

## GREENBELT AREAS AND LAND USE CONVERSION IN SOKOTO METROPOLIS (2002-2010)

Yusuf Isah Sokoto

Department of Urban and Regional Planning  
Umaru Ali Shinkafi Polytechnics Sokoto

### ABSTRACT

*Greenbelt is a term used by town planners to connote tract of vegetative communities near and within urban centre. A green belt or greenbelt is a policy and land use designation used in land use planning to retain areas of largely undeveloped, wild, or agricultural land surrounding or neighboring urban areas. Similar concepts are greenways or green wedges which have a linear character and may run through an urban area instead of around it. In essence, a green belt is an invisible line designating a border around a certain area, preventing development of the area and allowing wildlife to return and be established. In those countries which have them. Greenbelt is a new method of urban–rural policies that perform additional role of barriers to urban expansion and other environmental benefits. The primary purpose of establishing greenbelts is to provide open space for recreational opportunities, aesthetics and other environmental benefits. Also greenbelts was established within and around the city for the purpose of preserving agricultural amenities. This paper focuses on greenbelt area and land use conversion in Sokoto Metropolis, The source of Data for this Study was mainly from the Land sat data covering thus, the study area was universal transverse Mercator (UTM 31N) inclined and modified on 20 08 10 obtained from NASRDA (National Airspace Research and Development Agency). The imageries has a resolution of 60m, making it suitable for object identification using G.I.S. on the Arc GIS 9.3 and Idrisi Taiga environment also, Global Positioning System (GPS) receiver was employed. Map of Sokoto city 2002 and Lands at image 2010 were reconciled and carefully coordinated using G.I.S. on the ArcGIS 9.3 and Idrisi Taiga environment in addition Global Positioning System (GPS) receiver was employed for capturing coordinates of some specific road junctions in Sokoto Metropolis and the ground truthing to verify and confirm the authenticity of the reference information on the Spot image of Sokoto Metropolis 2010. Table showing the values of land use conversion in the study area was computed. The extent of Greenbelt conversion shows that the greenbelt was 101. 38 hectares in 2002 but in 2010 it stood at 55.46 hectares indicating a change of – 45.92 hectares in Sokoto Metropolis, The land use conversion is in form of bakeries, mini Motor Park, residential housing development, block making firm, restaurant and transforming surface tanks sites to filling stations. Based on the findings of the research, the use of political power to circumvent land use laws should be stopped, compensatory sites of the converted Greenbelt should be provided and Sokoto Master plan should be given due attention for any further physical developments in Sokoto Metropolis*

Keywords: Greenbelt, Land use, Land use Conversion, Urban Planning

### 1. INTRODUCTION

Hall in the year 1977, viewed greenbelt as a new method of urban–rural policies to perform the role of providing open space for functional, recreational and aesthetic quality, barriers to urban expansion protection of the nearby rural environment and preventing coalescence over intermixing agricultural land of adjacent communities similarly, Greenbelt is a term used by town planners to connote tracts of vegetative communities near and within urban centres (Miller 1988). furthermore, Greenbelt is a policy or land use planning to retain areas of largely undeveloped wild and agricultural land (Annon, 2014) however, on their part Justus and Anna (2011) observed that landscapes of urban open spaces can exist at different scales, from cracks in the pavement and private backyard gardens to more extensive urban landscapes such as green parklands, woodlands unused vegetated allotments and abandoned fields. In Nigeria, the origin of modern concept of greenbelt began with the arrival of British colonial rulers. The design of urban environment is credited to lord Lugard's colonial policy especially in northern Nigeria in the development of new towns (Urquhart, 1977). Though greenbelt is colonial legacy but has been incorporated in most African cities' Master plans. In Sokoto, greenbelt areas were established and incorporated in the Master plan to reduce the burden of urban expansion as well as to ensure the full utilization of the reserved areas in a way that will benefits both urban and rural dwellers. (Olawajaju 1995) It is obviously clear that well planned urban green landscapes, including wildscapes and green spaces, have the potential to contribute to climate change adaptation and mitigation, yet in so many cities in the low income countries the value of these urban green spaces in climate change response strategies is often disregarded and remains unharnessed and recorded for proper action plan. (Justus K. et al 2011) The study area of this research, Sokoto Metropolis has also incorporated greenbelt in its Master plan (Olawajaju 1995) The extent of expansion of Sokoto city shows that Sokoto city has

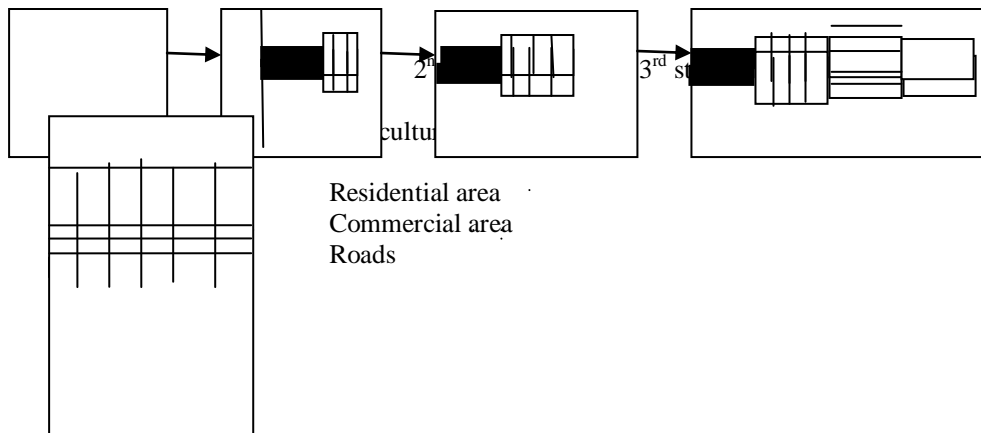
expanded by 1.3 square kilometres between 1965-1972, about 6.5 square kilometres, from 1977-1982 and 5.0 square kilometres between 1996-1999 (Mamman,1999) Similarly, The greenbelt areas conversion was 47.80 hectares decrease between 1967-1978, and the decrease between 1978 - 2002 was 190.20 hectares, indicating a total of 238.00 hectares decrease which is more than half of the greenbelt areas of about 420.00 hectares in 1967 (Isah, 2004).

However, despite the juxtaposition of Sokoto Metropolis lying in the savannah region of Nigeria resulting to its quest for a more greener environment, the greenbelt areas covering 420 hectares in Sokoto Metropolis as at 1967, was converted to other land uses which include governmental, institutional, residential in form of light density housing and other land uses which include, block making, filling stations, car wash, car sales, hotels, wood logging, commercial centres and other human activities in form of bush burning and deforestation in and around the designated greenbelt area of Sokoto Metropolis (Isah, 2014)

From the preceding paragraphs thus, the need arises to create awareness on the importance of preserving the greenbelt areas against its conversion in Sokoto Metropolis as findings show that, trees are felled without replacement in the study area

**1.1 Conceptual Frame Work**

The conceptual framework of greenbelts revolves around the various land use activities that emanate at the rural–urban fringe as well as the linkage between the land use conversion process and internal structural changes within and around the city. For instance, Japanese town planners Kim et al (2002) has demonstrated the conceptual process of land use conversion as characterized by three dynamic processes namely; transition, change and mixture, whereby transition process is when agricultural areas are invaded by roads and residential uses but later the residence grows more and more eating up agricultural land depicting a change, and at the last process or stage commercial uses invade residential and at the same time residential grows further, thus indicating a mixture use, all these processes distinguished such areas from more settled parts of the urban environments.



**Figure 2.1** Process of Land use change

1. Agricultural area change to road and residential at the first stage, roads and residential invade agricultural land.
2. Residential expanded into the agricultural area indicating growth of residential area eating up agricultural land.
3. Commercial area encroaches and invades residential and therefore residential area continues to grow.

**Source;** (Laboratory of Regional Planning, Japan, 2002, 58 (181-200)

From the above conceptual framework it is more likely that, greenbelt conversion in an area will lead to urban expansion in form of agricultural activities, residential and commercial that invades residential buildings and with the greenbelt is removed and converted without replacement will facilitate environmental problems such as flood, climate change and desertification

**2. METHODOLOGY**

**2.1 Study Area**

The study area of Sokoto metropolis comprises five local government areas namely, Sokoto North Local Government Area and Sokoto South Local Government Area at the centre and shares common boundaries with Kware Local Government Area, Wammakko Local Government Area and Dange

Shuni Local Government Area, Kware Local Government Area is to the northeast, Wammakko Local Government Area to the west and south west while Dange Shuni Local Government Area is to the south and south east of Sokoto Metropolis (Survey of Settlements in Sokoto State, 2012)

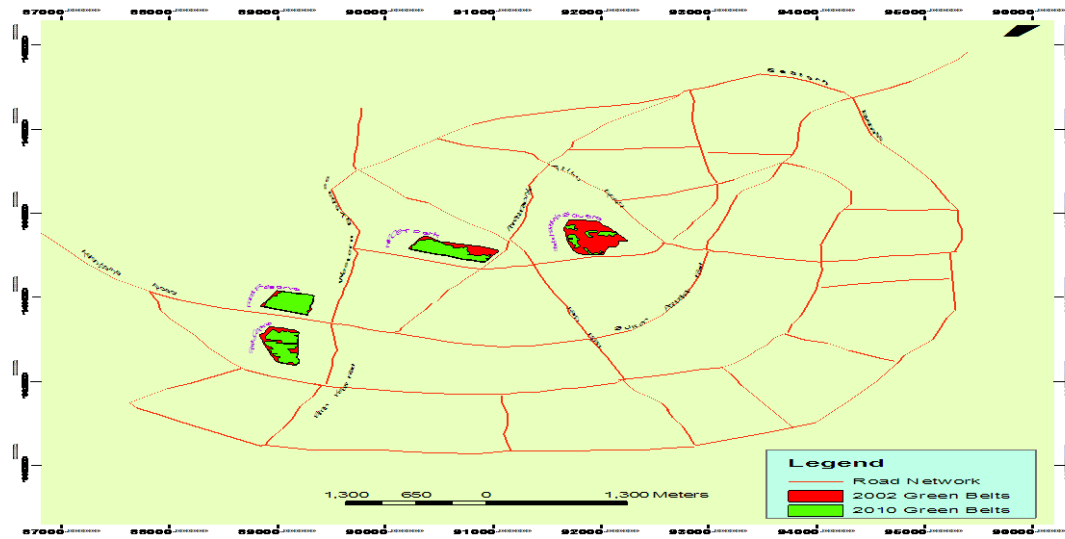


Fig 1 Map of Sokoto City 2002, showing the study areas Adapted from (Isah, 2004)

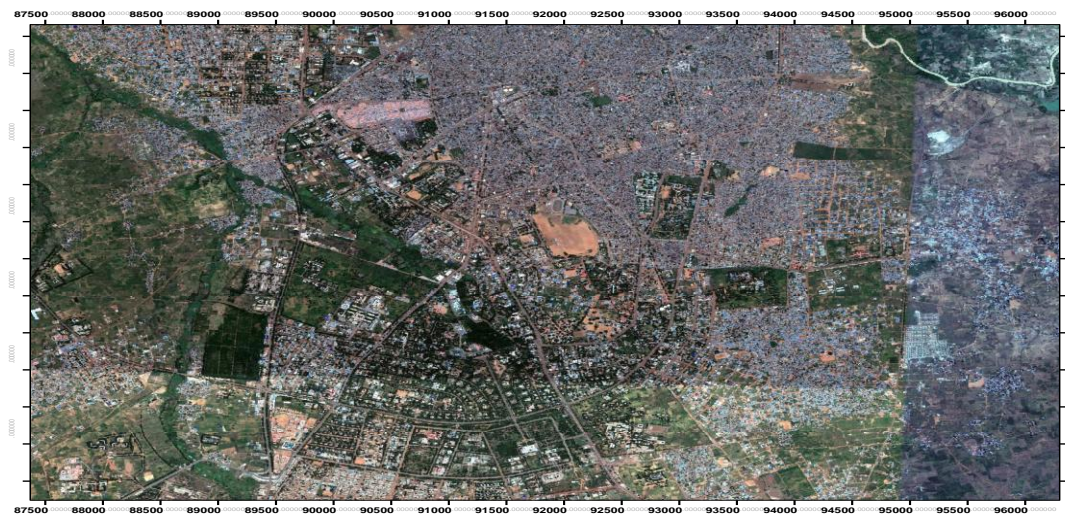


Fig 2 Land sat Image of Sokoto Metropolis 2010

## 2.2 Data

The data employed in this research are: maps and satellites geo- image, others are; - textbooks, journals, annual reports and seminar papers,

## 2.3 Sources of Data

The source of data in this study is mainly from the Greenbelt Map of 2002 adapted from (Isah, 2004) and 2010 spot image of Sokoto Metropolis, referenced as universal transverse Mercator 31N or (UTM 31N). Modified 20 08 10 obtained from NASRDA (National Airspace Research and Development Agency). The spot image has a resolution of 60m, making it suitable for object identification using G.I.S. on the ArcGIS 9.3 and Idrisi Taiga environment also, Global Positioning System (GPS) receiver was employed for capturing coordinates of some specific road junctions in Sokoto metropolis during the ground thrusting to verify and confirm the authenticity of the reference information on the Spot image of Sokoto Metropolis 2010

### 3. RESULT

Table 1 Greenbelt Area Conversion in 2002 and 2010 (sq. meters) and hectares (ha)

Area	Greenbelt 2002 (m <sup>2</sup> )	Greenbelt 2010 (m <sup>2</sup> )	Greenbelt change 2002-2010 (m <sup>2</sup> )	Greenbelt change 2002-2010 (ha)	Greenbelt 2010 (ha)	Nature of land use conversion 2002-2010
Forest Reserve	186059	165506	20553	-2.06	16.55	Agricultural, residential, industrial and commercial purposes
Sport Centre	243874	168679.10	75194.901	- 7.52	16.87	Commercial, governmental and residential
Park behind Nipost	254006	161722	92284	- 9.23	16.17	Agricultural activities, auto mechanics and residential purposes
Shehu Kangiwa Square	329911	587412.59	27116.974	- 27.12	5.87	Institutional, workshops and furniture works
<b>TOTAL</b>	<b>101385.0</b>	<b>554648.36</b>	<b>459201.64</b>	<b>- 45.92</b>	<b>55.46</b>	

Compiled: - Author's work (2012)

From the preceding table 1 the total greenbelt area in the study area as at 2002 stood at 101.38 hectares, with Shehu kangiwa square having 32.10 hectares, sport centre along Birnin Kebbi Road with only 24.39 hectares. The remaining areas in the study area are wilderness area having 18.61 hectares while the park behind Nipost is about 25.41 hectares. In the year 2010, 2.06 hectares were converted from the existing greenbelt of forest reserve area. Similarly 7.52 hectares were converted to various uses in the area designated as sport centre. Furthermore, in the park along Birnin Kebbi Road and Shehu Kangiwa square 9.23 hectares and 27.12 hectares were respectively converted, indicating that 45.92 hectares were further removed from the existing greenbelt area of 101 hectares. Hence in 2010 only about 55.46 hectares of greenbelt were left standing in the study area, this means that about half of the existing greenbelts in the study area (-45.92 hectares) has been converted to residential, commercial, institutional and similar land uses between the year 2002 and 2010 which is sending an unpleasant signal to the survival of numerous recreational and other environmental benefits of greenbelt in and around Sokoto Metropolis.

### 4. CONCLUSION

The research show that, the land use conversion in Sokoto metropolis between 2002-2010 was imminent and the lowest greenbelt conversion was found in the wilderness area adjacent to 5 Star Hotel along western bye pass with -2.06 hectares, while the highest greenbelt conversion was found at Shehu Kangiwa square with -27.12 hectares, but the total conversion in the whole study areas between 2002-2010 was -45.92 hectares, and the remaining existing greenbelt area in the study area is about 55.46 hectares.

On the nature of the land use conversion in the study area, they are in form of residential housing built on former block firm areas, also areas with surface tanks in the past are now converted to filling stations, other conversion include bakeries, mini motor parks, traditional herbs stalls and dualised roads also, parks and gardens are fast disappearing in Sokoto Metropolis, visual, aesthetic and beautification functions provided by greenbelt are unattained, thus, greenbelt conversion between 2002-2010 has become a reality in Sokoto Metropolis and if necessary action plan (policy formulation) by the government is not put into actualization, the remaining greenbelt area in Sokoto Metropolis may



be cleared in the next 10 years therefore, Government and stakeholders on environment should strive on finding more lasting solution to this particular environmental problem (greenbelt conversion)

## 5 RECOMMENDATIONS

The recommendations in the light of the research to the various stakeholders on environment are as viz;-

### *Government*

- Land use laws and byelaws should be adhered to by the government officials
- The Sokoto State Land Use and Forestry Laws require a review thus, should be revisited with a view to enacting more stiffer penalties on the felling of trees in Sokoto Metropolis
- The remaining gazetted Greenbelts should be clearly mapped out and bill boards to identify them should be erected for easy identification and caution on encroachment.
- The use of political power to circumvent land use laws and guidelines should be stopped
- New compensatory sites of the converted Greenbelt should be provided and mapped out by the government in Sokoto Metropolis
- Sokoto Master plan should be given due attention for any further physical developments in the Metropolis
- The State Government should acquire the remaining land surrounding the greenbelt area through its constitutional power 'the power of eminent domain' and the acquired land should remain State owned and be turned to greenbelts,
- Committee should be formed by the State Government and called State Land use and Other Environmental Matters Evaluation Committee (SLOMEC) and asked to evaluate and re-evaluate general environmental issues
- Urban Planning authorities should be well funded and empowered by the State government to enhance their performance and provide mandatory quarterly Reports to state government on environmental issues, which could provide a guide for future planning
- The findings of this research should be used for future urban planning and governmental policy formulation in Sokoto State
- Sokoto State Government should declare an "emergency" on environment similar to that declared on education for at least 5 years afterwards the next line of planning control action should be determined.
- Religious leaders should be involved in sensitizing the general public on the danger of deforestation

### *Urban planning authorities*

- Planning control procedures implementation should be vigorously pursued by the planning authorities
- Staff of urban planning authorities involved in planning control procedure should be well trained in Geographic Information System (G.I.S.) so as to monitor and control the various physical changes that emanate in and around Sokoto Metropolis

### *Non-Governmental Organization (N.G.O<sup>s</sup>)*

- Non-governmental organizations and civil societies on urban planning issues should independently monitor the environmental and physical development changes with a view to contribute on development control planning in Sokoto metropolis

### *Departments of Petroleum Resources (DPR)*

- The department for petroleum resources (DPR) should always ensure that areas cleared and approved for filling stations are not allocated in the greenbelts area

## 6. REFERENCES

- Annon, (2014). Greenbelt (Wikipedia) accessed 25/01/14, 1.15pm.
- Hall, P. (1977). *Urban and Regional Planning Problem in Modern Geography*, Douglas David and Charles Ltd.
- Isah, Y. S., (2004). Recent Land Use Conversion in the Greenbelt Area of Sokoto City. A dissertation submitted for an award of M.Sc. Degree in Geography, Usmanu Danfodiyo University Sokoto. (Unpublished)
- Isah, Y. S. (2014). Greenbelt Conversion and Micro Climate Change in Sokoto Metropolis. A dissertation submitted for an award of (M.Phil) Degree in Geography, Usmanu Danfodiyo University Sokoto. (Unpublished)

- Justus, K, Anna L. (2011). Urban wildscapes and green spaces in Mombasa and their potential contribution to climate change adaptation and mitigation Environment and Urbanization. Health and the city volume 23 number 1 April 2011.
- Kim. D. S. Mizuno, K. and. and DaeSik Kobayashi, S. (2002) "Analysis of Land use Change system using the species competition concept. *Laboratory of Regional Planning*.58 (2002)(181-200).
- Mamman, A. B. (1999). "Evolution and Growth of Sokoto City" *Journal of social sciences and administration vol.1.NO.2*, (pp. 45-60)
- Miller, R.M. (1988). 'Urban Forestry' planning and managing urban green spaces Prentice Hall
- Olarewaju, S. (1995). "Land use Conversion in the greenbelt area of western part of Sokoto city" A project in partial fulfilment of an award of B.Sc. Degree in geography, Usmanu Danfodiyo University, Sokoto. (Unpublished)
- Onuaha, M.C. and Ozor N. (2009). Climate Change and Sustainable Development in Nigeria: The mitigating greener approach of green wall Sahara Nigeria programme. *Conference Proceedings of the 51<sup>st</sup> Annual Conference of the Association of Nigerian Geographers (ANG)*. Anyagba, June 29<sup>th</sup>-2<sup>nd</sup> July 2009.
- Urquhart, A.W. (1977). "Planned Urban Landscape in Northern Nigeria" Ahmadu Bello University, Press Zaria, Kaduna Nigeria