other commercial spaces in the central area and the perceived total return on investment are key forces of change. Other factors that influenced change in the central area included the need to rehabilitate old buildings, growth of the city, government policies, the ethno-religious crises and the need to increase the aesthetic value of some buildings. However, the poor provision of services, poor maintenance of public services, pollution, congestion and street trading were increasingly perceived to be some of the hindrances facing the smooth development and redevelopment of the central area.

The analysis also revealed that though the land use changes were carried out independently and at different times by both government and the private sector, but the outcomes are chaotic in nature. However, of particular significance is the number of properties regenerated over the time period under study which shows constant increase in commercial uses, which raises the need for a coordinated effort by both the private and public sector in order to achieve sustainable planning and management of the central area.

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