

**HURBAN DEVELOPMENT AND NATURAL VEGETATION CHANGE:
A HISTORICAL ANALYSIS OF GULU CITY FROM 1911 TO 2021**

BY

**OJOK OBWONA MICHAEL
REG NO. 20/U/2660/MAH/PS**

**A DISSERTATION SUBMITTED TO THE FACULTY OF EDUCATION AND
HUMANITIES IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE AWARD OF THE DEGREE OF MASTER OF ARTS
IN HISTORY OF GULU UNIVERSITY**

OCTOBER , 2023

DECLARATION

I, **Ojok Obwona Michael** hereby declare that all the work in this dissertation is original and has not been submitted for any award in this or any other institution of higher learning.

Signature:

Date:

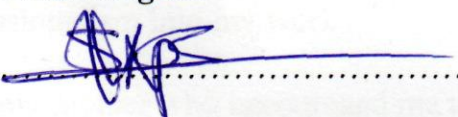
.....

.....11...../.....10...../.....2023.....

APPROVAL

This is to confirm that this research dissertation has been done under our supervision as the student's supervisors.

1. Dr. Expedito Nuwategeka

Signature:.....

Date: 13th / oct / 2023

2. Mr. Alex SSebaana

Signature:.....

Date: 12th / Oct / 2023

ACKNOWLEDGEMENT

Many thanks to my supervisors, Dr. Expedito Nuwategeka and Mr. Alex Ssebanna; thank you so much for all the support and guidance offered in carrying out this research.

I would also like to extend my heartily appreciation to the Department of History of Gulu University for their contribution and support in different sources of materials and all the lecturers who imparted professionalism into my work.

Special gratitude to my mother who encouraged me to go beyond myself in one way or the other.

My heartfelt thanks go to my lovely wife Harriet, and all the family members for being supportive, encouraging, understanding and loving throughout the entire period of this research.

Above all, to the Almighty God who is great and makes everything beautiful in His own timing.

Ebenezer, this far the Lord has brought me!

DEDICATION

To my late Brother, Ochola Peter Angal who instilled in me the love for education and helped me develop my esteem as having the ability to achieve anything others are able to; you set the bar high for me, Brother. You should have been here with me to witness the fruit of your inspiration. Continue to rest in eternal peace!

To my late Father, Obwona Martin; you showed me true fatherly love, even with the little you could afford by your sweat. I am indebted to you Baba. May God rest your soul in eternal peace!

TABLE OF CONTENTS

DECLARATION.....	Error! Bookmark not defined.
APPROVAL	Error! Bookmark not defined.
ACKNOWLEDGEMENT.....	i
DEDICATION.....	ii
TABLE OF CONTENTS	iii
LIST OF TABLES	vii
LIST OF FIGURES	viii
LIST OF ABBREVIATIONS.....	ix
ABSTRACT.....	x
CHAPTER ONE	1
1.0 Introduction.....	1
1.1 Background to the Study.....	1
1.1.1 Historical Background.....	1
1.1.2 Conceptual Background.....	5
1.1.3 Theoretical Background.....	6
1.1.4 Contextual Background.....	7
1.2 Statement of the problem	9
1.3 Purpose of study.....	9
1.4 Research Objectives.....	9
1.4.1 Specific Objectives	9
1.5 Research Questions	9
1.6 Scope of study	10
1.6.1 Geographical scope	10
1.6.2 Time scope	10
1.6.3 Content scope	10
1.7 Justification of the Study.....	10

1.8 Significance of study	11
1.9 Conclusion	12
CHAPTER TWO: LITERATURE REVIEW	14
2.0 Introduction.....	14
2.1 Review of the related literature	14
2.1.1 The Trends of Urban Development.....	14
2.1.2 The Spatial Expansion of Urban Areas	15
2.1.3 Urban Population Trends/Growth	17
2.1.4 Status of Gazetted Green Spaces in Urban Areas.....	18
2.1.5 Effects of the Spatial Extent of Urban Areas on Natural Vegetation	20
2.2 Summary of the literature review	21
2.2.1 Gaps in the literature.....	22
2.2.2 Theory	23
2.2.3 Methodology	24
2.2.4 Findings.....	24
2.2.5 Location of the Study.....	25
2.2.6 Year of study	25
CHAPTER THREE: RESEARCH METHODOLOGY	27
3.0 Introduction.....	27
3.1 Research Design	27
3.2 Study area	28
3.3 Study population	28
3.4 Sample size.....	28
3.5 Data Collection Methods	29
3.5.1 Data Collection Procedure	29
3.5.2 Data Collection Instruments	29
3.6 Data Analysis Procedures.....	30
3.7 Problems faced during the study	31

3.8 Ethical Considerations	32
CHAPTER FOUR:.....	34
PRESENTATION, INTERPRETATION, AND DISCUSSION OF STUDY FINDINGS	34
4.1 Introduction.....	34
4.1.1 Findings on the population trends of Gulu City	35
Table 4.1: Population of Gulu City over the Years.....	35
Table 4.2: Population projection of Gulu city 2040	36
Figure 4.1: Population Trends of Gulu City.....	39
Figure 4.2: Population Trends in Arua, & Lira Cities	40
4.1.2 Spatial Expansion of Gulu City	40
Figure 4.3: Map of Gulu City showing spatial Urban Sprawl.....	41
Figure 4.4: Maps of Gulu City showing urban growth trends from1990 to 2021.....	48
Figure 4.5: The Trend of Built-up area of Gulu City from 1990 to 2021	50
4.2 The State of Urban Green Spaces in Gulu City	50
Figure 4.6: Major formal and informal green and blue infrastructure assets in Gulu City	51
4.3 Effect of Spatial Extent of Urbanization on natural vegetation change in Gulu City	57
Table 4.3: Changes of the proposed land uses in relation with the existing situation	57
Figure 4.7: Land Cover Trends in Gulu City.....	59
4.4 Conclusion	64
CHAPTER FIVE	64
SUMMARY, CONCLUSION AND RECOMMENDATIONS.....	64
5.1 Introduction.....	64
5.2 Conclusion	64
5.3 Recommendation(s)	65
5.4 Area of Further Study	65
REFERENCES.....	67
Appendix 1: Interview Guide.....	74
Appendix II: Respondent Consent Form.....	76

Appendix III: Location of Gulu City in the National Context.....	77
Appendix IV: List of Respondents	78
Appendix V: Letter of Introduction	79

LIST OF TABLES

Table 4.1: Population of Gulu City over the Years.....	35
Table 4.2: Population projection of Gulu city 2040	36
Table 4.3: Changes of the proposed land uses in relation with the existing situation	57

LIST OF FIGURES

Figure 4.1: Population of Gulu City over the Years.....	35
Figure 4.2: Population Trends in Arua, & Lira Cities.....	38
Figure 4.3: Map of Gulu City showing spatial Urban Sprawl.....	41
Figure 4.4: Maps of Gulu City showing urban growth trends from1990 to 2021.....	48
Figure 4.5: The Trend of Built-up area of Gulu City from 1990 to 2021	50
Figure 4.6: Major formal and informal green and blue infrastructure assets in Gulu City	51
Figure 4.7: Land cover Trends in Gulu City.....	59

LIST OF ABBREVIATONS

BC:	Before Christ
CAP:	Chapter
CBD:	Central Business District
EKC:	Environmental Kuznets Curve
ESCAP:	The Economic and Social Commission for Asia
ETOA:	Environmental Threats and Opportunities Assessment
GIS:	Geographic Information System
GKMA:	Greater Kampala Metropolitan Area :
LRA:	Lord Resistance Army
MFED	Ministry of Finance and Economic Development
ML&H:	Ministry of Lands and Housing
NDPIII:	Third National Development Plan
NEMA:	National Environmental Management Authority
NURP:	Northern Uganda Reconstruction Programme
OECD:	The Organization for Economic Cooperation and Development
PWD:	Persons with Disability
SDGS:	Sustainable Development Goals
SDSN:	Sustainable Development Solutions Network
SOPS:	Standard Operating Procedures
UBOS:	Uganda Bureau of Statistics
UN:	United Nations
UN-HABITAT:	United Nations Human Settlements Programme
UNOPS:	United Nations Office for Project Services
UN-WIDER:	United Nations University World Institute for Development Economics Research

ABSTRACT

This was a historical study of urban development and natural vegetation change of Gulu City from 1911 to 2021. The global society has of recent been witnessing spatial expansion of urbanization which has a bearing on natural vegetation. There however, seemed to be no proper documentation of the effects urban development on natural change to guide future redirection in low resourced urbanizing societies, Gulu City being one of them. The study was therefore set to determine the historical urban development of Gulu city from 1911 to 2021 and its effect on the natural vegetation of the area. It precisely documented the trend of urban development, determined the status of the gazetted urban green spaces, and assessed the effect of the spatial extent of urbanization on natural vegetation. The study adopted a historical research design which was descriptive in nature - secondary data sources were analyzed and later triangulated with qualitative data from older persons of both gender who witnessed the changing pattern of urbanization and natural vegetation changes. The findings show that Gulu City has been witnessing an increasing population size which though declined at some point due to insecurity, generally rose at an increasing rate over the years between 1911 and 2021. The study also found that the urban built up area has been evolving over the years at an exponential rate with natural green spaces constituting of the wetlands and the planted forests alongside the forest reserves co-existing. The study concluded that the exponential spatial expansion of the built-up area of Gulu City was crucial to the characteristic decline in the natural vegetation over the years from 1911 to 2021. The study recommended among others, the need for the urban planning authority of Gulu City in collaboration with the local leadership to foster faster tracking of the preservation of the natural green spaces identified and earmarked in the urban plans. The study also recommended that the physical planners for the various residential setups, institutions, and factories for industrial development along the commercial buildings should develop plans that integrate alternative approaches to natural greening of the prospective urban setups.

CHAPTER ONE

1.0 Introduction

This was a historical study of urban development and natural vegetation change of Gulu City from 1911 to 2021. The chapter focused on the background, statement of the problem, purpose, and objectives. It also highlighted the research questions, scope, justification and significance of the study. Generally, a historical methodology was employed by the study. The motivations to undertake the study were premised on environmental history which is still a gray area and understudied in Uganda; this was the precursor to this study. Another equally important motivation in undertaking this study was the personal experiences of the investigator; as a young man who grew in this Town, he had a strong conviction to dive deep in the disappearance of natural vegetation around the then Gulu Town and now Gulu City.

1.1 Background to the Study

1.1.1 Historical Background

Globally, cities have grown rapidly in number and size over recent decades (Flörke & McDonald, 2018; Nguyen et al., 2020). The world's urban population has grown rapidly from 751 million in 1950 to 4.46 billion in 2021 and will grow to 6.68 billion by 2050, adding 2.22 billion people to urban areas. Ninety percent (90%) of the projected growth of the world's population between 2021 and 2050 will occur in Africa and Asia. This has led to the study of environmental history first coined in the United States of America by Roderick Nash in the early 1970s. Environmental historians like Alfred Crosby, Donald Worster and William Cronon thereafter added intellectual value by establishing the relationship between human agency and the transformation of the global ecology through imperialism, exploration, agricultural change, technological innovation and urban expansion.

The Konrad-Adenauer-Stiftung Foundation (2021) predicts that by the mid- 21st century, 68% of the world would live in urban areas. This trend is predicted to continue as urban areas are expected to absorb most global population growth. While the process of urbanization presents key implications for changes in physical landscapes and demographic characteristics, it can cause profound effects on environmental components, especially on urban natural vegetation (Wu, 2014). There have been snowball effects as cities merged their areas as they developed, and enlarged areas generated further development. However, the vicious cycle has created a situation

where the world economy grows unboundedly, the global population continues to soar, and natural resources diminish. Such a growth will lead to a catastrophe unless people implement various measures to create a more sustainable society (Spash, 2021). The environmental damage of an urban expansion reaches far beyond urban areas globally (Zhang, 2016).

In a rapidly urbanizing area, the resultant environmental damage is likely to deplete the vegetation cover as a result of urban expansion (Jiang & Shen, 2013). For instance, Mexico and Sao Paulo expanded from 3.1 million and 2.8 million respectively in the 1950's to approximately 24 million in the 2000s (Kasarda & Crenshaw, 1991; Zhao, 2017). In comparison, New York, which was the world's largest metropolis in 1950 took a century and a half to increase by 8 million (Potter & Sally, 2014). The urbanization and state formation in Chinese cities occurred roughly at the same period that similar development was occurring in ancient Egypt, Mesopotamia and the Indus valley.

Although worldwide urban growth rates have increased, much faster rates are observed in some regions between 1995 and 2015; the highest urban growth rates were registered in the least developed parts of the world with Africa being the most rapidly urbanizing (UN-Habitat, 2016). Africa's urban growth rate is estimated to be almost 11 times more rapid than growth rates in Europe. The driving forces of Africa's rapid urbanization include natural increase, rural-urban migration, spatial expansion of urban settlements through annexation, and reclassification of rural areas among others. Considering the high poverty rates that have characterized African cities, their rapid urban development signals a major challenge not only in their resource base, but also on the prospects to build and sustain adequate infrastructure as well as public services for the growing populations (UN-Habitat, 2016).

Urbanization has also been a major demographic trend in Nigeria, most especially in major cities across the country during the first half of the century. This is due to the relative increase in both social and economic development that is presently resulting in the uncontrolled population growth of Nigerian major cities, some of which are manifesting in the unnecessary pressures on available infrastructures, environmental degeneration, and traffic congestion.

The UN-Habitat (2011, p. 5) states that: "Today, half the world's population lives in Urban areas and by the middle of this century all regions will predominantly be urban with the tipping point in East Africa anticipated slightly after 2050." Further to that, according to current

projections, virtually the whole of the World's population growth over the next 30 years will be concentrated in urban areas.

The Konrad-Adenauer-Stiftung Foundation (2021) notes that urbanization is a population shift from rural to urban areas. It is the gradual increase in the proportion of people living in urban areas and the ways in which each society adapts to the change. Urbanisation, therefore, affects the natural vegetation cover through increased demands on natural resources brought by the increased population in an urban area. More people require more resources, which means that as the demographic trend increases, the earth's resources get depleted more rapidly. The result of this depletion is the likelihood of disappearance of natural vegetation which overtime could come with huge environmental violence as humans strip the earth of resources to accommodate rising population numbers due to urban development (Weber & Sciubba, 2018). The Uganda Ministry of Lands (2001) also states: "The environment on earth is suffering from the growth of global population. The depletion of resources and the destroying of natural habitat are serious problems that must be addressed in order to ensure that life on earth is sustainable over the next century."

One of the criteria for classification of an area to be gazetted as a city is that it must have a population of at least 300,000 residents within a minimum area of 50 square kilometres and a minimum density of 6,000 persons per square kilometre. Also, there needs to be a maximum density of 20,000 persons per square kilometre in an area not exceeding 100 square kilometres (Mbabazi & Atukunda, 2020).

This study argues that urbanization should be viewed from the lens of natural population increase and that of rural-urban migration processes leading to the development of rural outgrowth centers, built-up environment of a city, town or other urban area which includes growth of infrastructure, economic growth, and social amenities. For it to yield positive effect, it should take place up to desirable limit; excessive or uncontrolled urbanization may result in adverse effect on natural vegetation cover.

In the National Environment Act of Uganda - Cap 153, the Government of Uganda (2019) defines environment to mean the "physical factors of the surrounding of human beings including land, water, atmosphere, climate, sound, odour, taste, the biological factor of animals

and plants, and the social factor of aesthetics that include both the natural and the built environment.” Those elements make up the components of the environment. The United States Department of Agriculture (2016) also contends that natural vegetation (including semi-natural) is defined as where ecological processes primarily determine species composition and stand structure - that is, the vegetation is comprised of a set of plant species growing spontaneously and is shaped by both abiotic and biotic processes (Ehrlén, 2016).

Although the urban development of cities may normally have profound negative effects on natural vegetation overtime, the environmental effect has been barely evaluated in developing countries. Irumba (2018) studied the impact of urbanization on water resources with a case of Hoima municipality and reported that there is a significant increase in urban population than rural. Urban settlements in Uganda are increasing at an unprecedented rate. In 2002, the level of urbanization was at 12.3% and it is projected to increase to 21.8% by 2025 with an urban growth rate of 5.2%. Today, about 15% of Uganda’s population is categorized as urban and is projected to rise to 30% by 2035. Currently, Uganda has one capital city, 10 cities, 31 municipalities, 579 town councils and a number of town boards and rural growth centers (Uganda Ministry of Local Government, 2021, p. 112).

Similarly, Gulu City has registered urban growth in the recent past years and this growth is traced to the establishment of the British rule in Acholiland in 1911. Since then, urbanization has impacted the natural vegetation in the then Gulu town and now Gulu City. Be that as it may, Gulu being one of Uganda’s fastest growing secondary cities, faces a range of development challenges associated with rapid, unplanned and uncoordinated urbanization. Some of these challenges include environmental degradation and resource constraints among others (Natural Resource Stewardship Programme, 2022). Urbanization is a territorial response to structural changes in the economy, and when unregulated and unguided, it has its own problems as evidenced in the deteriorating condition of many cities like Kathamandu. When large numbers of people congregate in cities, many problems arise as result, particularly for the poor. For example, most urban poor live in slums that are unregulated, have congested conditions, are overcrowded, are positioned near open sewers, and restricted to geographically dangerous areas such as hillsides, river banks, and water basins; these are subject to landslides, flooding, or industrial hazards (United Nations, World Urbanization Prospects, 2019). Urbanization is often used more loosely, however, to refer to a broad-based rural-to-urban transition involving population, land

use, economic activity and culture, or indeed any one of these. Thus, it is frequently used to refer to the shift in population from rural to urban settlements, and it involves a shift to more dense settlement patterns. Moreover, the shift from rural to urban land use is increasingly the result of shifts to less urban settlement patterns (McGranahan & Satterthwaite, 2014).

1.1.2 Conceptual Background

Urbanization is a process in which increasing number of people migrate from rural to urban areas, and it eventually leads to horizontal or vertical growth of urban areas (Rashid et al., 2018). A country is considered to be urbanized when over 50 per cent of its population lives in urban areas. The criteria that can be used to define an urban area can include population size, density and economic organization (Bennett et al., 2019; Wineman et al., 2020).

The consequences of urbanization vary across different regions of the globe. The United Nations estimated that by the the end of 2008, half of the world's population would live in urban areas. The Tribune also predicted that, by 2020, 64.1 percent of the developing and developed world respectively would be an urbanized international. Urbanization is not a new phenomenon; however, since the process of urbanization is ongoing, it is dynamic and multi-faceted. The relationship between urban development and natural vegetation has been analysed in several studies. Both of these have been affected by human activities influenced by rapid urbanization and rural conversion. Unexpected population growth is related to natural vegetation degradation and continues to cause the disappearance of natural vegetation cover at an alarming rate (Glosh et al., 2014; Rai et al., 2017; Nath et al., 2021).

Economic growth together with changes in demography is generally seen as the driving force for urbanization. Unfortunately, the process of urbanization has resulted in environmental degradation besides economic growth. Rapid development at social and economic levels in Asia has caused the lack of infrastructure, lack of housing, traffic congestions, overall decay in environment especially in sustainable development of major cities and towns as reported by Asia-Pacific Environment and Development (Inchimura, 2003). Across the world, rapid urbanization has led to serious consequences. On a positive note, it has led to the birth of gigantic cities, opened up new opportunities, and more importantly, led to competition at

national and international levels. The downside to this is that uncontrolled urbanisation has led to huge environmental damages (Zhang, 2016; Singh & Singh, 2017).

In the context of developing countries like Pakistan, the rapid pace of urbanization has led to serious environmental concerns. In the past few decades, due to the transformation of the economy and society, natural resources have been depleted extremely fast. This unabated degradation of environment in any country is continuous (Ogunbode et al., 2021).

1.1.3 Theoretical Background

Urbanization is an irreversible process. The first known civilization in the world took place in Mesopotamia where there was development of city states by 3000 B.C. City states included Uruk, Sippar, Ur, Eridu and Shuruppak among others. The urban region or city later extended to the Indus valley civilization in the middle of the 3rd millennium BC in India (Frenez et al., 2016). Hence, one can say that there are several urban theories, some of which go back to the time of initial civilization.

This study was underpinned by the Environmental Kuznets Curve (EKC). The curve suggests that economic development initially leads to deterioration in environment, but after a certain level of economic growth, a society begins to improve its relationship with the environment and levels of environmental degradation reduce (Stern, 2018). The study will further be guided by the Environmental Transition Theory, developed by Marcotullio (2003). Marcotullio outlined the relationship between increasing wealth and environmental conditions in cities using McGranhan's environmental transition theory (UET) which suggests that as cities increase in wealth, they undergo a series of environmental burdens that shift in temporal scale and geographic scale. The Environmental Transitions Theory is a powerful tool in understanding the changes in environmental burdens associated with the different levels of development. It is considered a major advancement over the Environmental Kuznets Curve because the theory addresses the scale of impact and accommodates different relationships between economic and environmental conditions (Marcotullio, 2003).

Khalidum (1337) and Montesquieu (1748) were some of the first historians to note variations in the natural world climate as critical to human behavior, and hence, the theoretical background to the study of environmental history can be traced to them. Further to that, Marx in

his philosophical manuscript of 1844, observed that human activities involve the use of natural environment.

However, environmental history as a self-conscious undertaking dates to the recent 1970's. The environmental history is globally experiencing a great change in ideas about nature and the environment. There is advocacy for "sustainability", which completely changed its meaning over the historical period. The range of actors changed and broadened, with a prominent role of the state and international organizations, civil society and professionalized environmental NGOs. Similarly, political practices have changed - from humble petitions in the 19th century to the more massive protests culminating in the 1970s, 1980s, and 2000s.

1.1.4 Contextual Background

According to the Gulu City Local Government (1997), Gulu derives its name from the Oitino stream which has its source in Mican. The source of Oitino stream was named after one of the great Acoli chiefs called Latigo Gulu (p. 7). The first edition of Gulu city magazine (2021) also describes the origin of the name and the journey of Gulu becoming a city, and expounds that its name is likened to Latigo Gulu who lived at Gulu-Gulu which consisted the present day Mican, Sub-ward, Bardege parish, and Bardege-Layibi City Division. The origin of Gulu town Board (then) now a city dates back to the first native Acoli pre-colonial settlement in about 1800 at a place called Wang Kwa in the present location of Pakuba. It was a small commercial center under the jurisdiction of the Nubian Jadia, whose administrative headquarters was located in Gondokoro on the present border of Uganda and Sudan. Gulu's growth as an urban center was a result of the advent of the British rule at the beginning of the 20th century. In particular, the event which made this easily possible was the reversion of the Lado-enclavement from Uganda to the Government of the Sudan in February 1911. This transfer favored the choice of Gulu as a more centrally located place from which the British had a firmer grip of what was to be Northern Uganda. Consequently, in 1912 Gulu Town became the administrative headquarters for Northern Uganda. In 1950 Gulu was declared a Town Board, 1960 a town council, 1973 a municipality, and she became a city in July 2020 - fully operational in July 2021 (Gulu City Local Government, 1997, p.7).

In the Gulu Physical Development Plan, the Gulu City Local Government (2020, p. 12) notes that the first Gulu outline scheme was produced in 1959, then a Town Board continued to grow through the 60s and early 70s. As independence set in, its position as a regional administrative seat, a center of trade and commerce and of various services grew stronger; this was attributed to the fact that Gulu had by then attracted spatial expansion in terms of shops, office buildings, post office, banks, places of worship and institutions like schools and hospitals.

In the Gulu City Development Plan for FY 2020/2021 through 2024/2025, the National Planning Authority (2020, p. 2-3) of Uganda reports that the administrative divisions in the then Gulu municipal council were 4 and they included: Laroo, Bar-dege, Layibi and Pece divisions. Gulu City was created through an Act of Parliament in 2020. The city consists of two main divisions: Bardege Layibi City Division and Laroo Pece City Division. The wards in Bardege Layibi City Division include: Alokolum, Pageya, Kweyo, Laliya, Oitino, Pamainano, Patuda A and Patuda B, all of which are annexed to Bardege Layibi City Division. Other wards include Bardege, For God, Kanyagoga, Kasubi, Kirombe, Library and Techo. Laroo Pece City Division comprises of the following wards that were annexed and they include: Acoyo, Agonga, Kal, Pakwelo Lawiye Adul and Twon Okun. Agwee, Iriaga, Labour Line, Obiya Laroo, Pageya Laroo, Pece Prison, Queen's Tegwana, Unyama and Vanguard are some of the original wards situated in the former municipality.

Having contextualized the study area, it's imperative to showcase how environmental damage, especially vegetation clearance is being occasioned by urban expansion. As noted by Hamilton (1984), a confirmation is reached that there has recently been a big reduction in the number of trees in many parts of the country as a result of urban expansion (p. 5). He describes part of Acoli, Lango, and Teso as being miserably short of trees. Yet, before the advent of the British, the study area in question was deeply forested with big trees like: *Ficus natalensis* Hochst (*Kituba* - L. Acoli) and different *Acacia spp.* (Okuttu – L. Acoli), *Azelia africana* Sm. ex Pers. (Beyo - L. Acoli), *Borassus aethiopum* var. *senegalense* Becc. (Palm trees, *Tugu* L. Acoli) and *Vitellaria paradoxa subsp. nilotica* (Kotschy) A.N. Henry, Chithra & N.C. Nair (Shea Nuts, *Yaa* - L.Acoli) among other indigenous tree species in Acoli sub-region. These indigenous tree species are disappearing and there seems to be limited documentation on this changing trend and pattern that needs further investigation. Spreading knowledge on these issues through further

research could help environmentalists to regenerate the ecosystems. Additionally, it could be one of the strategies to improve the negative effect created by disappearances of these species as a result of the urban development of Gulu City.

1.2 Statement of the problem

Natural environments are essential for the aesthetic and environmental sustainability of urban environments. The process of urbanization entails expansion of settlements for the ever-increasing population, creation of urban infrastructure like transport and recreational facilities. The spatial expansion of these facilities has a bearing on natural vegetation. Gulu City has been experiencing urban sprawl, and whereas there are studies documenting the effects of urbanization on natural vegetation in cities in the developed countries, none of them was conducted to evaluate the effect of urbanization of Gulu City. This study, therefore, sought to document a historical analysis of urbanization and its effects on the natural vegetation of Gulu from 1911 to 2021.

1.3 Purpose of study

The purpose of the study was to find out the effect of urban development on natural vegetation in Gulu City.

1.4 Research Objectives

1.4.1 Specific Objectives

The specific objectives of the study were:

1. To find out the trend of urban development of Gulu City from 1911-2021.
2. To investigate the status of the gazetted urban green spaces in Gulu City.
3. To assess the effect of the spatial extent of urbanization on natural vegetation of Gulu City from 1911 to 2021.

1.5 Research Questions

1. What is the population trend of Gulu City from 1911 to 2021?
2. What is the trend of the urban spatial expansion of Gulu City from 1911 to 2021?
3. What is the status of the gazetted urban green spaces in Gulu City?
4. What is the effect of the spatial extent of urbanization on natural vegetation of Gulu City?

1.6 Scope of study

1.6.1 Geographical scope

The study took place in Gulu city, focusing on the central business district. The study area did not cover the entire 225,654 square kilometers of Gulu city land area size as at 1st of July 2020, but was limited within the radius of two square kilometers stretching from the Post Office to CBD area of Layibi, Kasubi, Pece and Industrial Area.

1.6.2 Time scope

The study covered the period ranging from 1911 to 2021. The selection of the study period was due to the fact that 1911 is the year when the British colonial administration was established in Acholiland and 2021 is an historical landmark when Gulu City became operational.

1.6.3 Content scope

The research was historically biased to analyze the effect of urban development on the natural vegetation. The study was therefore set to determine the historical urban development of Gulu City from 1911 to 2021 and its effect on natural vegetation. The results of the study are hoped to feed into the important programs of the government and international organizations like “Vision 2040”, PDM and SDGs among others.

1.7 Justification of the Study

Environmental History is a gray area of study in Uganda and most African universities. From the literature reviewed, it was revealed that areas of environmental history are still under studied in Uganda. Since there were limited studies done in this area in Gulu city, this study is hoped to sensitize the residents on the adverse effects of urbanization in order to reduce the degradation and disappearance of natural vegetation, hence the justification for undertaking the study.

More to that, the study is deemed important in policy formulation. Policy makers and practitioners can therefore maximize the research findings to inform their decisions in policy making processes. The study is also hoped to help the ministries concerned with environment such as NEMA, and in turn, policy practitioners can draw on the research and evidence to produce more effective policies.

Finally, the study findings are hoped to be used in the updating of historical information and knowledge.

1.8 Significance of study

Findings from the study are expected to be of great importance to various groups in a number of ways and they include: Planners and Policy Makers, Government and Policy Makers, City Dwellers, and Future Researchers and Academicians. First and most importantly, the study is hoped to strongly underpin the various correlations and explore the drivers that may exist, in order to assist planners and policy makers to prioritize, identify limits to Gulu City resources base and make timely corrections to avoid vegetation depletion as a result of urban sprawl and potential crisis. This is expected to better facilitate urban planners to identify key drivers and new hotspots of degradation for timely on-the-ground interventions and improved awareness.

It has to be noted that in Uganda there is limited research on urban development and land cover changes in line with goal 11 of the Sustainable Development Goals (SDGs) which focuses on sustainable cities and communities aligned with the Uganda Vision- 2040 as well as the recently published Third National Development Plan, (NDPIII)-2025. Goal 11 of the SDGs recognizes the importance of public spaces and it states: “By 2030, provide universal access to safe, inclusive and accessible green and public spaces, in particular to women and children, older persons and persons with disability.” In 2016, the SDG Network proposed an indicator for this target as the average share of the built-up of cities that is open for public use for all disaggregated by age group, sex and PWDs. The Uganda Vision 2040 (Government of Uganda, 2013), which was launched in 2013, is the overall blue print for the economic and social development of the country. The significance of this study undertaken is therefore projected to provide a comprehensive framework to operationalize Uganda’s Vision Statement which is “A transformed Ugandan Society from a Peasant to a Modern and Prosperous Community within 30 years.” The Uganda Vision 2040 guides the establishment of four regional cities (i.e., Gulu, Mbale, Mbarara and Gulu city). The Vision further envisages the city of Gulu to become a key economic zone with infrastructural corridors. Gulu city is also envisaged under Vision 2040 to become a key strategic agricultural zone with an emphasis on agro-processing.

Additionally, Government and policy makers can make use of the results of this research to make appropriate development goals. The government can achieve this through its Ministry of

Land, Housing and Urban Development, government agencies such as NEMA and other stakeholders to devise means in order to reduce the negative impacts of urbanization on natural vegetation. More so, the results of the study are expected to alert the city dwellers of the danger of the natural vegetation destruction in the region and thus adopt right procedures to conserve the vegetation.

Finally, the data generated and recommendations are projected to aid future academicians, scholars and researchers. After having the documented report of this study published and made available online and in the library, learners are expected to utilize it for more knowledge and skills on the danger of vegetation depletion as a result of urban sprawl. This is likely to enlighten Non-Governmental Organizations dealing with natural vegetation management and Gulu City council in urban planning. The study is also anticipated to provide a foundation for future research about the same problem in the area and elsewhere.

1.9 Conclusion

This chapter highlighted on the information relating to the spatial expansion of urbanization of Gulu City from 1911 to 2021 which is logically arranged in chronological order. Commencing with the historical background to the study that described how cities evolved from global, African, regional and national perspectives, it traced the growth of Gulu City as an urban center to the establishment of the British rule in Acholiland in 1911. Further to that, the conceptual background, theoretical background and contextual background vis-a-vis the theoretical framework were well articulated in the chapter. Along with this was the statement of the problem / research problem which is linked to the topic of study. It explicitly described what would change when the research was done and/or what would have happened if the research was not done. Also highlighted in the chapter were the research questions that answered the research gaps. The study, therefore, investigated and documented the historical urban development of Gulu City from 1911 to 2021 and its effect on natural vegetation change from 1911 to 2021.

CHAPTER TWO: LITERATURE REVIEW

2.0 Introduction

This chapter provides the review of works done by other authors and other documents that relate to the topic under study. It includes the trend of urban development from a global perspective, the spatial expansion of urban areas, urban population trend/growth, changes in gazette urban green spaces, effects of the spatial extent of urbanization on natural vegetation, key knowledge issues, controversies in literature, main research gaps and the actual gap(s) that the research addressed.

2.1 Review of the related literature

2.1.1 The Trends of Urban Development.

The contribution of natural increase to urban development is a complicated issue. Overall, about 37% of the people of the Asian and Pacific live in urban areas (United Nations, 1998) although there is considerable range in the extent of urbanization, both across and within the sub-regions. For example, the higher degree of urbanization in Australia and New Zealand contrast markedly with the much less urbanized of the Pacific Island countries and is sufficiently high to ensure that the South Pacific sub-region is on average the most urbanized, whilst South Asia is the least urbanized followed by Southeast and Northeast Asia (Economic and Social Commission for Asia [ESCAP], 1999). The diversity of countries in the region in terms of levels of economic development has resulted in even greater variation in the level of urbanization. For example, urbanization ranges from a minimum of 7% in Bhutan to 100% in Singapore. It is projected that some of the big countries of the region like People's Republic of China, Indonesia, and Pakistan where current urbanization levels are well below 50% will cross this figure by the next century, whilst India's urbanization level will also approach 50% by the year 2030 (United Nations, 1998; ESCAP, 1999, p. 149).

The impact of urbanization on the environment due to uncontrolled urbanization in India environmental degradation has been occurring very rapidly and causing many problems like land insecurity, worsening water quality, excessive air pollution, noise and the problems of waste disposal. Such impacts were good literature to compare and contrast the challenges posed by the disappearance of natural vegetation as a consequence of urban development of Gulu City from 1911-2021 (Mugabi, 1992, p. 3). The growth rates of most of the smaller towns were far higher

than those of larger towns. The share of small urban centers declined from 61.5% in 1969 to 54.4% in 1980-1985. Most remarkable was the growth of Bombo at an average annual rate of 24.2%, Buikwe at 23.3%, Busia at 21.3%, Luwero at 18.6%, Kiboga at 15.6%, Bugiri at 13.8% and Kisoro at 13.8%. On the other hand, the major center of Kampala stagnated at 3.2% while Jinja declined at a rate of 0.7%.

In the literature, White et al. (2015) point out the effect of urbanization in exerting pressure mainly on peri-urban forests and wetlands for expansion of urban centers. It is emphasized that 30% of Uganda's wetland ecosystems, or 4.7% has been lost in 15 years (NEMA, 2014). This is attributed to urbanization and rapid population growth. For example, in Kampala - a rapidly growing city, the built environment will continue to expand and there will inevitably be natural resource and ecosystem loss (White et al., 2015, p. 49). It is further argued that the city of Kampala has undergone a period of rapid urbanization that has contributed to the degradation of the city's natural environment. Yet, no serious attempt has been made to integrate protection or enhancement of critical natural asset systems within physical development like natural vegetation; this study was key to compare and contrast the urban expansion of Gulu City from 1911-2021 vis-à-vis its effect on natural vegetation cover.

To aggravate the matter, the development of additional secondary cities - Arua, Gulu, Mbale and Mbarara and strategic towns including Hoima in the Albertine region planned under Vision 2040, present a potential threat to forests, wetlands and other biodiversity resources. Environmental and waste management including wetland management and conservation of green areas need to be considered for sustainable urbanization (Government of Uganda, 2012). Suffice to note, these changes in Uganda's environmental landscape as in many African countries, are primarily due to anthropogenic factors involving population growth and urban settlement (Ejigu & Mataya, 2006).

2.1.2 The Spatial Expansion of Urban Areas

Most urban expansion in developing countries is characterized by informal growth, increasing the number of people who live in slums, currently estimated at over one billion (OECD, 2016; UN-Habitat, 2016). Most cities in emerging economies grow spatially through the low urban expansion, commonly known as "sprawl" which takes place in the context of poorly regulated land use and distorted land market (Shlomo et al., 2016).

The process of urbanization in Europe has evolved as a clear cycle of change during the post-war period from urbanization to suburbanization to de-urbanization, and, most recently to re-urbanization. Historically, the growth of cities was fundamentally linked to increasing population. In contrast, urban sprawl is a more recent phenomenon and is no longer tied to population growth. Rather, a variety of other powerful factors drive the development of the modern city, including individual housing preferences, increased mobility, commercial investment decisions, and the coherence and effectiveness of land use policies at all levels (Sokolov, 2019;). Mukwaya, Sengendo and Lwasa (2016, pp. 5-9) argue that the urban spatial and development pattern in Uganda can be classified in 5 phases and includes i) the age of urban initiation before 1900, ii) the age of settlement stabilization, fixation and pseudo-planning (1900-1962), iii) the age of conflict and collapse (1962-1986), iv) the age of laissez faire development and urban information 1986-2004, and, v) the age of urban reconnaissance (2005 to date).

Mukwaya et al. (2016) explained that the age of urban initiation in Uganda was before 1900; they contended that in the precolonial times, societies in Uganda were organized around tribal kingdoms and it was from these that early urban centers in the country were initiated. It can be said that urbanization is an alien concept in Uganda, and most of its urban centers have had colonial origins. They further argue that this age was associated with the British colonial footprint in Uganda; it was a period (1900-1962) that defined Uganda's urban spatial and development pattern. This period of colonial rule was associated with the building of the Uganda Railway, which accelerated the growth of urban centers such as Tororo, Kasese and Gulu. It was also verified that the line which forms a continuation from Tororo to Soroti reached Aloi in January and Lira in July 1962, and was extended to Gulu the following year (Connor, 1965).

As mentioned by Mukwaya et al. (2016, p. 6), literature indicates that there was a sequence of town plans for the country. Specific planning attention was given to Kampala, as the largest and geographically most complex of the country's urban centers. Similar planning efforts spread to Jinja, Entebbe and a few district towns of Arua, Tororo, Mbale, Masaka, Fort Portal, Mubende, Mukono, Mpigi, Mityana, Bombo, Gulu and Kitgum. The first urban planning regulations in Uganda were enforced in the Township Ordinance of the 1903 Uganda Gazette East African Protectorate and Uganda Act No.10 of 1963 (Mukwaya et al., 2016).

The civil strife and subsequent economic collapse that were predominant in the 1970s and 1980s precipitated urban collapse and degeneration. The political turmoil meant a total collapse of the whole Ugandan economy. This period saw significant changes in the government's attitudes towards urban planning for major towns in Uganda (Langlands, 1974; Büscher, 2020). Accordingly, several recommendations have since been made for urban areas in the country, including Kampala to base its plan for expansion upon commercial, institutional and not upon major urban expansion.

The age of urban renaissance in Uganda was from 2005 to date. In this period, the government has observed that much of the urbanization taking place in the country today is informal, organic and haphazard; and existing urban plans have expired. The government of Uganda is committed to ensuring orderly, sustainable and organized urban development and has therefore launched a national urban campaign as part of its national agenda.

2.1.3 Urban Population Trends/Growth

As pointed out by Mugabi (1992), the use of population statistics does not warrant plain acceptance of the degree of concentration of people in the towns or demographic terms as the basic conceptualization. It is also noted that although the demographic aspect of urbanization is undoubtedly important, criticisms of Chicago-3 school's work have convincingly demolished claims that social aspects of urbanizing can be understood in demographic and ecological terms (1992, p. 2). Urbanization is not simply a demographic process nor is it the growth of specifically urban institutions in the descriptive sense of an urban area way of life. Put differently, a city should have defining characteristics that include a large population, size, a heterogeneous nature, and a defined boundary. Rather, urbanization is the spatial organization of territory emerging as a result of interactions between the social, economic and political systems. The urban then is a spatial unit for the working of social, economic and political institutions.

This view was similarly shared in the Northern Uganda Reconstruction Project - Gulu Structure Plan (Gulu City Local Government, 1997). Together with the increased population, there has been an equally dramatic increase in the demand for space, services, utilities and other infrastructure that render the existing Gulu Structure Plan completely inadequate for the present realities and future demands. It is worth noting as mentioned in the Northern Uganda Reconstruction Project - Gulu Structure Plan (1997, p. 45) that the town center or the CBD of a

town by definition contains those areas in the center in which business is transacted; this includes primarily the civic and office areas, the commercial Zone and in many cases some light industry and warehouses. In the mentioned structure plan, the principal town land uses will consist of retail, wholesale, specialized shops and shops dealing in produce. Other major town center uses include retail market, informal sector activities, civic and government departments, transport and communication, public utilities and open spaces.

2.1.4 Status of Gazetted Green Spaces in Urban Areas

Natural vegetation means all plants, including but not limited to grasses, forbs, trees, shrubs, flowers, or vines that grow in the wild or under cultivation. The vegetation of Gulu notably consists of intermediate savannah grassland (Okello et al., 2017; Simple et al., 2018). This type of vegetation is found between the moist and the dry savannah and it is characterized by open canopy of trees 10-12 meters high and underlying grasses of 80 centimeters high. From the literature, Howard (2002, p. 3) expounds on the environmental consequences of urban congestion. Indeed, he documented the degree to which the lack of pure air, water and sunlight caused higher mortality rates in urban centers and he also believes that the concentration of people in large cities touches or underlies most of the practical questions of the day.

Urban green space interventions are defined as actions that significantly modify the quality, quantity and accessibility of urban green space. According to the World Health Organization, this can be done by establishing new urban green spaces or by changing the characteristics and functions of existing ones. Rostami et al. (2013) equally note that the quality of green spaces helps to define the identity of towns and cities which can enhance their attraction for living, working, investment and tourism. In his study, one of the famous samples of historical Persian Gardens was chosen due to its historical background as first sample of Iranian green spaces which are still being used actively by residents.

Previous studies by several scholars such as Colding et al. (2020) have also come to different results. For example, they could not find a significant change in Western European cities between 1990 and 2006. In a study of 386 European cities, Fuller & Gaston (2009) found a dramatic drop in per capita green space provision in cities with high population density, likely due to more people packed into the urban matrix rather than buildings replacing existing green spaces. They also found out that access to green space rapidly declines as cities grow, decreasing

opportunities for people to experience nature. Following post-socialist changes, many East-European cities have experienced a decline in green space. Similarly, McDonald et al. (2010, p. 24) found out that there was an open space loss between 1990 and 2000 for all examined 274 metropolitan areas in the continuous United States of America. While many Chinese cities show mixed results with both increases and decreases, cities in many developing countries are losing green spaces at a rapid pace. Ohri and Poonam (2012) as well as the Geographic Information System data for the year 2012 assert and share a similar view that we are losing our nature due to increasing population and heavy human-induced activities, with the earth surface is being significantly altered in some manner. Forests and vegetation covers are getting depleted day by day with greater rate.

This study argues that there exist similarities in the literature provided on Garden city to Green city (Howard, 2002) to the one of Otieno and Atem (2016), in that both point directly to the threats the environment is facing as a result of the urban growth and development globally. While NEMA (2007) also conducted a study on the general state of the environment in Uganda, these studies are too broad and hence fall short on addressing the research problem in respect to a historical study of the effect of urban development on the natural vegetation of Gulu city from 1911-2021.

As the world continues to urbanize, the vegetation cover in urban areas is changing rapidly; in 2015, urban vegetation covered a substantial area, equivalent to size of Belarus (Belcher & Richards, 2020). Belcher and Richards continue to contend that proportional vegetation cover was highly variable and declined in most urban areas between 2000 and 2015. Declines in proportional vegetation cover were particularly common in the Global South. Conversely, proportional vegetation cover increased in some urban areas in Eastern North America and parts of Europe. Most urban areas increased in size, suggesting that the observed net increases were driven by the capture of rural ecosystems through low density suburban sprawl. Far fewer urban areas achieved increases in vegetation similar in size, although, this trend occurred in some regions with shrinking populations or economies. Maintaining and expanding urban vegetation cover alongside future urbanization is felt to be critical for the well-being of the five billion people expected to live in urban areas by 2030.

According to the International Journal of Science (2017), Uyo - the Akwa Ibom state capital has grown in numbers and size since its creation in 1987, and accommodated the high influx of people. It has also satisfied their infrastructural needs, expanded to surrounding suburbs and led to widespread changes to land use/cover (Ekpenyong, 2008). This has given rise to the depletion of natural vegetation as the urban centers grow, and resulted into continued destruction of the natural vegetation.

2.1.5 Effects of the Spatial Extent of Urban Areas on Natural Vegetation

Indian cities are expanding exponentially due to rapid and unplanned urbanization. The unprecedented pace of expansion is a major challenge for surface water management (Sridhar & Sathyanthan, 2020), and several studies have been conducted to find out the extent of urbanization in some of these Indian cities. During the last three decades, several Indian cities have experienced vast urbanization, which has been categorized by unprecedented population growth and unplanned development activities.

Spatial-temporal land use and land cover changes due to urban expansion have been studied extensively. The previous works have concentrated on the loss of vegetation and the pattern of urbanization (Sridhar & Sathyanthan, 2020), and contented that an attempt has been made to investigate the relationship between the increase in urban land use (built-up area) and its spatial impact on water surface bodies. The studies therefore aim to raise the level of attention paid to encroachment and surface water management issues in the spatial planning of the development process. The impact of water body may lead to increase in water demand due to rapid urbanization. This study drew relevant literature related to the problem statement in an attempt to assess whether these urbanizations affected the spatial extent on the natural vegetation of Gulu City over a period of 110 years. It also examined whether increased population has some effect on the natural vegetation in a substantial manner, whether positively or negatively and to what extent.

The high rate of urbanization has become a worldwide phenomenon and Nigeria is not left out in the prevailing global demographic and spatial influx. It has been observed that urban settlements attract people as they offer better economic opportunities and well-being. While analyzing the situation in Ibadan city, Oyinloye and Adesina (2011) observed that one human phenomenon that has been impacting severely on the environment is urbanization. This is

reflected by the quality of urban centers as well as the spread of urban features into rural areas. The authors revealed that the urban infrastructures such as roads/streets and waste management systems are depreciating, and this have compounded the way cities are sprawling far beyond the range for which the facilities were planned and projected.

Besides the expansion of cities into valuable farmlands, urbanization policy, and solid wastes in many cities in Nigeria, the government is obviously losing the battle against the colonization of human and industrial wastes (Oyinloye & Adesina, 2011). It's therefore obvious that urban sprawl has a negative impact on the environment and sustainability of cities. In most cases, it translates into an increase in the cost of transport and commercial development. In many places, urban sprawl encourages new developments that cause significant loss of prime farmlands. When cities are improperly planned, urban sprawl also adds to environmental degradation like depletion of natural vegetation (UN-Habitat, 2016).

Decades of expanding urban development have led to clearance of much of natural vegetation on the hill's tops and slopes. This has destabilized the soil and caused increased run-off; erosion, siltation and flooding in the low-lying areas between. Residential and Industrial development has reduced the land area of lowland forests in Kampala from 7.6% in 1983 to 0.4% in 2004 (Nyakaana, Sengendo, & Lwasa, 2007). According to the Kampala Capital City Authority, forest lands have been virtually eradicated from the city with only 58 ha remaining by 2012. Public park spaces have also been converted to urban development. For example, most of the Centenary Park was remodeled to develop a leisure and recreation center; Lugogo green-park is now a shopping plaza and approximately 1,000 of Namanve Forest Reserves were de-gazetted in 1997 and allocated to Uganda Investment Authority for development. This significant decline in the overall forest coverage and associated top soil erosion has left GKMA with only a few areas of extensive continuous forest habitats and upstream catchments.

2.2 Summary of the literature review

This chapter reviewed the literature related to the study and identified the gaps as well as the strengths on theory, methodology, findings, location of study and year of study in relation to the literature.

2.2.1 Gaps in the literature

While there is considerable literature on Uganda post-colonial history and politics, there is until recently very little documentation on the urban development of Gulu City from 1911-2021 and its adverse effects on urban natural vegetation. Review of the related literature showed that the 1997 Gulu Structure Final Report indicated that in an urbanized settlement like Gulu, the original vegetation had been cleared to give room for urban needs. However the review also emphasized that urbanization of Gulu City had moved a great distance from 1911 to 2021 and yet no concrete study had been conducted on the effect of natural vegetation disappearance as a result of urban development under the study period. The literature also highlighted that the study conducted by Otieno & Atem (2016) was on the impact of effluent of water quality of Pece stream of Gulu Town. The literature on the study conducted by Irumba (2018) on the impact of urbanization on water resources with a case of Hoima municipality indicated that little attention was paid to the study of urban development on natural vegetation change in the study area. The National Environment Management Authority [NEMA] (2006) also made a similar observation on the general state of environment in Uganda.

In previous studies on the several aspects of Gulu City, specifically, the level of effect of this urban development on natural vegetation has received little documentation by scholars. It is along this line that this research anchors to provide the findings on the level of effect of natural vegetation depletion of Gulu City over a period of 110 years.

On extensive review of the literature three gaps were identified and addressed through this study.

- (i) First, previous studies on Gulu Town were conducted from geographical point of view. The research gap that this study attempted to bridge was that by carrying out historical studies we increase our knowledge about the periods and the trend that are important for climatic variation and changes. This study deals mainly with the interaction between urban development and natural vegetation change in a historical perspective.
- (ii) Secondly, all previous studies did not investigate on the level of the effect of natural vegetation depletion as a result of urban development. For instance, the Gulu Structure Final Report of 1997 only indicated that the original vegetation were cleared to give room for urban development but did not explicitly state the level of the effects of that degradation.

Hence, in this study, we investigated and documented the effect of urban development on natural vegetation with a focus on over 110 years.

- (iii) Thirdly, except for few studies like the one carried by Otieno & Atem (2016), the rest were outside Gulu Town. For example, Irumba (2018) studied the impact of urbanization on water resources with a case of Hoima municipality and reported that there is significant increase in urban population than rural. NEMA (2006) also conducted the study on the general state of environment in Uganda. The aim of this study was to fill these gaps in the literature.

2.2.2 Theory

The theoretical review focused on two theories that were used to explain the study. The first one was the Environmental Kuznet Curve (EKC) theory developed by Grossman and Kruege (1991). The main insight of the Environmental Kuznet Curve theory is that income and environmental degradation grow together during the first steps of a country's development, and once a given threshold of income is reached, environmental degradation starts decreasing while per capita income keeps increasing. In addition, the Environmental Kuznet Curve studies the relationship between urban development and natural vegetation overtime and this was relevant to the historical study of urban development and natural vegetation change of Gulu City from 1911 to 2021. It should be noted, however, that there is no guarantee that economic growth will see a decline in degraders/polluters; degradation or pollution is not simply a function of income, but many factors. For example, the effectiveness of government regulation, the development of the economy, population levels. Coupled with these is lack of consideration for the potential negative impacts of economic growth on environment and society.

The study was further guided by the environmental transition theory developed by Marcotullio in 2003. It's a major advancement over the Environmental Kuznet Curve because the theory addresses scale of impact and accommodates different relationships between economic and environmental conditions.

Its major limitations are that it does not distinguish changes in transitions and is premised on unrealistic assumptions that cities undergo series of environmental burdens that shift in temporal scale and geographic scale.

2.2.3 Methodology

Mixed methods was preferred to produce a richer and comprehensive understanding of the study, drawing on the strength of each of the approaches. Using both approaches also enhances validation and complementation. Oral tradition was used to retrieve information about pre-literate past stored in memory (Alidri, 2016). Accordingly, oral tradition is defined as history handed down by word of mouth from generation to generation. Oral history, which is one of the historical sources employed can be defined as history orally narrated by witnesses who either witnessed or participated in the event. The method was used for conducting in-depth interviews with the elderly persons. The strength of the qualitative method which was a major method in this research relied on eye witness account as the primary source because it generates much information from the respondents. However, oral tradition and oral history exhibited inconsistencies in the narratives caused by memory lapses due to age. The gaps were filled through triangulation and corroboration from written documents.

History as a cross-cutting discipline does not only use historical methods but also others. The quantitative method was used in this research to study satellite images showing the GIS maps for the periods 1990, 2000, 2010, and 2021 and analyze the spatial extent of urban development and degradation. This method was helpful in revealing the statistics that showed the intensity of the impact of vegetation loss in the past; such details could not be adequately retrieve through oral tradition and oral history.

2.2.4 Findings

The findings show that Gulu City has been witnessing an increasing size of the population which though declined at some point due to insecurity, generally rose at an increasing rate over the years 1911 to 2021. This result also compares well with what was earlier indicated by Ejigu and Matayo (2006) who reported evolving increases in population within the urban settings.

The study also found out that the urban built-up area has been evolving over the years at an exponential rate with natural green spaces constituting of the wetlands and planted forests alongside the forests reserve co-existing. R7 in her narratives asserted that “Laroo forest was a planted forest reserve as a deliberate effort by the Government to protect and preserve natural vegetation like *vitex donania Sweet (Oywello)* and many others. This agrees with the

Environmental Kuznet Curve theory which states that economic development at some point will attain stability and society will harmoniously live with environment.

The study concluded that the exponential spatial expansion of the built-up area of Gulu City was crucial to the characteristic decline in the natural vegetation over the years 1911 to 2021. In the observation of K3 the urban development of Gulu City has affected natural vegetation in the following urban green spaces which have been encroached on: Uhuru Park, Kaunda Ground, Golf-Course and Boma Ground. This result is much similar to what was reported by Shlomo et al. (2016) that most cities in emerging economies grow spatially through the low urban expansion commonly known as “sprawl”.

2.2.5 Location of the Study

The study area did not cover the entire 225,654 square kilometers of Gulu City land area size as at 1st of July 2020, but was limited within the radius of two square kilometers stretching from the Post Office to CBD area of Layibi, Kasubi, Pece and Industrial Area.

2.2.6 Year of study

This study covered the period ranging from 1911-2021. The justification is that 1911 is the year in which the British colonial administration was established in Acholiland, and 2021 is a historical landmark when Gulu City became operational. The weakness of the time lag of 110 years was that retrieving of the GIS Maps for the period from 1911 to 1980 was a challenge as those details could not easily be accessed. In this study, satellite images showing Gulu urban area for the period 1990, 2000, 2010, and 2021 was obtained and processed to analyse the spatial extent of urban area in the respective years. However, retrieving of the GIS maps for the period from 1911 to 1980 was a challenge as those details could not easily be accessed.

The primary target population for this study comprised of selected elderly people (both men and women) who witnessed the changing trend and pattern of urbanization and natural vegetation depletion, people who are closer to 1911 by age especially those born between 1920s and 1960s with vast knowledge and experience about the historical development of Gulu city and some selected city officials as key informants. In the course of the study getting participants of this age bracket later presented its own challenges as most of them have already died.

2.3 Conclusion

This literature review was set to evaluate the historical trend of urban development of Gulu City within the past 110 years (1911 to 2021). It's clear from the literature that while there are several studies on Uganda post-colonial history and politics, there is until recently little documentation on the urban development of Gulu City from 1911-2021 and its adverse effects on urban natural vegetation. It is clearer that environmental history is still a gray area of study in Uganda and most African universities. With climate change and environmental degradation threats arising from the increase in local and global development trends, this study becomes pertinent in raising critical development issues.

Along with this, the literature review also clear the major areas of agreement and disagreement in the review. This study argues that there exist similarities in the literature provided on Garden city to Green city (Howard, 2002) to the one of Otieno and Atem (2016) because both pointed directly to the threats the environment is facing as a result of the urban growth and development globally. While NEMA (2007) also conducted a study on the general state of the environment in Uganda, these studies are too broad and hence fall short on addressing the research problem in respect to a historical study of the effect of urban development on the natural vegetation of Gulu city from 1911-2021.

Conversely, proportional vegetation cover increased in some urban areas in Eastern North America and parts of Europe. Most urban areas increased in size, suggesting that the observed net increases were driven by the capture of rural ecosystems through low density suburban sprawl. Far fewer urban areas achieved increases in vegetation similar in size, although, this trend occurred in some regions with shrinking populations or economies. Maintaining and expanding urban vegetation cover alongside future urbanization will be critical for the well-being of the five billion people expected to live in urban areas by 2030.

Looking from the paranoid, this chapter on literature review was employed to draw relevant literature to the problem statement in an attempt to assess whether or not these urbanizations affected the natural vegetation of Gulu City from 1911 to 2021 in a substantial manner (whether positively or negatively) and its magnitude on natural vegetation depletion.

CHAPTER THREE: RESEARCH METHODOLOGY

3.0 Introduction

In this chapter, the researcher discusses the materials and methods that were applied in the study. It explains the research design, study area, study population, sample size, data collection method, data collection procedures, data collection instruments, data analysis procedures, limitations and delimitations to the study, ethical considerations and plan for dissemination of results.

3.1 Research Design

The research design employed in this study as the overall strategy to effectively address the research problem was the historical research design which was descriptive in nature. This was done in a historical perspective which constituted the blue print for data collection, measurement and analysis. The research orientation was qualitative (historical paradigms). Malunda & Atwebembeire (2021) contend that this approach arises from the constructivist paradigm that highlights socially constructed realities and their nature. They maintain that it is good for studying people's opinions, attitudes and beliefs among others.

A quantitative approach was used, especially in quantifying the extent of the loss of the natural vegetation to urban expansion. In a similar manner, when gazetted urban green spaces are investigated, there should be an aspect of quantification of their extent. This study therefore employed the mixed approach by the use of both qualitative and quantitative methods, based on

pragmatism theory in order to bring a clear understanding of the phenomenon under investigation.

3.2 Study area

This study was conducted within the Gulu City boundaries. The City, which is about 300km to the North of Uganda's capital Kampala, is located roughly in the middle of northern Uganda with coordinates: 2°46'54.0"N 32°17'57.0"E.

3.3 Study population

The primary target population for this study comprised of selected elderly people (both men and women) who witnessed the changing trend and pattern of urbanization and natural vegetation depletion, people who are closer to 1911 by age especially those born between 1920s and 1960s with vast knowledge and experience about the historical development of Gulu city, and some selected city officials as key informants.

The key informants included: (i) the City Mayor who is key as the political head of the city and plays an oversight role in supervision of implementation of government programs; ii) the City Town Clerk, who is the head of City Public Service, and whose role is to manage the city council priorities and delivery of services through provision of technical leadership and guidance, coordination, implementation, monitoring and evaluation of activities and accountability for city resources; iii) the Statistician; iv) the City Physical Planner, and (v) the Senior Physical Planner. All these key in providing statistical data necessary for the quantification of the extent of the natural vegetation loss that resulted from urban development.

3.4 Sample size

In the determination of sample size, a non-statistical method was employed based on saturation level. This was recommended by Polit & Beck (2012) who notes that when sourcing for general respondents, snowballing techniques and networking would be applicable until the point of saturation is attained. Notably, a small sample size of 6-12 participants is adequate for qualitative studies as the emphasis is put on the richness of the data collected rather than the number of subjects. In total, eight participants were reached instead of initial twelve, because previews of the recorded interviews revealed saturation around the 7th respondent. In addition,

key informants were considered due to their vast knowledge and wealth of experience in the research area vis-a-vis their technical expertise.

3.5 Data Collection Methods

Data collection methods are techniques and procedures used to gather information for research purposes whereas data collection instruments are tools and methods use for data collection. This was a historical study and the data collection sources employed included: oral tradition, oral history and written sources. To achieve the objective of the study, both primary and secondary data were deployed by making use of the snowball technique as the sampling strategy to identify general respondents.

3.5.1 Data Collection Procedure

Data collection was done through in-depth interviews and observation to the elderly persons. According to Social Assistance Grants Employment (2017), the Senior Citizens Grant targeted older persons of 65 years and above. In the context of this study, however, elder persons refer to persons who are closer to 1911 by age especially those born between 1920's and 1960's. In precise terms, the study refers to those who are 80 years and above. In-depth interviews were therefore conducted with this category comprising of both gender in private for each respondent and in the area of their comfort which was either their home or residence environment. Each interview lasted for about one hour that allowed the respondents ample time to describe their experiences in line with the study subject. The proceedings of each interview were audio-recorded to enable tracking. During the process of data collection, it was observed that natural vegetation in the urban gazetted green spaces are being depleted. A case in point is Kaunda Ground which is now bare.

3.5.2 Data Collection Instruments

Interviews as one of the data collection methods was used with interview guides as a data collection instrument. Onen (2008) defines interviews to be person to person verbal communication in which one person (or a group) asks another a question (s) to obtain answers to a given research question deriving from the set objectives. This was employed to generate relevant data to find out the trend of urban development of Gulu City from 1911 to 2021, to

investigate the status of the gazetted urban green spaces in Gulu City, and finally, to assess the effect of the spatial extent of urbanization on natural vegetation of Gulu City from 1911 to 2021.

Correspondingly, the use of GIS was employed to locate the spatial distribution and the extent of urban development and degradation. In this study, satellite images showing Gulu urban area for the period 1990, 2000, 2010, and 2021 was obtained and processed to analyse the spatial extent of urban area in the respective years. The use of GIS were employed to locate the spatial distribution and the extent of urban development and degradation in those years. For example, the satellite image of 2021 revealed that the urban built-up area had increased furthest while natural vegetation had declined. This, therefore, informed the study on the effects of spatial extent of the urban area on the natural vegetation thus showing its intensity. Nyakaana (2015) asserted that GIS was applied in spatial analysis of urban growth to get a characterization of how the city has been growing to obtain historical information factoring the period between 1980 and 2004.

Further to that, the study made use of secondary data sources such as existing literature, including the unpublished and published data, for example, relevant materials on earlier research, journals, archives, periodicals, the media and the like to address research question four on what the effect of the spatial extent of urbanization on natural vegetation of Gulu City is.

3.6 Data Analysis Procedures

Data analysis was guided by the following process. First, electronic data was generated from raw data received, and the process of editing followed suit, preceded by correction and classification of data sources. After finalizing the database and finally creating the data files, the data was analyzed using the thematic procedure of content method of qualitative analysis. This allowed grouping responses into themes and subthemes based on the study objectives. During this, coding of the respondents was done where information that served the same purposes with similar content were grouped together and the varying ones were treated independently for easy analysis and interpretation. The findings were then reported using verbatim technique by the researcher to aid the analysis of the qualitative data.

Satellite images were processed using ArcGIS software to generate maps showing the built-up environment and the natural vegetation in the areas of focus. Map calculations were

done to establish the spatial extent of the built-up areas and natural vegetation for each of the years of analysis. Finally, the statistics on the extent of the land uses was used to generate a time-series effect of one land use type (urbanization) on the other (natural vegetation). Quantitative research does not only use formula in historical research; it requires GIS to show the areas destroyed or built up environment in the past. At higher level, history is both science and humanities; the most important thing is that the period must be specified. For example, satellite images showing Gulu urban area for the period 1990, 2000, 2010, and 2021 were obtained and processed to analyze the spatial extent of urban area in the respective years. Thus, the status of the urban green spaces in Gulu City was revealed during data analysis and this gave answers to research question three on the status of urban green spaces in Gulu City.

3.7 Problems faced during the study

This was a historical research where the qualitative method was adopted, and interview guide as an instrument for data collection was leveraged using snowballing techniques. Oral tradition as one of the methodologies to collect data was employed but it also comes with one major negative flip side: Oral history is history handed down from generation to generation, but a whole generation sometimes disappears either as a result of natural disaster such as famine, drought, or flood or as a result of man-made disaster such as wars, raids, slavery or conquest thereby depriving the researcher of the key respondents. In the course of the study, getting participants of eighty years of age and above later presented its own challenges as most of them had already died. In the face of difficulties in raising eighty years and above, the number of the elderly persons on which the tools were administered varied between seventy and eighty. Historians do not rely on a single source, but always seek corroboration, qualification and correction as the production of history is very much a matter of accumulation of details and refining nuances.

Furthermore, oral tradition does not go very far in the distant past. The transmission depends on the power of memories of successive generations. In an event of memory loss, oral tradition does not maintain the same value of oral history; instead, the value keeps on changing as time goes. This problem was experienced in the course of the research. A case in point is of two elderly women, one aged eighty years and the other aged eighty three; they had memory lag in the course of their narrations. In the ethical research principles of “Do no harm to your client,”

their data were discarded and not captured for the purposes of this research. Triangulation and corroboration of historical facts was employed to verify information where such cases of inconsistencies arose. Secondary sources of data and use of archival documents were used to verify the information.

Another problem faced in the course of conducting this research was that getting interview schedules with the City Town Clerk and the City Mayor was not possible as they were too busy to be interviewed. Instead of initial target of five, the interviews were administered to four key respondents. More so, one prominent problem faced was the respondents' biases which had a tendency to reveal only good things. Besides, the data collection process may easily be manipulated by both the interviewee and interviewer while the responses could have been negative due to high expectation of the additional support.

Some unobservable factors that affected the participation were motivation, expectation, satisfaction and awareness thereby leading to unwillingness to respond on the side of respondents. To overcome this the researcher educated the respondents that their identity would remain anonymous and the outcome of the research would be used purely for scholarly purposes only. In addition to the above problems, there were delays and fears of meeting respondents due to the Corona virus pandemic. A number of standard operating procedures (SOPs) including social distancing were followed.

3.8 Ethical Considerations

First and most importantly, the researcher sought clearance from Gulu University Research Ethics Committee for clearance before embarking on data collection.

Thereafter, the researcher obtained informed consent from the respondents before engaging into interviews with the respondents. No respondent was forced to participate in the interview against his/her own will.

The researcher further ensured confidentiality and anonymity of the respondents by ensuring that their names are withheld from the interview transcripts and report. Besides, information provided by the respondents was not be disclosed to unauthorized persons.

The researcher also implemented COVID-19 mitigation measures by following the SOPs such as wearing face mask, sanitizing and maintaining social distance during data collection.

The researcher also solicited for permission from the City Authority before embarking on the study, in which case an introductory letter was obtained from the Faculty of Education and Humanities introducing the researcher to the authorities.

CHAPTER FOUR:

PRESENTATION, INTERPRETATION, AND DISCUSSION OF STUDY FINDINGS

4.1 Introduction

This chapter presents the findings regarding the historical urban development of Gulu City from 1911 to 2021 and its effect on the natural vegetation. It provides the specific results on the population trend of Gulu City from 1911 to 2021, the trend of the urban spatial expansion of Gulu City from 1911 to 2021, the status of the gazetted urban green spaces in Gulu City, and the effect of the spatial extent of urbanization on natural vegetation of Gulu City with respect to the prior set research questions. The chapter also provides a discussion of the specific results relating them with the relevant literature prior reviewed.

Responses

There were two categories of respondents in this study: The first category were the selected elderly persons who were aged eighty years and above. In the course of the study getting participants of this age bracket later presented its own challenges as most of them have already died. In the face of difficulties in raising eighty years and above, the age of the elderly persons on which the tools were administered varied between seventy. In total, eight participants were reached instead of initial twelve, because previews of the recorded interviews revealed saturation already around the 7th respondent. In total, the researcher had 8 in-depth interviews with the selected elderly persons, 25% of whom were female and 75% male.

The second category of respondents were the key informants and this comprised of the appointed Government officials and they included the Senior Physical Planner, the Physical Planner and the City Statistician, and the former Mayor of Gulu Municipality. A total of five key informants was initially targeted but only four were interviewed because the City Town Clerk and the City Mayor were too busy to be interviewed.

For anonymity, the selected elderly respondents were coded as Respondent 1(R1), Respondent 2(R2), Respondent 3 (R3), Respondent 4 (R4), Respondent 5 (R5), Respondent 6 (R6), Respondent (R7) and Respondent (R8). The key informants were coded as Respondent K1, K2, K3, and K4. Also, information that served the same purposes with similar content were grouped together, and the varying ones were treated independently for easy analysis and interpretation.

4.1.1 Findings on the population trends of Gulu City

The first objective of the study was to establish trend of the population within Gulu City from 1911 to 2021. The results arising from the Uganda Bureau of statistics were as shown below;

Table 4.1: Population of Gulu City over the Years

Years	Jan 1969	Jan1980	Feb1987	Jan 1991	Sep2000	2002	Jan2019
Population(000s)	18.190	14.958	29.292	42.841	69.282	119,430	198.061
Annual Change%	-	-17.8	95.8	46.3	61.7	10.9	185.9

Source; UBOS (1969, 1980, 1987, 1991, 2000, 2019 & 2002)

The study results shown above indicate that the population of Gulu urban area has been increasing over the years. As of the year 1987, Gulu as an urban town had a population of 29,292 people. This was correlated with qualitative interviews for prior years as herein below.

Gulu city is the largest metropolis in the northern region of Uganda. The city has a population density of (2,728/km²) and represents one of the fastest-urbanizing regions in Uganda. According to the National Housing Census Report (2014), Gulu City was ranked the fifth largest municipality in Uganda with a total population of 152,276 people (increasing from a population of 14,958 in 1980) and a growth rate of 2 per cent before being elevated to city status. The UBOS projections for the current expanded Gulu City put the population at approximately 206,000 people.

Table 4.2: Population projection of Gulu city 2040

DIVISION	FORMER SUBCOUNTY/DIVISION/Ward	POPULATION 2014	PROJECTED PUPULATION 2040 (Growth rate3.3%)
BAR-DEGE-LAYIBI DIVISION	Layibi Division	37,205	86539
	Bar Dege Division	40,322	93789
	Oitino Ward	3,702	8611
	Alokolum Ward	5,486	12760
	Kweyo Ward	3,929	9139
	Patuda Ward	3,644	8450
LAROO-PECE DIVISION	Pece Division	45466	105754
	Laroo Division	27313	63530
	Laliya Ward	7,278	63530
	Pakwelo Ward	4807	11181
	Unyama Ward	4794	11151
	Agonga Ward	4926	11458
	Pakwelo Ward	3458	8043
	Acoyo Ward	2,441	8043
	Kal Ward	5,658	8043
	Pageya Ward	6,286	8043
TOTAL		206,715	518,064

Source: Mott-MacDonald 2021

According to the census report, the average population density of Gulu City has increased from 2,168 persons per square km in 2002 to 2,764 in 2014. R1 noted that the population of Gulu Town from 1911 to 1920 was estimated to be less than 2,000 because the town itself was small and people were very few. This similar view was shared in the narration of R8 that “in 1911 to 1920 the population was low because even the adults were few and estimated the population to be between 500 and 1000.” R1 continued to submit that still, “from 1920 to 1930, the population could have been less than 3,000 but from 1930 to 1940 the population had increased to more than 6,000”. This was a fact that was confirmed by R5, R4 and R8 who expounded that the increase in population could be attributed to majorly three factors. Social amenities could have partly attracted other clans to move to Gulu Town. Secondly, intermarriage also was a contributing factor in population increment. In the narratives of R4, the most important factor in the increase of the population was the construction of Gulu Hospital in 1932 which view was also shared with R8 whereas R8 attributed that some people were attracted to build the Catholic Cathedral

between 1911 and 1914; thereafter, they became permanent residents of the area after the construction. In a bid to solve the manpower gap in the construction of the hospital, the British had to evacuate people from Anaka, Apaa, Lamogi, Alero, Toro, Pagak, Pabwo and Parabongo under the pretext that those areas were infested with Tsetse flies. When they were brought to Gulu Town, they never returned to their original villages. Instead, they intermarried with other clans hence population increase. This fact was corroborated by Egeru et al. (2020). They noted that *Glossina spp* (Tsetse fly) studies in Uganda have shown that the country has had three major epidemics of sleeping sickness since the 1890s. Over the years, the geographical extent of tsetse prevalence and trypanamosis in Uganda evolved. It expanded from traditional concentration in Buganda sub-region (1905-1920) to the Busoga, south-eastern and mid-eastern parts of Teso sub-region as well as the Northern and West Nile areas of Uganda. In effect, these participants speak to three important issues that contributed to the population increase of Gulu City and they included both pull and push factors like the needed manpower for the construction of Gulu Cathedral and Gulu Hospital between 1911 and 1932, social amenities and intermarriages among clans.

R1 in his narration estimated that in the first census which took place in 1911 in Uganda, the population of Gulu Town might have been less than 5,000, and in the second census of 1959 it was about 6,000. However, R2 estimated that between 1969 and 1980, the census population of Gulu must have been about 30,000. He continued to submit that during President Idi Amin's regime, there was no census undertaken in the whole of Uganda.

One of the respondents - R6 enlightened that "the other reason for the increase in population of Gulu Town was due to the influx of the foreigners who came and settled in Gulu Town due to several reasons". He continued to submit that "between 1911 and 1960 and even after independence, the population was rural-based. Majority of the population lived in rural areas where peasantry agriculture like cultivation of food crops and keeping of the livestock were the main pre-occupation. He added that even Government employees like teachers and Agriculture officers would commute to offices from their homes.

The same respondent highlighted that "there were few Africans who lived in African quarters in Pece. The few that he could remember were: Arthur Eture Oryem the then Assistant Agricultural Officer who was his father, Okot Lakana –the Information Officer, Engineer

Anthony Oryang - an Engineering Assistant, Mark Okot – the Senior Medical Assistant and the late Alija Latim who was a Teacher/Politician.

Respondent R6 was on spot saying that “the Asians who included the Banani, Koja and the Ismaili were the major business persons living in the Bazaar (central business district) doing business in front of the commercial and living behind, and some few Africans also participated in doing business”. R7 in her narration confirmed that the Indians were the first foreign inhabitants in the urban growth and development of Gulu Town. She recounted that “her father the late Mzee Abondio Odur, was one of the first black business partners to the Indians and constructed the commercial building Atanga Family which still stands adjacent to Gulu Main Market between Labwor Road and Olya Road. Other first black businessmen that she could remember were: Wilson Lutara, Anywar Collins and Ajulina Ouma who constructed Gulu Dit building, now a ramshackle building”.

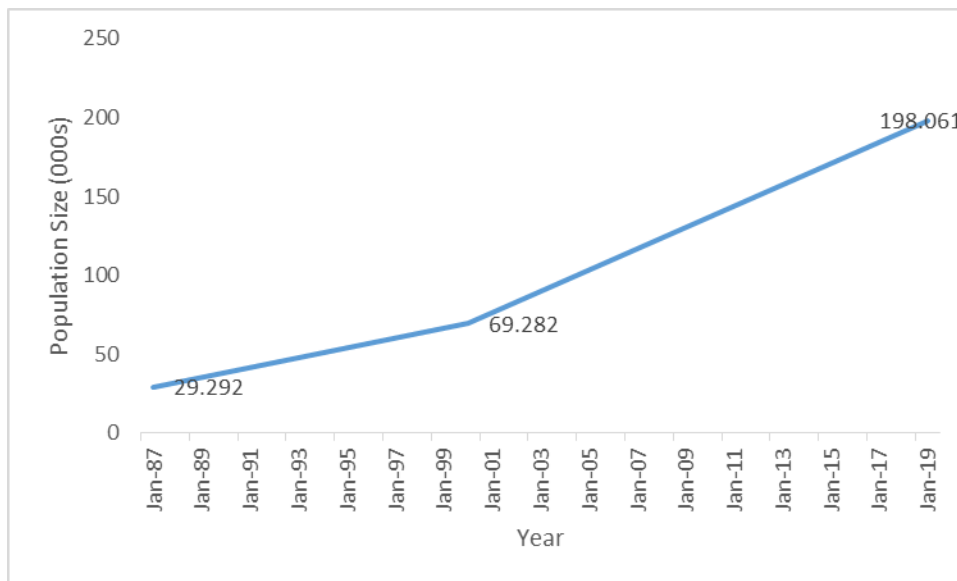
Similarly, R6 alluded to the same that, Singh - another category of the Indians were also living within Bazaar and were mainly involved in construction work, building and managing motor garages.

Here is further excerpt from R6: “all the fuel station like Eso was managed by Badrudin and wholesalers and retailers were being managed by Indians of Indian and Pakistan origin. The Goan quarters was mainly for civil servants and majority were Goans who were of Indian origin; their major occupations were in the fields of accountancy and holding executive offices in the Government, handling finances.” Coupled with the above, R6 submitted that BR Government Pool Houses in Senior Quarters were preserved for Senior Civil Servants. This was exclusively preserved for Heads of Departments and Regional Officers covering the whole of Acholi and majority were European.

R6 continued to observe that the area to the south of Gulu City Kanyagoga was mainly occupied by Banyoro, which fact was corroborated by K2 that a one Munyoro commonly was referred as Mzee Pantaleo had his residences around Kanyagoga area. In the Lunyoro language it literally means “coldness”. Further to that, both R8 and R6 asserted that Lendu occupied the place before Layibi Trading Center, presently referred to as Cereleno but the Nubians during Amin’s regime occupied most of the commercial area, notably Layibi Trading Center. They added that Kasubi was a mixed place where there were many immigrants from other Central

Uganda, West Nile, Pakistan, India and Britain. It is conceivable that Gulu had a mixture of other races and it included: The Whites, Orientals and the Africans. The population trends continued to grow over the years as reflected in Figure 4.1.

Figure 4.1: Population Trends of Gulu City



As in Figure 4.1, the population was about 69000 in the year 2000. Due to unavailability of statistics prior to the year 1987 when official population censuses were implemented in Uganda, the trend of population is correlated with the qualitative narratives as follows:

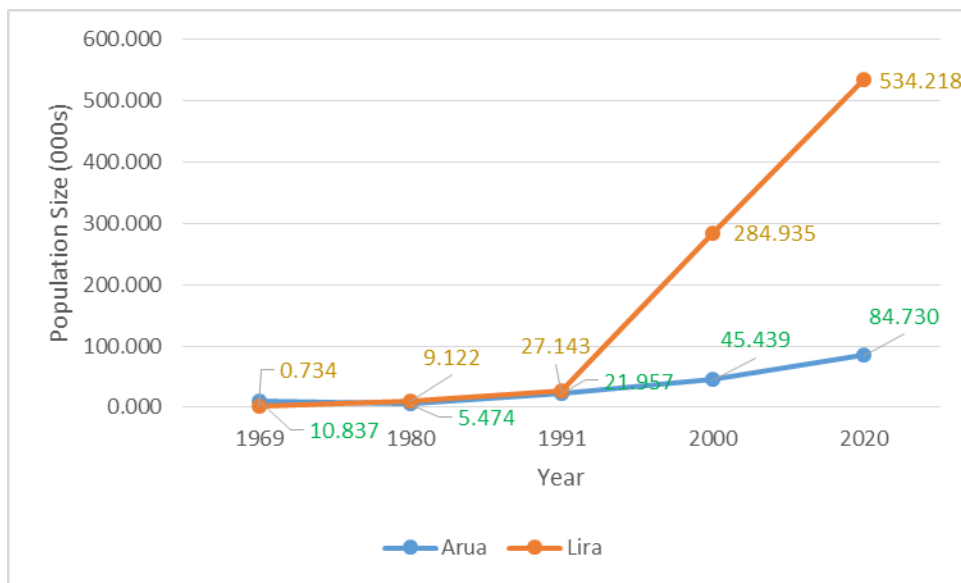
According to participant K4, in 1987 the population of Gulu Town was 29,292 and the urban built-up area was 7.7 Hectares while in 2000 the population was 69,282 and the urban built-up area had increased to 290.3 Hectares. By 2019, the population had increased to 198,061. K4 continued to submit that the urban extent annual change between 1987 and 2019 was 5.7 per cent whereas urbanized open space in the same period was 47 percent.

This population however increased by 136.5% that is more than doubled to 69,282 people as of the year 2000 during which the census was held. Indeed, as noted by R2, in the censuses of 1991 and 2002 the population of Gulu could have been less than 100,000.

As per the statistics in Table 4.1, the urban unit continued to witness an increasing size of the population that by the early 2019, Gulu City had a population of 198,061 people. This represents an increase of 185.9% in over a period of a decade. Overall, the increase in the

population of Gulu City has been witnessing an increasing rate that's from an increase of 136.5% between the year 1987 and year 2000 to an increasing rate of 185.9%. Similar trends of population growths were reported in the other cities of Arua and Lira as in the Figure 4.2 that faced similar situations

Figure 4.2: Population Trends in Arua, & Lira Cities



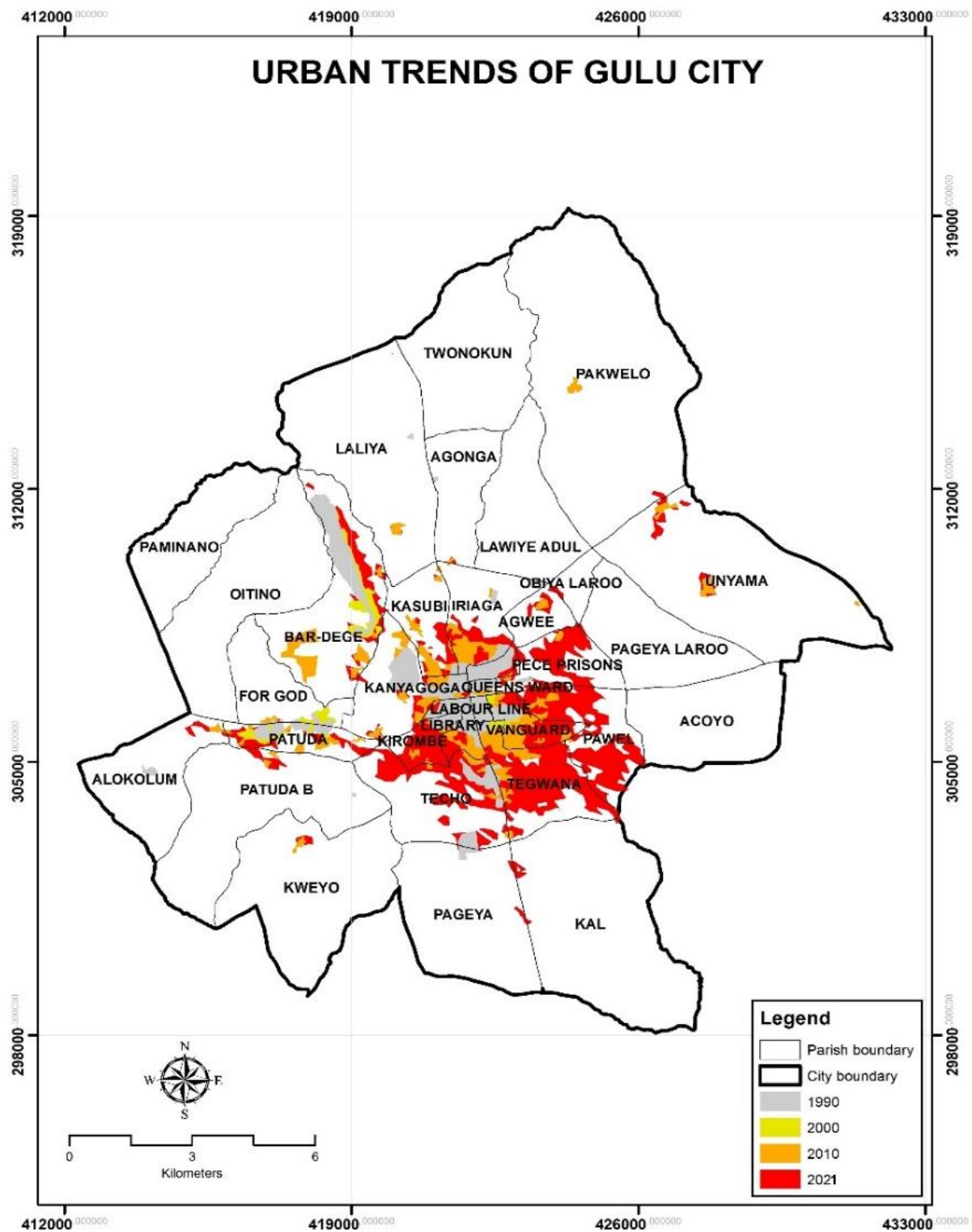
Source: UBOS and others

As in the Figure 4.2, the populations of Arua and Lira Cities that faced similar phenomena as Gulu City have equally been increased though the rate was much higher in Arua City than in Lira City. This result compares well with what was earlier indicated by Ejigu and Mataya (2006) who reported evolving increases in the population within the urban settings.

4.1.2 Spatial Expansion of Gulu City

Apart from the population trends showing population increase, there is an increase in spatial expansion. This is evidenced in the Gulu City Map of the urban trends as shown in Figure 4.3.

Figure 4.3: Map of Gulu City showing spatial Urban Sprawl



Source: GIS (1990, 2000, 2010 & 2021).

As can be seen in the Figure 4.3, the urban setups and their related activities concentrated in small geographical areas at a border of Pageya and Techo, the border of Techo and Tegwana as of the year 1990. The urban areas were however concentrated around Kanyagoga Queens towards Pece Prisons and some portions in Bar-Dege. This aligns well with what all the interviewees R1, R2, R3, R4, R8, R7, R6, R5, K2 and K1 who seem to agree that the name of Gulu originated from a spring well/ lagoon which has existed to-date with permanent water oozing from underground. They contended that there was a deep valley to the south-west of Gulu Town with steep valley which could create “Gul-Gul”-like sound as water pours down the slope in the area and in the European phonetic repetition of the same word is not common in the English version as they mapped the place, they adopted Gulu instead of Gul-Gul.

However, R4 introduced more detailed information as pertains to the origin of Gulu Town. He expounded that, the Arabs came to Gulu Town in 1841 under the disguise of spreading Islam and camped in Gulu-Gulu area. This eventually became their center for coordinating slave trade and slavery, with their main camp which was established at Ajulu in Patiko sub-county. Latigo Gulu who was the clan chief of Pageya Lapoti, one of the eight clans earlier on mentioned collaborated with the Arabs. When the British, who had initially camped in the area with their civilizing mission on evangelism, education and health services forcefully displaced the Arabs - headed by one, Mohammed Said and his ally Latigo Gulu from the area and Latigo Gulu re-allocated to Pece Pawel from where he died and was buried. The name of Gulu could therefore be likened to this great Acholi Chief who lived in Gulu-Gulu the present Mican ward in Bardege-Layibi, City Division.

Other participants - R3, R4 and R8 provided a similar view that Gulu urbanization came about as a result of development of religious setup with protestant leadership setting up their center in what is now Northern Diocese where St. Philip Cathedral is now based. R4 pointed out that *“by 1895 the British had already made their footprint in Gulu and by 1901 Protestantism had already been entrenched at Mican. Catholics came in 1911 when St. Joseph’s cathedral was constructed”*. R8 gave an account of how improved medical services led to the urban development of Gulu with the coming of Gulu Hospital and St. Mary’s Hospital Lacor in 1932 and 1959 respectively. R8 further emphasized that there was improvement of educational facilities with the construction of St. Joseph’s Junior Secondary School, Sir Samuel Baker

Secondary School, St. Joseph's College Layibi and Gulu High School. This was corroborated by R1 that the Anglican Church was established at Mican in 1912 where they opened their school Gulu High school but had a contrary view that the Verona Father came in the 1930s where they established St. Joseph Primary School. This fact was confirmed by R3 that the Catholics took up the adjacent immediate position and set up St. Joseph which later metamorphosed to become a cathedral with medical setup. This later turned out to be a health center and eventually St. Mary Hospital Lacor which same view was corroborated by R4.

The Daily Monitor in their Special Report Friday, November, 26, 2010 ran a story "Gulu Today and 100 Years Ago". Christianity was introduced in Gulu about 1903 and the first baptized Acholi priest was Ali Musa and the first bishop to be ordained was Rev. Adipayo Latigo in 1939. In 1913, the first school Gulu High School, was opened by Padre Qudesia". What can be inferred is that whether catholic or protestant, Christianity was instrumental in the urban growth and development of Gulu City right from its inception.

R1, R3 and R4 all argued that Gulu Town started as a military base but later upgraded to an administrative unit of the colonial government in 1912. R1 and R2 revealed that the transition into administrative unit coincided with the idea of establishing the headquarter of Acoli. They continued to contend that the initial place that was chosen as the Acoli District Headquarter was Keyo in the present-day Amuru District but several factors such as Lamogi rebellion of 1911 and frequent and severe lightening among others forced the Colonial Government to relocate to the current position of Gulu.

In the views of R2, urbanization was first sited by the British at Keyo area (Mountain) in the present Amuru District but was shifted to the then West Acoli District Administration. Because of favorable vegetation and cool weather given by the present Gulu City, the British moved and started building around the present weather station. The British were attracted to this area because of their love for a cool weather thus moved the site from Keyo to the present Gulu City.

By 1926 as submitted by R1, the size of Gulu Township was roughly a radius of about 2 miles. This fact was later confirmed by R3 who explained that economic expansion led to infrastructural development and that the first road that was opened was Nehru Road that ran from Kampala Road to Gulu Post office.

However, R2 asserted that the size and boundary of Gulu Town in the North ran as far as Laliya Trading Center and this seemed to be in agreement with submission from R1 that when the headquarter was transferred from Keyo, it was at first established at Kei and southwards it ran as far as Layibi swamp. It was said to have stopped at Custom Corner in the west, whereas in the East, it stopped before Obiya primary school. K2 equally noted that in the 1980s, Gulu was a small Town on Moroto Road; it stopped at Holy Rosary. On the Northern side, it stopped at Corner Kitgum while on Sudan Road, it stopped at Custom Corner. It was also indicated that on Kampala Road, Gulu Town stopped at Bilbao and that beyond those frontiers were rural areas.

In addition, narrations by R3 revealed that the growth and development of Gulu City was gradual in the sense that the colonial administrators were engaging the local community mainly on forced labour while setting up their desires but later the locals adapted to their methods. As earlier on submitted by R3, the first community to settle there were the Madi from West Nile who at first were attracted to work for the missionaries and later the Indians and in the railway construction.

R1 continued to contend that civic centers like Police and dispensaries which were constructed at the present City Yard before Gulu Main Hospital was built were constructed between 1930s and 40s. This participant had to put it this way that Gulu Main Hospital was built in 1934 but there were profound differences to the submission of R4, who argued that the first hospital was built at Caribbean around 1901 by the protestants and was later transferred to the present location in 1930.

Coupled with the above, R1, R7, R6, K3, R5, K2 and K1 all asserted that residential quarters like Senior Quarters for government officials mostly colonialists were built between 1933 and 1934. Local Government structures were established by 1936 where the Acoli council Hall at the present Gulu District Headquarter is situated. R6 went ahead and narrated that, people living in BR Government pool houses in Senior Quarters in Gulu Town were exclusively District Heads of Departments and mostly of foreign origin - the whites.

More so, according to R1, the Postal Service of East African Common services organization which was the body of the whole of East Africa and later developed to the East African Economic community was established in the 1930s. R1 highlighted that apart from Nehru Road, Atwal Road and Awich Road had alluded to earlier, another street on Awere Road

was created where the big commercial building of Badrudin brought many buses. This road ran from the Round About to Pece Local Government Prison presently renamed Jomo Kenyatta Road and was established in the 40s as per the narration. This was corroborated by R3 that such prominent Indians who remained respected in Acoli and Gulu included Aboo, Atwal and Badrudin were instrumental in opening the transport operating system/business. More locals from the villages started filtering in the urban Gulu increasing in population and business activity. This resulted into high demand for accommodation which is affordable by casual laborers.

R1 went ahead and narrated that just opposite Local Government Prison at Pece, in 1948, a Local Government primary school was constructed - Pece Local Government Primary School under the control of the Central Government (Pece Mahdivani).

All the four respondents interviewed opined that Gulu Town was predominantly mud-wattled grass-thatched houses. According to R4's version, there were only three Mabati Houses at the homes of: Owiny, Adimola and Odida, whereas R1 on his part narrated that there were few commercial buildings on Andrea Olal Road, a few around Amuna's building and a few on Atwal Road.

Narratives from R1, R2, R3 and R4 are all in agreement that Iron roofed houses started emerging in Gulu in the late 50s and early 60s. All of them shared similar views that Labour Line was constructed to house the road workers commonly referred as PWD (Public Works Department or Pida workers camp) who embarked on road constructions. However, R2 further explained that Labour Line was built for a group employees, but the first inhabitants were demobilized World War II Veterans. They were stationed there and those who had skills like drivers, mechanics, clericals, medicals or any other skills were deployed in different ministries and accommodated there. That place remains a Labour Line Quarters up-to-date. According to R2, the reasons for the emergence of Iron roofed houses was because tins for cooking and Kerosine provided the Mabati followed by the Iron roofs; however, most of the walls were mud-wattled.

R1 submitted that in the early 50s around Pece, there was a residential quarter called African Quarters. It was meant for African employees of Government like Bankers, Clerical Officers and Government Officers. R1 further narrated that to the West was Kasubi area where

the colonialists established Gowns Quarters meant for the Asians and that some of the quarters have been assimilated by the barracks.

R4, R2 and R1 all agreed that in the 1950s there was already progress of Sports and Football. There were already plans to build a Stadium because by 1956 Acoli Football Soccer Team was sent to the United Kingdom to play Football and it accelerated the interest of building a Stadium. By 1958-1959, Pece Stadium was already built by the Acoli Local Government and the name of the stadium was given as Pece War Memorial in the memory of the veterans who fought in the Second World War.

According to R1, by the 1950s, more commercial buildings were established on Nehru Road. These were mainly occupied by the Asians Bank Services which was already opened by the Uganda Credits and Savings Bank around Patiko enterprises along the Main Street.

R2's narrative was that by the time of elevating the status of Gulu from a mere Town Board to a Town Council in 1960, on the northern side the boundary extended as far as before Laliya Trading Center, southwards to Layibi Swamp; in the west it stopped at Custom Corner. This view was confirmed by R6 who narrated that pre-independence Gulu had a Town Council and the area was about 2 miles from the central business district.

R1 reasoned that in 1969, a very big commercial building called Atanga Family was built by an Acoli. This prompted many Ugandan businessmen to come and build in Gulu and to begin running commercial businesses. Thus, majority of them came in to join hands with the Asians. There were also in the outskirts of Gulu Town like Layibi, Custom Corner, and Unyama small retail businesses that were being carried.

Participant R1 had this to say *“there was a broken vehicle thrown around Pece. Some people had built semi-permanent buildings for rentals. Women started renting those buildings for brewing Marua, a local potent gin. It became one of the few places where people gathered in the evening to take Marua. It was commonly referred to as Vanguard meaning the place where the broken vehicle is situated.”* This was corroborated by R4 who asserted that a Bogugard Vehicle which had mechanical problem became a marua joint by Mego Kele.

According to the narratives of R2, when Gulu was granted municipality status in the 70s, the northern part had been extended from Laliya Trading Center to Bungatira Primary School,

southwards from Layibi Swamp up to the valley separating Koro sub-county and Layibi Trading Center. This stretched to the late Odoch's home from Obiya Highland Primary School on the eastern side. This was confirmed in the narrations of K2 when she said that later development of 54.6 square kilometer radius was extended and that was when Gulu was granted municipality status. R6 further confirmed that Gulu became a Municipality in 1974 and the first Mayor was Hassan Greek and his Deputy was Obi. He continued to submit that the area of the municipality on the northern side was up to Laliya Tol-Manwang and the eastern side up to Highland Primary School. The north-eastern side was up to the current St. Mauritz, Moroto Road and it stretched up to Pece Stream. In the southern part it ended in the first windows in Layibi center of the commercial shops (those others were outside the municipality). Towards Pakwach Road, it ended at Awaranga and on Juba Road it was up to the point of the valley of Lacor Market.

It was pointed out by R1 that in the early 70s, there was a new political system in Uganda under the Leadership of Dictator Idi Amin Dada whose 1972 political pronouncements expelled the Asians. These Asians were operating business in Uganda where 60,000 of them had British passports. Britain and some other countries decided to accommodate them. According R1 those expelled from Gulu were less than 1000. Meanwhile, in Uganda, the government allocated the Asian businesses to the citizens.

As in the figure 4.3 since 1990, there has been spatial expansion over time to other areas as reflected in yellow that's Vanguard, even up to Patuda, then Alokolum and Patuda. This result is much similar to what was found by Mukwaya et al. (2016) who prior explained that the age of urban initiation in Uganda was before 1900 but reported the building of the Uganda Railway as accelerating the growth of urban centers such as Tororo, Kasese and Gulu.

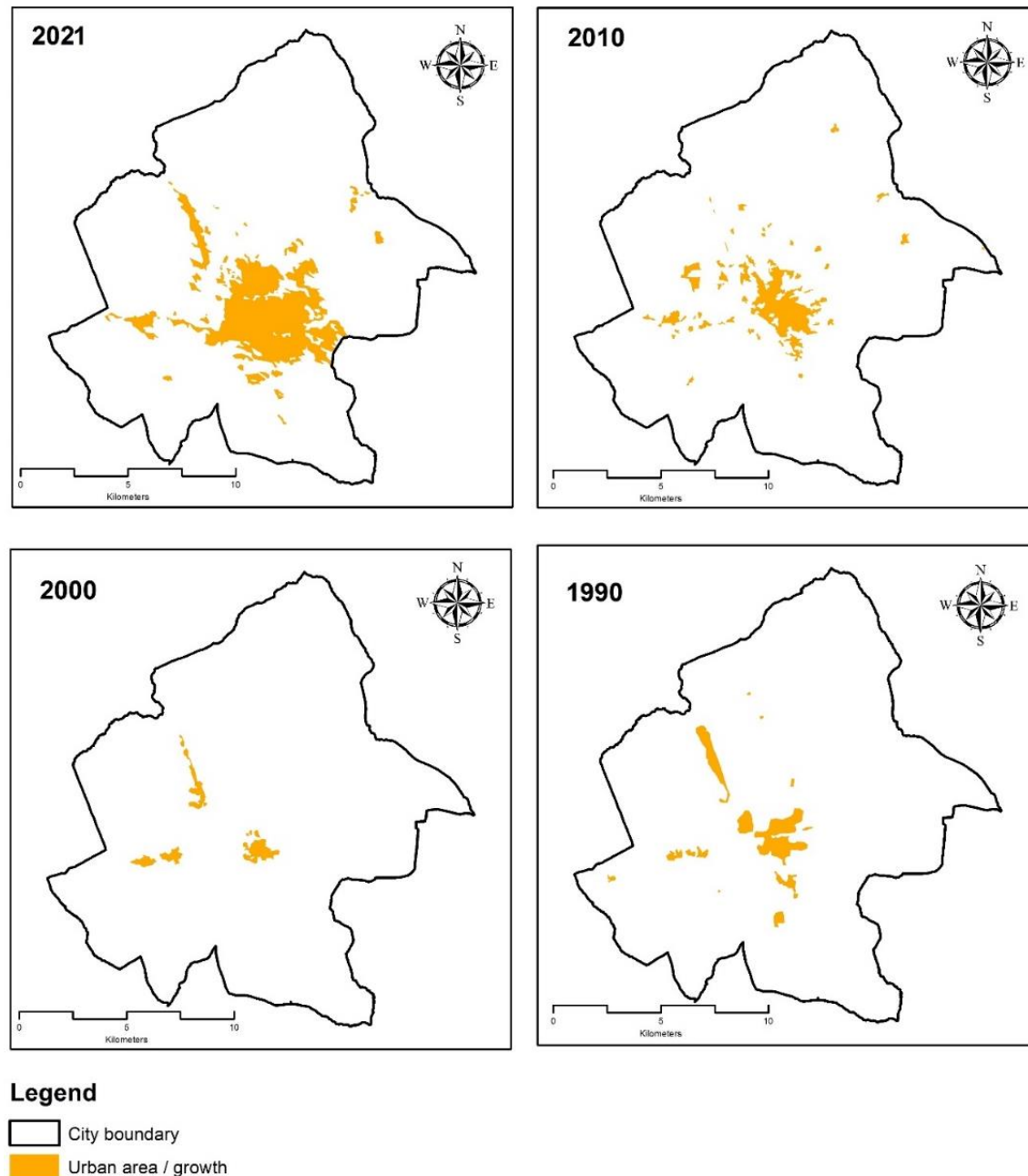
Spatial expansion reflected through the urban spiral has continued that the city has spread to far places such as Kal, Pageya, Kweyo, and Unyama. There have been further expansions in the areas with urban settings and related activities of more than 3-fold as in the Shaded red areas.

Specifically, R2 went ahead to highlight on what became Gulu City in terms of its present boundary after she was granted City status on the 1st of July 2020 but became fully operational in July 2021 through an Act of Parliament. The Ministry of Local Government in the exercise of the Constitution of Uganda under Article 179 (a) (GOU), 1995) and the Local Government Act, Section 7 (2a) of the Local Governments Act CAP 243 (GOU) presented bills in Parliament

seeking for a creation of 15 cities of which Gulu City was among one of them. On April 28, 2020, the Parliament of Uganda approved these cities.

That the former boundary of Gulu Municipal Council on the northern side was extended from Bungatira Primary School up to Bungatira Trading Center. On the eastern side, it extended from the late Odoch's home in Obiya up to Sir Samuel Baker Secondary School. Southwards, it was extended up to the valley before Koro Abili Trading Center and finally westwards, the boundary moved after Lacor Bardege Market up to Tochi River.

Figure 4.4: Maps of Gulu City showing urban growth trends from 1990 to 2021



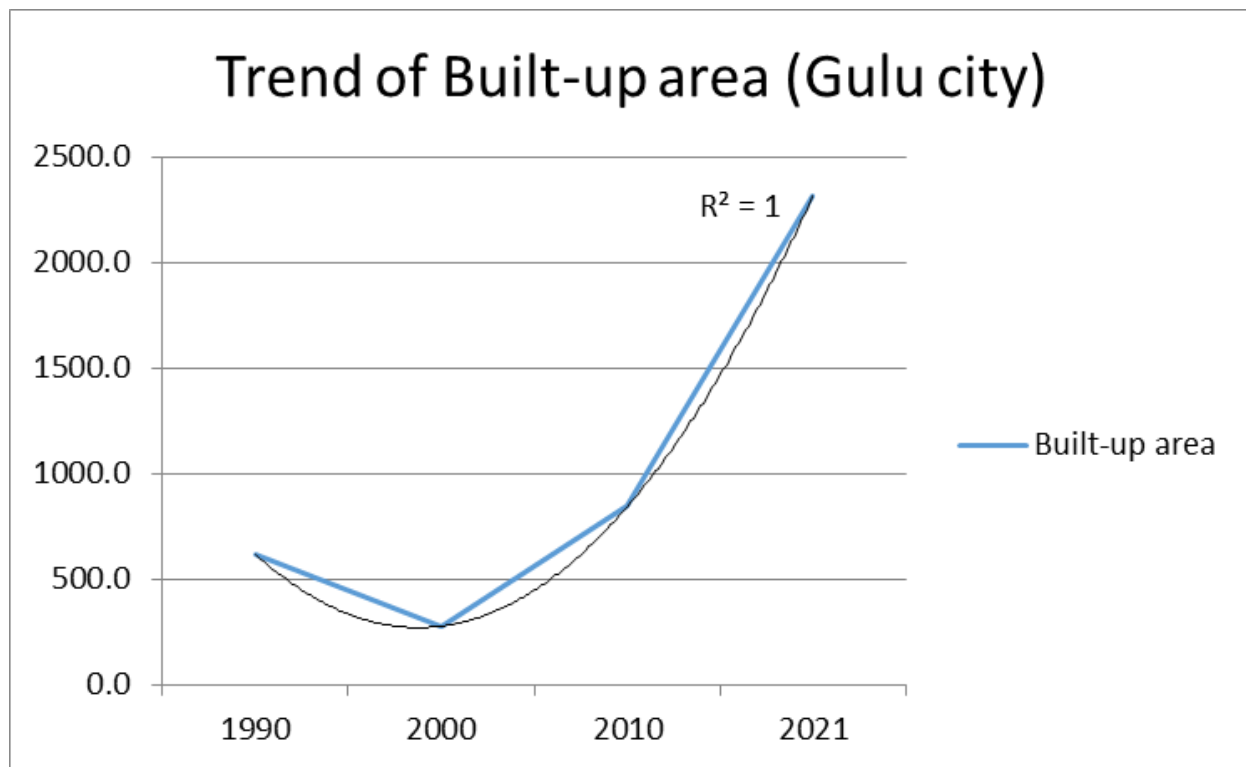
Source: GIS (1990 to 2021)

Figure 4.4 shows that a relatively small area of the land was actually urban as of the year 1990. The size of the area of the urban nature however reduced as of the year 2000. This could be attributed to the fact that insecurity trends which were common in the areas rendered people to shift to more secure areas resulting in reduction in urban area. There was also destruction of the few urban residential which furthered the shrinking of the urban area.

The results show that as of the year 2010, the spatial dispersion of the urban area was much high widening but with some smaller towns coming up. As of the year 2021 that's a decade later, the urban built up area had increased furthest filling up the scattered urban units with urban residential and activities.

This spatial expansion of the urban setting is further supported by the fitted trend as in the Figure 4.5 below.

Figure 4.5: The Trend of Built-up area of Gulu City from 1990 to 2021

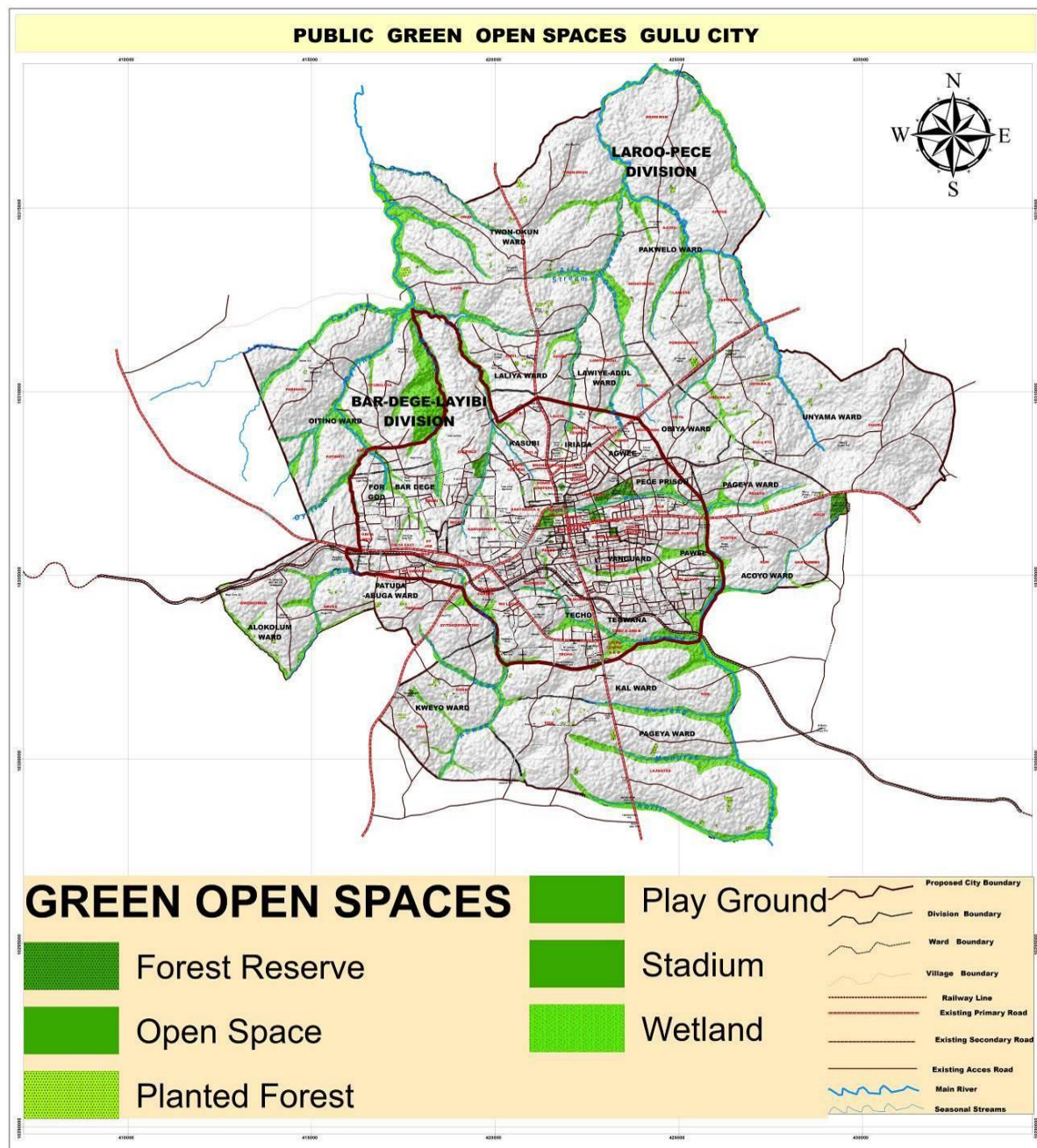


As reflected in the figure 4.5, the built-up area in Gulu City first shrunk between the year 1990 and the year 2000. This was attributed to the insecurity that characterized the place. From the year 2000 however, spatial expansion of the urban area increased. The increased was then furthered at a very high rate between the years 2010 to the year 2021. Here was an exponential spatial spread of Gulu City based on maps and the fitted trends. This result is much similar to what was reported by Shlomo et al. (2016) that most cities in emerging economies grow spatially through the low urban expansion, commonly known as “sprawl” which takes place in the context of poorly regulated land use and distorted land market. It is also quite similar to what was found by the OECD (2016) that most urban expansion in developing countries is characterized by informal growth, increasing the number of people who live in slums.

4.2 The State of Urban Green Spaces in Gulu City

The second objective of this study was to investigate the state of the gazetted urban green spaces within Gulu City. The study results in relation to the major formal and informal green and blue infrastructure assets in Gulu City are as presented in Figure 4.6.

Figure 4.6: Major formal and informal green and blue infrastructure assets in Gulu City



Source: Mott-MacDonald, 2021

As reflected in the Figure 4.6, several green spaces still exist in Gulu City. These green spaces specifically constitute of the wetlands, the stadium of Gulu City, the playground and the planted forests. The other green spaces found within Gulu City include the forest reserve and the planted forest. In particular, the dominant and most active open green spaces as of the year 2021 include: Pece War Memorial Stadium in Vanguard ward, Boma in Iriaga ward and Kaunda grounds (a

large public open space which was used for a large meeting during the Papal visit in 1993) in Bar Dege Division, Golf Course in Ariaga Ward in Laroo Pece Division, Uhuru Park in Bus Park Ward, and Laroo Central Forest Reserve in Holy Rosary Ward in Laroo Pece Division. Numerous playing fields are attached to schools, but usually fenced off and not accessible for public use while Boma Ground located behind Acholi Inn also supplements the already existing grounds during games. There is also a lack of sports facilities, recreation and public space at all levels that serve the whole population or local facilities for neighborhoods.

All the twelve respondents interviewed asserted that Gulu before the advent of colonialists was deeply forested with native tree varieties such as *Ficus natalensis* Hochst (Kituba), *Acacia hockii* de Wild (Okutu Oryang), *Vitellaria paradoxa subsp. nilotica* (Kotschy) A.N. Henry, Chithra & N.C. Nair (Yaa), *Combretum collinum* Fresen. (Odugu), *Vitex doniana* Sweet (Oywello) and many others. These forests were inhabited by wild animals such as *Loxodonta africana* (Elephant), *Bubalus bubalis* (Buffaloes), and different species of kobs. Some people fed on them to supplement their vegetation diet. This was further triangulated by R1 who said that the area was also endowed with several streams that provided people with fish such as Mud fish among others. Further confirmation came from R2 who submitted that Pece Stream had a lot of natural trees. Besides, Layibi Swamp had thickly *Cyperus papyrus* (papyrus reeds) with many species of monkeys roaming all over the area, for example, *Cercopithecus aethiops* (Ongera). R2 contented that Gulu-Gulu area had thick forest stretching up to Oitino Stream providing greenly area with thick natural trees. He further submitted that there are still some pockets of thick forest thriving; this are believed to have been used by the original inhabitants - the Patiko clan for their divination in the Rain making festival periodically performed to appease the gods and grant them good health and blessings.

R5 on her part narrated that buildings have grown and are still growing in what used to be urban green spaces. She asserted that urban green spaces have been encroached on; a notable example she gave was Alero Alpha Garden which has encroached on Pece Stadium an urban gazette green place preserved for sports. This was confirmed by R6 who asserted that, where Alero Alpha Garden is situated was a parking lot for the guests who would come to watch sporting events in Pece Stadium. K1 on his part admitted that the natural endowments of Gulu City have been destroyed to give way to commercial and residential buildings as well as

industrial areas to some extent. For instance, K2 pointed out that where Gulu Modern Market is now situated was deeply forested and surrounded with mud-wet grass-thatched ramshackle buildings.

As revealed by R2 in his narrations, the following constituted the urban green spaces in Gulu Town: Golf-Course which was purely green, well mowed with periodic workers who were in charge of its proper maintenance. The well-spacious Golf-Course which R2 estimated to be 30 acres in size was majorly used for leisure activities, golfing and partying. This fact was confirmed by R1 in his narration that the Golf-course was preserved by the British for their leisure where they had their rest house in the former Gulu Town primary school. R4 submitted that Golf-Course in terms of size was bordering Senior Quarters up to Akena Pa Jok's residence. R1 explained that the then Municipal Council changed the user clause of the Golf-Course where it was allocated into plots for residential building purposes. K2 augmented this statement and asserted that Gusco buildings, AMREF, Gulu District Engineering Offices and TAKS Center were part of Golf -Course that was encroached on as a result of urban development of Gulu Town. This was further confirmed by K3 in her narratives that natural vegetation in Gulu City was affected by urbanization. She went ahead to nail her point down that open green spaces like Golf-course have been encroached on and have now disappeared. She cited TAKS Center which was Tennis Court and part of Golf-Course.

Further corroborations were made in the narrations of R7 on the existence of Golf-Course as one of the urbanized open green spaces that was destroyed due to urbanization. She pointed out that Gulu Golf-Course was the best Golf -Course in the whole of East Africa but unfortunately due to political changes it was sub-letted for construction. She continued to submit that, there were Basketball areas and that TAKS Center was an area for recreation. The Golf-Course was big, starting behind Acholi Inn and stretching up to Kitgum Road. R6 vividly described the Golf-Course. In his narrations the Golf-Course was an open ground and second longest in Uganda, following Entebbe Golf Course. He continued to explain that there was Gulu Golf Club where after playing Golf, the Golfers and Government officials would retire and relax at Gulu Golf Club, presently the TAKS Center.

R6 submitted that the Golf-Course was running from the Resident City's Commissioner's Offices up to Kitgum Corner. On the eastern side there was a strip of three acres running along

Kitgum Road up to Colville suite. The three acres along Kitgum Road were being used for cultivation by Uganda Prisons. In addition to that, between the pool houses and the government prison up to Colville was green place for Golf. The only building was the Pool Houses (around the upper Churchill) and behind was the Government Golf-Course. Finally, between upper and lower Churchill, all land lying between up to the then Gulu Town Primary School which is currently the Office of the Prime Minister was the Old Golf-Course. These were opened grounds truly dedicated for leisure.

According to R2, Laroo Central Forest Reserve which had natural trees, was one of the urban green gazetted spaces to be counted among the rank of green spaces in Gulu Town, a fact that was corroborated by other respondents interviewed. K2, R1 and R2 further contented that through the department of forestry it was taken over as a forest reserve in the 1970's. However, K2 maintained that Laroo forest was a planted forest by National Forestry Authority and part of it was allocated to a one Omoro, a local businessman, for construction of housing estates; part of it was allocated to Gulu Town Primary School in the late 80s. R7 shared this same view when she asserted that Laroo Central Forest Reserve was a deliberate effort by the Government to protect and preserve the natural vegetation like *Vitex doniana* Sweet (Oywelo), *Combretum collinum* Frescen. (Odugu), *Ficus sycomorus* L. (Olam) and others that had been destroyed for timber. She continued to submit that with time, *Eucalyptus spp.* were being planted but it shifted to pines. On the contrary, R4 and R3 submitted that it was forested and full of native trees like *Acacia hockii* de Wild (Oryang) and *Vitex doniana* Sweet (Oywello). R1 narrated that of recent, there is a process of de-gazetting 70 acres part of the remaining 243 acres of Laroo Central Forest Reserve to Gulu University by the Government which part is earmarked for expansion. He added that the university is implicated for illegally occupying 29 Hectares of land belonging to Gulu Central Forest reserve land following the expiry of its temporary occupation license in 2007. Accordingly, the university has continued to expand its infrastructure on the forest reserve land without any attempt to renew its temporal occupation permit.

K2, K3, K4, R1, R2, R3 and R8 narrated that another gazetted urban green space was Uhuru Park, presently, where FM Mega Radio is now situated. K1 summarized his narratives in this way: "*I have seen areas that used to be forests becoming housing estates. For example, Uhuru ground where Mega FM Radio is now situated.*" This was corroborated by R7 who

asserted that Uhuru Park was a celebrated ground and as they were growing, they attended very many parades as pupils. R6 wrapped these views as follows: “*Uhuru Park was an open ground stretching from Police Barracks up to Awich Road, was maintained but naturally endowed with trees*”. He continued to note that FM Mega was the spot where the Union Jack was lowered at mid-night and was area marked for political rally and the seat of Arbitrators.

R1 narrated that along the main street of Gulu, between 1950s and 1960s, the British had planted in front of the commercial buildings on both sides *Mangifera indica* L. (mango) trees. This view was supported by R8 in his version by stating that infrastructural development of Gulu started on the main street with the construction of the commercial permanent buildings by the Indian who had planted trees on both sides of the roads. He went ahead to submit that along Pece Stream there were also *Mangifera indica* (mango) trees planted up to Pece Local Government Administration, a fact that R2, R3 and R4 confirmed. R2 submitted that most of the *Milicia excelsa* (Welw.) C.C. Berg (Mvule) trees planted on the major streets where the works of Forestry Department.

R2 asserted that Pece Stadium was gazetted for Sport and other public functions, a fact corroborated by R1 who observed that by 1958-1959 Pece stadium had already been built by the Acoli Local Government. According to the version of R8, Pece Stadium was called Pece War Memorial Stadium which came about as a gift after World War II to soldiers of King African Rifle who fought in Boma in India on the side of the British. When the soldiers came back, they were rewarded with Pece Stadium. Alero Alpha Garden and the Disabled School are part of Pece. This fact was corroborated in the narrations of R6 that Pece Stadium was Acholi War Memorial Ground which was given to Acholi World War II veterans as appreciation in the 1950s. R6 continued to contend that Pece Stadium was an open ground but the first encroachment started with the School of Disabled which was a community center. Alpha Gardens which started as a pork joint and temporary shelter was such other form of manifestation of encroachment to the Stadium. K2 confirmed this fact that where Alero Alpha Garden is now situated used to be a parking lot for the President and his entourage. R6 further attested to this fact that buildings have been growing in what used to be urban green spaces, giving an example of Alpha Gardens which was an encroachment to Pece Stadium. Besides, there was another encroachment on the southern side which is now a residential area and the

western side has been swallowed by the hotel industry, with hotels like Golden Gate, Stadium View and a lot more.

Another participant - R1 observed that Kaunda Grounds, a ceremonial ground in Gulu is such other urban green space in Gulu which is currently bare without grasses and it's in a sorry state. This was supported by R8 when he stated further that Kaunda was meant to be an open ground which was named in 1984 after a joint rally conducted by the then President of the Republic of Uganda, Apollo Milton Obote and Kenneth Kaunda the President of Zambia. According to R8, Kaunda Ground was an opened green belt called Caribbeans before it was renamed Kaunda and it appeared that it belonged to the Local Government. He continued to submit that a one Lakony, a former tax officer presently occupies the small Local Government structure situated on the Kaunda Ground; he inherited it after the demise of a one Odoch, the then Treasurer of Local Government.

All the twelve respondents submitted that due to urbanization, Kaunda Ground which used to extend from Pece Stream up to Pece Local Government has been reduced in size. K2 indicated that the present Human Rights Focus Building was part of Kaunda Ground. Further confirmation came from the narratives of K2 that Kaunda Ground has been reduced in size. In an elaborative way, she said that Walter Opwonya Road was a footpath and the whole of that place was Kaunda Ground. Unifat Primary School was also part of Kaunda Ground and the constructed fish pond disturbed part of Kaunda Ground. R6 went ahead and corroborated all this information in his narratives. He narrated that Kaunda Ground was initially a sports arena for Indians, with sports like Cricket, Badminton and Volley Ball, and generally a place for relaxation. This was corroborated by R7 when she asserted that Kaunda Ground was a playground for the Indian Aga Khan. Like K2, R6 augmented her statement in the following ways: *"Kaunda Ground as an open gazette green spaces have been encroached due to increase in built-up areas that has reduced its size"*. She mentioned the followings as areas that encroached on Kaunda Ground: *"Gulu Senior Secondary School, Christ Church Primary School, Parking lots, Driving Ground, Fish Pond from the site of Unifat Primary School, structures built along Walter Opwonya Road and Cynbelle supermarket are all part of Kaunda Ground."*

More revelations about gazetted urban green spaces came from R1, who asserted that Senior Quarters, with its spacious and greener, nice looking and attractive compound was more than a building area meant for the Europeans.

4.3 Effect of Spatial Extent of Urbanization on natural vegetation change in Gulu City

The last objective of this study was to assess the effect of spatial extent of urbanization on natural vegetation change in Gulu City from 1911 to 2021. First the results about the percentage changes of the proposed land uses in relation to the existing situation were as presented in Table 4.3.

Table 4.3: Changes of the proposed land uses in relation with the existing situation

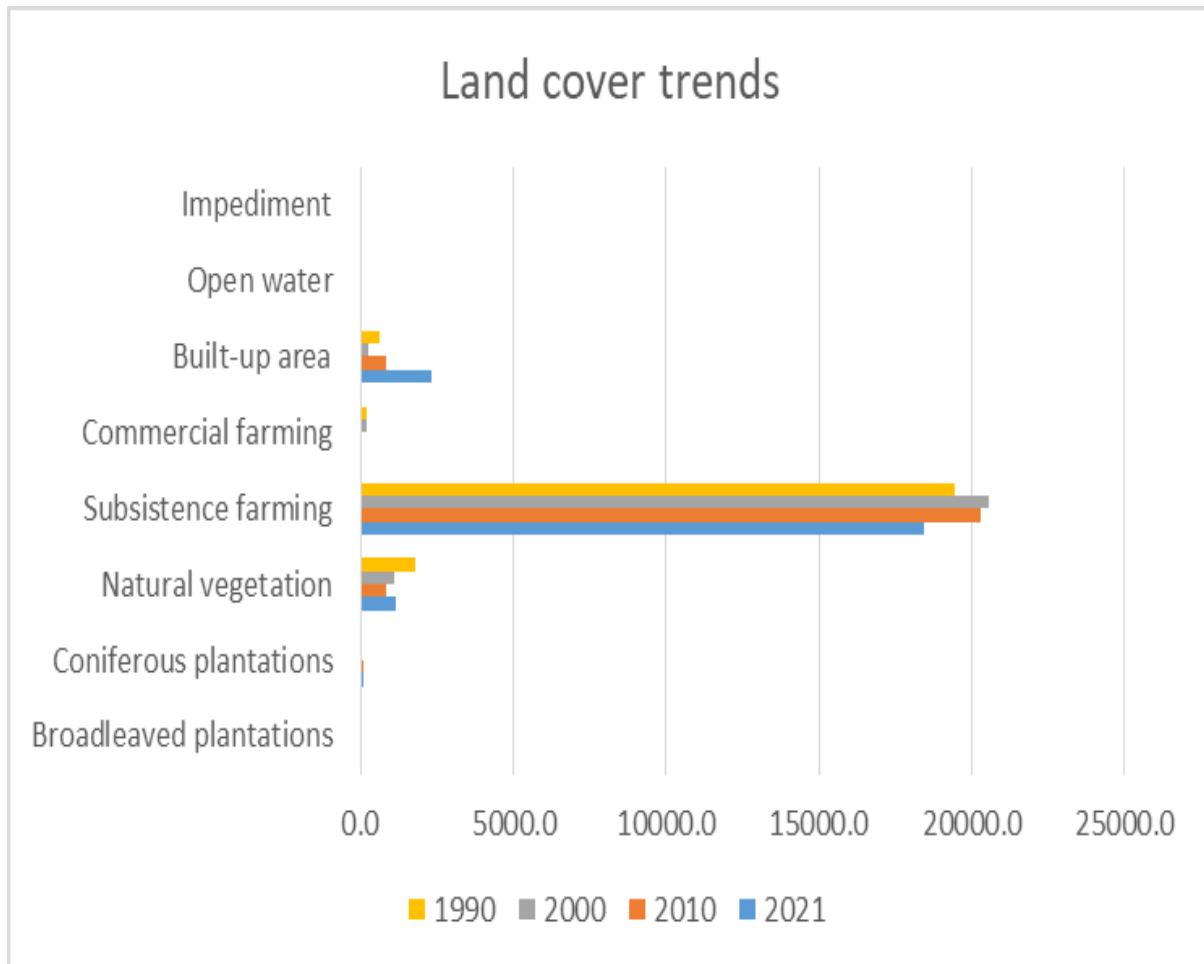
		Existing land uses		Proposed land uses		
Land uses		Area_ Acres	Percentage (%)			
RESIDENTIAL						
High Density Residential		8342.5		10780.6	19.13	
		7271	30.8%	12394.7	21.99	
Medium Density Residential		1771				
City Regions						
INSTITUTIONS						
Education Institutions		1736.8	3.7%	2305.7	4.09	
Health Institutions		201.9		304.5	0.54	
Religious Institutions		157.6		181.1	0.32	
INDUSTRIAL						
Light industries& warehousing		171.2	0.3%	1913.6	3.39	
		5.4		8.1	0.01	
Abattoir						

Existing land uses			Proposed land uses			
Land uses	Area_ Acres	Percentage (%)				
COMMERCIAL						
CBD	1865.2	3.4%			1635.7	2.9
Local Centers					2348.5	4.17
Market	19.9				67.2	0.12
URBAN GREENERY						
Forest Reserve	166.2				151.1	0.27
Planted Forest	270.6	1.1%			134.3	0.24
Play Ground	42.7				169.1	0.3
Open Space	116.1				120.1	0.21
Stadium	9.4				9.4	0.02
Source:	Mott-MacDonald, 2021					

The study results in Table 4.3 show an increase in the number of residential setups at a rate of 30.8%, highest of all other activities in Gulu City. This is further increased by a 3.7% rate of increase in institutions like the education institutions, health institutions and the religious institutions. The study results show an increase in the industrial setups and an increasing rate of 0.3% for commercial building like the central business centers; the rate for markets is at 3.4%. The combined rate of increase in the artificial setups is much higher than the rate of increase of 1.1% in terms of forest reserves, planted forest, playground, open space and stadium. This result compares well with what was found by Pichler-Milanovic (2007) that the development of the modern city is aligned to individual housing preferences alongside commercial investment

decisions. The results are also comparable to what was found by Ejigu and Mataya (2006) that changes in Uganda's environmental landscape as in many African countries, are primarily due to anthropogenic factors of which urban settlement was part. This result implies a likelihood of the urban greenery being overtaken by the other urban related settings. Such a change in natural vegetation is also evidenced by the land cover trends reflected in the Figure 4.7 below.

Figure 4.7: Land Cover Trends in Gulu City



The study results presented in Figure 4.7 show a decrease in the built-up area from the year 1990 to the year 2000. The built-up area then increased but with the highest level of increase being in the year 2021. Other results, however, show that subsistence farming in the city first increased then lowered though it remains high. As can be seen in figure 4.7 above, the natural vegetation has been declining but the built-up area has been increasing. The result illustrates a negative relationship between built-up area and natural vegetation change. The more

the rate of urban expansion, the lower natural vegetation currently occurs. This was also agreed to during the qualitative narratives from all the twelve respondents.

First and most importantly, they observed that urbanization has put a lot of pressure on natural vegetation, and the effect is very serious in the sense that natural vegetation is being depleted. Secondly, encroachment of wetlands continues unabated, and other effects included degradation of natural vegetation, flooding, high temperatures and seasonal changes. In an elaborative way, they narrated that population increase created demand for farming in the wetlands, harvesting of *Cyperus papyrus* L. (papyrus reeds) for mats making, construction of buildings, infrastructural development, destruction of forests, increasing number of washing bays and improper waste disposal have all contributed to adverse effects leading to natural vegetation depletion. Above all, encroachment in the gazetted urban green spaces has led to the disappearance of natural vegetation.

According to K2, natural vegetation has been greatly reduced as a result of the spatial extent of urbanization of Gulu City. Population increase has affected the natural vegetation in the ways that *Cyperus papyrus* (papyrus reeds) in Pece Stream around Pece Prison have been completely destroyed. She cited an example of Pece Stream that has disappeared especially around Pece Primary School. She went ahead and stated that there were basically two main reasons for the drying out of the stream, “*first, human activity like bricklaying partly contributed to this, and growing of Brassica oleracea var. capitata L. (cabbages) in the wetlands also accounting for that adverse effects on Pece Stream.*” In her views, different land uses like bricklaying, road construction, building and farming have affected natural vegetation negatively. She gave Layibi Division as an example of natural vegetation that has been destroyed as a result of urbanization. According to R3, railway works in the 60s left the entire Layibi area opened up from natural vegetation depletion as it created the demand for construction of housing estates to provide accommodation for the laborers so as to settle near their place of work. This commonly came to be referred as Railways Quarter. R3 continued to submit that the same adverse effects of environmental destruction of natural vegetation was also witnessed with the construction of West Acholi Co-operative Union Limited (Coo-Rom) ginnery in the 60s. *Cyperus papyrus* L. (papyrus reed) vegetation at Pece and Layibi Swamp were heavily affected.

K2 further submitted that other forests that have been destroyed as a result of urbanization include Bongii (Bunga Pa Latek) at Aywee ward, Tegwana Parish, Ojok Mwok at Cubu Ward, Tegwana Parish and Layibi Techo Primary School, Techo Ward. Other effects of the spatial extent of urbanization on natural vegetation of Gulu City included the reduction of water level because of quarrying works thereby affecting natural vegetation cover. She went ahead to drive her point home by stating that the drying of Oitino at some point is attributed to this as a result of silting in the stream. The Golf-Course has been swallowed-up with buildings and part of Kaunda Ground has been disturbed. A case in point is that Unifat has constructed a fish pond. At Limu, a swampy area (Adoko-Gwok) has now been swallowed-up by buildings and the location of Human Rights Focus was a burial ground.

In the narratives of K4, the current vegetation has dropped beyond natural expectation causing heavy negative impact. For example, the frequent bursting of Pece Stream during wet season. She attributed this to human activities that has led to devastation of river tributaries adding that Pece Stream is on the verge of drying up due to unnecessary construction near its bank as it flows to the Nile. She continued to explain that the heavy forestation from Holy Rosary up to Unyama and Aswa River were heavily affected. Further corroboration came from R3 to qualify this fact when he asserted that the influx of the locals looking for labour and survival was immediately followed up by need of settlement. This resulted in clearing the heavy forested areas of what is now Senior Quarters up to Unyama which was heavily forested.

R7 highlighted further in her narratives that urbanization has put a lot of pressure on natural vegetation. To her mind, washing bays, improper waste disposal, and harvesting of *Cyperus papyrus* L. (papyrus reeds) for mats-making depleted the species and instead brought a lot of changes like unpredictable weather patterns.

R1 narrated that in the early days, access and use of natural resources was done in a sustainable manner. With the current trend in population increase coupled with the high level of poverty, access and use of natural resources is unsustainable and destructive. He submitted on how Pece Stream was destroyed where the mango trees were cut down and keeping the natural green was never an agenda in terms of maintenance. R1 continued to narrate that the change of user clause of Golf-Course to residential buildings led to serious destruction and devastation of the natural environment. The narratives of R1 pointed to Kaunda Ground as being the only open

space still available but it's not even being maintained. R1 also revealed that the first public rally ground Uhuru Park where FM MEGA Radio station is now situated was sub-divided into plots. To aggravate the state of the urban green spaces, R1 submitted that Laroo Central Forest Reserve has been allocated to Gulu University as well as for private residential areas.

R2 further asserted that environmental destruction has depleted natural vegetation and replaced it with man-made activities (urban development) such as building roads and planning of artificial trees. Lagoons have also been constructed for sewerage. Also, R3 narrated that the key areas which later turned out to be urban were full of forests, swamps and streams. Colonial administrators later cleared and set up an administrative unit in this current position where they considered it to be on the higher ground. R3 continued to submit that because of the heavy jungle surrounding the entire premises and to ensure security, they set up a strong security guard point formed as AREA GUARD, now known by the local as Ariaga. This was further corroborated in the narrations of R6 who submitted that there were other immigrants from other places. He continued to explain that after the Golf-Course at Kitgum Corner extending up to St. Mauritz was an area called AREA under GUARD - now referred to as Ariaga, which was a reserve for the demobilized ex-combatants of World War II. They were allocated that space so that in an event that their services would be needed in future, they could easily be mobilized. Besides, next to them from the main road up to St. Mauritz eastwards was Palaro Reserve commonly known as "Palaro Rajab". This was area allocated to the demobilized soldiers who were from Palaro.

R3 cited in his narration that the Golf-Course according to its original design was meant to provide good green shade but was converted into plots and building. Similarly, the construction of the Air field also made serious impact on natural resources depletion with very little economic impact. R1 corroborated this assertion from R3 when he stated in his narration that the jet fighters which were brought by Train to Gulu had long wings which could not allow the Jet fighters pass through the main street. This is because the trees were a lot inside the roads. In order for the wings to pass, the *Mangifera indica* (mango) trees had to be cut since the Jet fighters were brought on a wheel loader and passed through the main street to the Air field.

According to the version of R4, St. Jude's children home was constructed in 1911 by Father Alberto for the Catholics. Also, there was establishment of the Military Air Force in 1967, construction of Air field road and later barracks during Amin's regime in Kasubi Parish and

Bardege Layibi City Division which were vastly forested with Olam trees. R4 continued to submit that, another road linking to Quarters Guard was the common property regime heavily infested with natural trees. R4 enlightened that natural vegetation like *Albizia grandibracteata* Taub. (Owak) trees that used to provide protection to the people from the lightening were depleted, and he attributed the rampant rate of lightening to the disappearance of this species as a result of the urban development of Gulu.

K3 observed that the urban development of Gulu city has affected natural vegetation in the following open green gazetted places that have been encroached: Uhuru Park, Kaunda Ground, Golf-Course and Boma Ground. She continued to observe in her narration that there has been a reduction in natural vegetation in these urban gazette green spaces due to increase in built-up area.

According to R8 the Golf-Course which was behind Municipal chamber was eventually encroached on and it eventually disappeared. He continued to point out that one of the most serious effects of the spatial extent of urbanization on natural vegetation was the disappearance of green belt in the Golf -Course. The argument is also interwoven with the related population increment and urban development that have destroyed the natural vegetation in other urban gazette green spaces like Uhuru Park, Kaunda Ground and Boma Ground. *Cyperus papyrus* L. (papyrus reeds) have been depleted and this has led to the drying of streams as *Cyperus papyrus* L. (papyrus) would help in the filtration of water. R8 wrapped his narrations on the effect of the spatial extent of urbanization of natural vegetation in Gulu City, in that it affected the eco-system and thereby affecting both the fauna and flora.

According to the version of K1, the cutting of trees for fire wood and building of local huts led to destruction of natural vegetation. Besides, small scale urban grazing consuming much of the grass all had serious toll on the environment. He gave an example of Pece Stream and Layibi Swamp that have dried-up as a result of urban development. He continued to assert that the Sewerage system interfered with Pece Stream and that washing bays too have destroyed Layibi Swamp. Coupled with that, sand mining at Bardege in Oitino Stream all contributed to natural vegetation depletion. The greener nice-looking areas have been swallowed up by buildings and road construction. Some trees have been cut, providing ugly sites and making the

Town unattractive. Some tree species such as *Vitex doniana* Sweet (Oywello) and *Annona senegalensis* Pers. (Obwollo) are already endangered due to pressure of human activities.

4.4 Conclusion

All the respondents interviewed concurred that urbanization has exerted much pressure which resulted in deforestation and habitat loss. This in turn directly decrease the biodiversity and allow species ranges and interactions, consequently increasing the impact on climate change like temperature rise. This finding is consistent with what was prior reported by White et al. (2015) regarding the effect that urbanization had in exerting pressure mainly on peri-urban forests and wetlands for expansion of urban centers. The findings are equally similar to those earlier on found by NEMA (2014) that a proportion of Uganda's wetland ecosystems had been lost over the years, attributing it to urbanization and rapid population growth.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter is divided into three sections: conclusion, recommendation and areas of further study. This study had an overall objective of assessing the historical urban development of Gulu City from 1911 to 2021 and its effect on the natural vegetation. It sought for answers to the population trend of Gulu City from 1911 to 2021, the trend of the urban spatial expansion of Gulu City from 1911 to 2021, and the status of the gazetted urban green spaces in Gulu City.

5.2 Conclusion

There has been a continued increase in size of the population Gulu City which though declined at some point due to insecurity, has been rising at an increasing rate over the years 1911 to 2021. Much as the built-up area of Gulu City started as a small urban unit, it has evolved over the years at an exponential spatial rate. A number of green spaces still exist in Gulu City both natural and artificial, constituting of the wetlands, the stadium the playground, and the planted forests alongside the forest reserve.

The natural vegetation in Gulu City has been witnessing a declining trend over the years and the exponential spatial expansion of the built-up area like the increase in the number of residential setups, institutions like education, health and religious institutions, and industrial setups along with commercial buildings. At a much higher rate, this exponential spatial expansion is crucial to natural vegetation change.

5.3 Recommendation(s)

The research found out that there had been a gradual disappearance of the natural vegetation in Gulu City over the years as a result of urbanization. This natural vegetation is on the verge of extinction. Therefore, this study recommends that the urban planning authority of Gulu City in collaboration with the city's local leadership need to advocate for faster tracking of the implementation of the natural vegetation areas identified and earmarked for preservation in the urban plans. Recognizing the faster rate of urban spatial expansion that may result in total extinction of the natural vegetation can help to improve the situation.

The authorities at the urban planning unit of Gulu City in conjunction with personnel of environmental enforcing agencies are further recommended to sensitize and approve physical building plans that integrate natural vegetation preservation for any of the upcoming built-up settings.

The physical planners for the various residential setups, institutions, factories for industrial development and commercial buildings should develop plans that integrate alternative approach to greening of the urban setups.

Furthermore, the open space areas need are to be designed to provide network linkages around the City and in particular for walking and cycling. The council needs to undertake some work to firm up which open space areas are critical, and to put in place a capital acquisition programme so that reserve contributions are either taken at the time of major development or are funded through contributions using the plan as a guide.

5.4 Area of Further Study

The following areas of further study should be upheld given the fact that this study experienced limitations arising from the geographical scope. This research investigated the effect of urban development on natural vegetation change of Gulu City in an historical perspective over a period of 110 years. The study may not cast a general picture in some other secondary cities in Uganda, and thus a further study on this issue at a country level is recommended so that a more conclusive documentation can be attained.

REFERENCES

- Alyssa K. Whitcraft, Eric F. Vermote, Inbal Becker-Reshef, & Christopher O. Justice, (2015) Cloud cover throughout the agricultural growing season: Impacts on passive optical earth observations. *Remote sensing of the Environment*, 156, 438-447.
- Belcher, R. N., & Richards, D. R. (2020). Global Changes in Urban Vegetation. *International Journal of Science*.
- Bennett, K. J., Borders, T. F., Holmes, G. M., Kozhimannil, K. B., & Ziller, E. (2019). What is rural? Challenges and implications of definitions that inadequately encompass rural people and places. *Health Affairs*, 38(12), 1985-1992.
- Büscher, K., Komujuni, S., & Ashaba, I. (2020). Humanitarian urbanism in a post-conflict aid town: aid agencies and urbanization in Gulu, Northern Uganda. In *Urban Africa and Violent Conflict* (pp. 156-174). Routledge.
- Campbell, J.B. (2007) Introduction to remote sensing. 4th Edition, *The Guilford Press*. New York.
- Colding, J., Gren, A., & Barthel, S. (2020): *The Incremental Demise of Urban Green Space*.
- Congalton R. G. & Green, K. (2020) Assessing the Accuracy of Remotely Sensed Data: *Principles and Practices*, Third Edition.
- Connor, O. (1965). Railways and development in Uganda. 92.
- Daily Monitor, (2010, November 26). Red flags raised over failure to protect environment. *Daily Monitor*, (Thursday monitor), 25. <https://www.monitor.co.ug/uganda/news/national/red-flag-raised-over-failure-to-protect-environment-1473598>.
- Egeru, A.; Opio, J.; Siya, A.; Barasa, B.; Magaya, J.P.; Namaalwa, J.J., (2020). Tsetse Invasion as an Emerging Threat to Socioecological Resilience of Pastoral Communities in Karamoja, Uganda. *Sustainability*, 12, 1599. Retrieved from; <https://doi.org/10.3390/su12041599>
- Ehrlen, J., Morris, W. F., von Euler, T., & Dahlgren, J. P. (2016). Advancing environmentally explicit structured population models of plants. *Journal of Ecology*, 104(2), 292-305.

- Ejigu, M., & Mataya, C. (2006). *Foundation for environmental security and sustainability on the pattern of changes in environmental landscape in Uganda*. . Kampala: USAID.
- Ekpenyong, R. (2008). An assessment of the nature of urban growth and development in Akwa Ibom state, Nigeria. University of Uyo Publishing Press.
- Faniran, A. (1994). Solid Waste Management. Ibadan region, Ibadan: Rex Charles Publication and Connel Publications, 231-243.
- Flörke, M., Schneider, C., & McDonald, R. I. (2018). Water competition between cities and agriculture driven by climate change and urban growth. *Nature Sustainability*, 1(1), 51-58.
- Frenez, D., Esposti, M. D., Méry, S., & Kenoyer, J. M. (2016, January). Bronze Age Salūt (ST1) and the Indus Civilization: Recent discoveries and new insights on regional interaction. In *Proceedings of the Seminar for Arabian Studies* (pp. 107-124). Archaeopress.
- Fuller, R. A., & Gaston, K. J. (2009). *The scaling of green space coverage in European cities*. The Rival Society Publishing Co.
- Government of Uganda. (1995). Draft National Environment Action Plan, 1995.
- Government of Uganda. (1997). *Gulu Northern Uganda Reconstruction Project: Gulu Structure Final Report*. Gulu.
- Government of Uganda. (1997). Local Government Act. *Uganda Printing and Publishing Corporation*. Kampala.
- Government of Uganda. (2019). The National Environment Act. *Uganda Printing and Publishing Corporation*. Kampala.
- Greening Uganda's Urbanization and Industrialization (2020-2023): *Gulu City Physical Development Plan*, (2022-2023) MOTT McDonald, 2022.
- Gulu City Local Government. (1997). Gulu Structure Plan Final Report.
- Guto, S. N. (2014). *Impact of Residential Development Watiti Wetland: The case of Watiti wetland Kangeni Estate Nairobi County*.

- Hamilton, A. C. (1984). *Deforestation in Uganda*. London: Oxford University Press.
- Howard, E. 2002, *From Garden City to Green City and Beyond*; The legacy of Ebenezer Howard, edited by Kermit C. P. and Schyler, D. The Johns Hopkins University Press.
- Irumba, H. (2018). *Impact of Urbanization on water resources: A case study of Hoima Municipality, Uganda*.
- J R Landis, G G Koch, 1997. The measurement of observer agreement for categorical data. *Biometrics*, 33(1):159-74.
- Jiang, H., & Shen H. (2013). *Environmental Impact of Urban Growth*. Yale University publishing press.
- Kasarda, J. D., & Crenshaw, E. M. (1991). Third world urbanization: Dimensions, theories, and determinants. *Annual Review of Sociology*, 467-501.
- Konrad-Adenauer-Stiftung. (2021). Focusing on Participation, Representation, Security, and Innovation. *Sage Journals*, 29-33.
- Malunda, P. N., & Atwembeiere, J. (2021). Research Supervision as an Antecedent to Graduate Student Progression in the Public Higher Institutions of Learning in Uganda.
- Marcotullio, P. J. (2003). Globalisation, Urban Form and Environmental Conditions in Asia-Pacific Cities . *Sage Journals*, 19.
- Mbabazi, J., & Atukunda, P. *Creation of New Cities in Uganda: Social Economic and Political Implications*. Semantic Scholar
- McDonald, R. I., Forman, R. T. T., & Kareiva, P. (2010). Open Space Loss and Land Inequality in United States' Cities, 1990–2000. *PLoS ONE* 5(3).
- McGranahan, G., & Satterthwaite, D. (2014). Urbanisation concepts and trends. *IED*, 19-24.
- Minstry of Local Government. (2020). Development and Design of Structure.
- Mugabi, E. A. (1992). *The Development of Towns in Uganda 1970-1980: Political Change, the Decline of a Nation's Capital and the Spread of Small Towns*. Development Planning Unit, University College London.

- Mukwaya, P. I. (2012). Rural-urban transformation in Uganda. 28.
- Mukwaya, P. I., Sengendo, H., & Lwasa, S. (2016). Urban Development Transitions and their Implications for Poverty Reductions and Policy Planning in Uganda, UN-WIDER working paper no.10/45.
- National Environmental Management Authority. (1995). The Draft National Environment Plan. (1995). National Forest. 40.
- National Environmental Management Authority. (2006). General State of Environment in Uganda.
- National Planning Authority. (2020). Third National Development Plan (NDPIII). (2020/21-2024/25). Impact of Urbanisation.
- Nath, B., Ni-Meister, W., & Choudhury, R. (2021). Impact of urbanization on land use and land cover change in Guwahati city, India and its implication on declining groundwater level. *Groundwater for Sustainable Development*, 12, 100500.
- Nguyen, T. T., Barber, P., Harper, R., Linh, T. V. K., & Dell, B. (2020). *Vegetation trends associated with urban development: The role of golf courses*. PLoS one, 15(2), e0228090.
- Nyakaana, J. B. (2015). *Urban Development in Uganda*. Kampala: Environs.
- Nyakaana, J. B., Sengendo, H., & Lwasa, S. (2007). Population, urban development and the environment in Uganda: the case of Kampala city and its environs. *Faculty of Arts, Makerere University, Kampala, Uganda*, 1-24.
- Ogunbode, T. O., Omotayo, O. E., Asifat, J. T., Ogunbile, P., Olatubi, I., & Oyebamiji, V. O. (2021). Challenges of degradation in the tropical environment: causes, footprints and remedies. *Aswan University Journal of Environmental Studies*, 2(4), 218-239.
- Ohri, A., & Poonam, Y. (2012). *Urban Sprawl, mapping and land use change defection using remote sensing and Global Information System* . V3.
- Okello, R. C., Opio, A., & Kansiime, F. (2017). Seasonal macrophyte diversity and water quality in an urban wetland. *African Journal of Environmental Science and Technology*, 11(6), 292-303.

- Onen, O. (2008). *Data Collection Instrument*.
- Organization for Economic Cooperation and Development. (2016). *The Sustainable Development Goals as Business Opportunities*.
- Otieno, O. M., & Atem, M. P. (2016). Impact of municipal effluent on the water quality of Pece stream Gulu town, Uganda. Kasaija, P. (2020). *Gulu Physical Development Plan on the modification of Gulu City*. Gulu: UNCDF.
- Oyinloye, R. O., & Adesina, F. A. (2011). The Paradoxal Effects of Urbanization in Developing Countries. A case study of solid waste pollution in Ibadan City, Nigeria.
- Paul Drichi, (2002). National Biomass Study (Project: Uganda) National biomass study: *technical report of 1996-2002, Forest Department*.
- Rai, R., Zhang, Y., Paudel, B., Li, S., & Khanal, N. R. (2017). A synthesis of studies on land use and land cover dynamics during 1930–2015 in Bangladesh. *Sustainability*, 9(10), 1866.
- Rashid, H., Manzoor, M. M., & Mukhtar, S. (2018). *Urbanization and its effects on water resources: An exploratory analysis*. Asian Journal of Water, Environment and Pollution, 15(1), 67-74.
- Rostami, R. A. H. E. L. E. H., Lamit, H. A. S. A. N. U. D. D. I. N., Khoshnava, S. M., & Rostami, R. A. S. O. U. L. (2013). Urban green spaces and city sustainability. *Asian Journal of Microbiology, Biotechnology and Environmental Sciences*, 15(2), 441-446.
- Sharma, M. L. (1989). Land reforms in India: Achievements, problems and prospects. *Sciology Mind*.
- Shlomo, A., Alejandro M. B., Parent, J., Lamson-Hall, P., & Sánchez, N. G. (2016). Atlas of Urban Expansion: Areas and Densities. Vol. 1.
- Simple, O., Mindra, A., Obai, G., Ovuga, E., & Odongo-Aginya, E. I. (2018). Research Article Influence of Climatic Factors on Malaria Epidemic in Gulu District, Northern Uganda: A 10-Year Retrospective Study.
- Singh, R. L., & Singh, P. K. (2017). Global environmental problems. *Principles and applications of environmental biotechnology for a sustainable future*, 13-41.

- Sokolov, A., Veselitskaya, N., Carabias, V., & Yildirim, O. (2019). Scenario-based identification of key factors for smart cities development policies. *Technological Forecasting and Social Change*, 148, 119729.
- Spash, C. L. (2021). 'The economy' as if people mattered: revisiting critiques of economic growth in a time of crisis. *Globalizations*, 18(7), 1087-1104.
- Sridhar, M. B., & Sathiyantan, R. (2020). *Urbanization, demographic transition, and the growth of cities in India, 1870-2020*. International Growth Center.
- Stern, D. I. (2018). The environmental Kuznets curve. In *Companion to Environmental Studies* (pp. 49-54). Routledge.
- Swerts, E., Pumain, D., & Denis, E. (2014). The future of India's urbanization. *Futures*, 56, 43-52.
- Temple, K. (1955). *Urbanization*. Kampala.
- Thomas, A. S. (2016). *Natural Vegetation*. Gulu: Northern Uganda.
- Uganda Ministry of Land. (2001). *Urbanisation Development*. Kampala.
- Uganda Ministry of Local Government. (2021). Retrieved from: <https://www.gou.go.ug/ministry/ministry-local-government>, on 19/08/2022.
- Uganda Urban Expansion Data Results. Urban Area Population and Density 1987: *Cities Alliance and migration program*, (2021).
- UN-Economic and Social Commission for Asia and Pacific. (1999). New York.
- UN-Habitat (2011). State of the World's Cities 2010/2011- Cities for All: Bridging the Urban Divide.
- UN-Habitat. (2016). World Cities Report 2016: Urbanization and Development - Emerging Futures.
- United Nations Office for Project Services. (2007). *Environmental Degradation*. Belgium.
- United States Department of Agriculture. (2016). Natural and Cultural Vegetation. 19.
- Vardoulakis. (2016). *Challenges and Opportunities for Urban Environmental Health and Sustainability*. London: International Conference on Urban Health.

- Weber, H., & Sciubba, J.D. (2019). The Effect of Population Growth on the Environment: Evidence from European Regions. *Eur J Population* 35, 379–402. <https://doi.org/10.1007/s10680-018-9486-0>
- Wineman, A., Alia, D. Y., & Anderson, C. L. (2020). Definitions of “rural” and “urban” and understandings of economic transformation: Evidence from Tanzania. *Journal of rural studies*, 79, 254-268.
- White, R., Huang, C., Oule, H., Onyach-Olaa, M., Bachmann, J., Dale, D., Goldberg, B., Pechin, M., & Turpie, J. (2015). *Promoting green urban development in African cities : Kampala, Uganda - urban environmental profile (English)*. Washington, D.C. : World Bank Group.
- Wu, J. (2014). *Use and Misuse of Landscape Indices. Landscape Ecolog.*
- Zhang, X. Q. (2016). The trends, promises and challenges of urbanisation in the world. *Habitat international*, 54, 241-252.
- Zhao, S. X., Guo, N. S., Li, C. L. K., & Smith, C. (2017). Megacities, the world’s largest cities unleashed: major trends and dynamics in contemporary global urban development. *World Development*, 98, 257-289.

Appendix 1: Interview Guide

Dear respondent,

This interview guide is intended for the selected elderly people who will be identified using snowballing techniques and key informants comprising of the City Mayor, City Town Clerk, the Statistician, the City Natural Resources and Environment Officer and lastly the City Physical Planner.

I am a student pursuing Master of Arts in History at Gulu University and here to carry out research on a historical study on the Effect of Urban Development on the Natural Vegetation, the case of the CBD areas of Kasubi, Pece, Layibi and Industrial area in Gulu City (1911-2021) as a partial fulfilment to the requirements for the award of the degree of Master of Arts in History of Gulu University. I will ensure confidentiality and anonymity of the respondents by ensuring that their names will be withheld from the interview scripts and reports. Besides, information provided by the respondents will not be disclosed to unauthorized person. I cordially request you to accord me your valuable time which shall be helpful in developing this study.

INTERVIEW GUIDE FOR THE SELECTED ELDERLY PERSONS.

1. What is the population trend of Gulu city from 1911-2021?
2. What is the trend of the urban spatial expansion of Gulu City?
3. What is the status of the gazette urban green spaces in Gulu?
4. What is the effect of the spatial extent of urbanization on natural vegetation of Gulu City?
5. What has been the effect of human activities on natural vegetation in Gulu City?

INTERVIEW GUIDE FOR THE KEY INFORMANTS.

1. In your own judgment or opinion, what are some of the human activities that led to the growth and development of Gulu City from 1911 to 2021?
2. Basing on your experience, describe the growth and development of human activities in Gulu City?
3. What is the status of natural vegetation of Gulu City in your own perspective?

4. Do you think the current state of natural vegetation is as it used to be? How does it compare with the past 4 or 5 decades?
5. How do you rate the emergence of urbanization and its effects on natural vegetation depletion?
6. In an elaborative way, do you think urbanization has created some effects on the natural vegetation?

Appendix II: Respondent Consent Form

- I..... voluntarily agree to participate in the research study.
- I understand that even if I agree to participate now, I can withdraw at any time or refuse to answer any question without any other consequences of any kind.
- I understand that I can withdraw permission to use data from any interview within four weeks after the interview in which the materials will be deleted.
- I have had the purpose and nature of study explained to me in writing and I have had the opportunity to ask questions about the study.
- I understand that I will not benefit directly in this research.
- I agree to my interview being audio-recorded.
- I understand that all the information I will provide for this interview will be treated with the utmost confidentiality by the researcher.
- I understand that on any report of the results of the research findings my identity will remain anonymous. This will be done by anonymizing any details of any interview which may reveal my identity or the identity of the people I speak about.
- I understand that signed consent forms and original audio recordings will be retained in soft copy.

Signature of Respondent

.....

Date...../...../.....

Witness to the Consent.....

I believe the respondent is giving informed consent to participate in this study.

Signature of Researcher

.....

Date...../...../.....

Appendix III: Location of Gulu City in the National Context



Source: Mott-MacDonald, 2021

Appendix IV: List of Respondents

SN	PARTICULARS	AGE	VILLAGE	DESIGNATION	DATE INTERVIEWED
01	R1	79	Highland	Retired Army Officer	03/10/2022
02	R2	77	Mican	Retired Civil Servant	05/10/2022
03	R3	76	Labourline	Businessman	15/10/2022
04	R4	81	Farm	Cultural Leader	09/11/2022
05	R5	77	Pece Acoyo	Retired Publisher/Lecturer	23/11/2022
06	R6	78	Obiya West	Retired Civil Servant	16/11/2022
07	R7	74	Holy Rosary	Retired Banker	12/12/2022
08	R8	80	St. Joe	Retired Headteacher	19/12/2022
09	K1	62	Cubu A+B	Former Mayor	14/11/2022
10	K2	43	Physical Planner	Police Barracks	24/11/2022
11	K3	42	Senior Physical Planner	Ariaga Central	13/12/2022
12	K4	38	City Statistician	Goan	11/01/2023

Appendix V: Letter of Introduction

GULU UNIVERSITY
OFFICE OF THE DEAN
FACULTY OF EDUCATION AND HUMANITIES
P.O. BOX 166, GULU UGANDA
TEL: +256 0471-432922

12th October 2022

TO WHOM IT MAY CONCERN

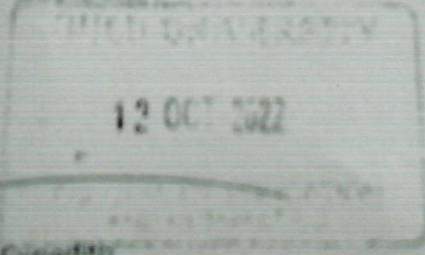
This is to introduce to you Mr. Ojok Obwona Michael Registration Number 20/UJ/2660/MAH/PS, a student pursuing a programme of study leading to the award of a Master of Arts in History degree of Gulu University.

He is undertaking research on the topic: Urban Development and Natural Vegetation Change; A Historical Analysis of Gulu City from 1911 to 2021, which is in partial fulfilment of the requirements for the award.

Any assistance given to him in relation to his research work will be highly appreciated.

Yours sincerely


Dr. Nuwategeka Expedito
Deputy Dean, Faculty Education and Humanities


12 OCT 2022