

**IMPACTS OF RAPID URBANIZATION ON ENVIRONMENTAL QUALITY**  
**A CASE STUDY OF MBARARA MUNICIPALITY, WESTERN UGANDA.**

**BY**

**MUGARURA ALEXANDER**

**BEM/34827/113/DU**

**A DISSERTATION SUBMITTED TO THE SCHOOL OF ENGINEERING**  
**AND APPLIED SCIENCES IN PARTIAL FULFILLMENT FOR THE**  
**AWARD OF BACHELORS OF SCIENCE DEGREE IN**  
**ENVIRONMENTAL MANAGEMENT OF**  
**KAMPALA INTERNATIONAL**  
**UNIVERSITY.**

**SEPTEMBER, 2014.**

### Declaration

I **Mugarura Alexander**, declare that this dissertation is my original work and has never been presented anywhere for any award in any other university or institution of higher learning.


Signature:.....

Date:.....

### Approval

This is to certify that this dissertation entitled “The Impacts of rapid urbanization on environmental quality” has been done under my supervision and submitted to the Department of Biological and Environmental sciences.

Supervisor: ENIRU ENMANUEL INNOCENT

Sign: 

Date: 29<sup>th</sup> - 9 - 2014.

### **Dedication**

This dissertation is dedicated to my beloved parents **Mr. Byamugisha Edward** and **Nankwasa Penninah Jolly**, my grandmother and my siblings for the love and feel of belongingness, the courage they bestowed to me which has devoted me to the completion of this course.

### **Acknowledgement**

Whereas research is an individual task, I still believe however without any support different people, it is impossible to accomplish successfully.

I would therefore acknowledge the almighty God for the strength, wisdom and understanding granted to me in completion of this course, my supervisor Mr. Eniru Innocent Emmanuel and all other lecturers who offered me guidance, support, and advice in the accomplishing the same.

I would like to acknowledge my class mates like Muhumuza Adbdulkharim, Kakooza Henry. Kembabazi Rachel, Musinguzi William, Rwakaningiri Frank, Asere Juliet, Nantumbwe Edith. Maraika Amabile and Scarion Ruhura Eugene among others especially those who helped me in the accomplishment of this course through their cooperation.

I would also acknowledge my family members that are; my sisters Atuhair Esther. Niwenyesiga Isabel, Musiimenta Rachel and my brother Muhoozi Joshua not forgetting my parents and grand mum who provided everything as far as this report is concerned. May God bless them abundantly! Also, I would like to extend my sincere thanks to my friends like Nabasa Crispus, Eyar Joshua, Atim Jackie, Ninsiima Wilkins and Mikorre Esther to mention but a few for supporting me in various ways; may God bless them abundantly.

### **List of Abbreviations**

EIA	Environmental Impact Assessment
GAP	Ganga Action Plan
GSS	Ghana Statistical Service
KCCA	Kampala Capital City Authority
LEDs	Less Economically Developed Countries
LULC	Land Use and Land Cover
MLHUD	Ministry of Lands, Housing and Urban Development
NEMA	National Environment Management Authority
NWSC	National Water and Sewerage Corporation
SMSB	Shanghai Municipal Statistics Bureau
SPSS	Statistical Package for Social Scientists
UBOS	Uganda Bureau of Statistics
UCIL	Union Carbide India Limited
UHI	Urban Heat Island
UK	United Kingdom
UNEP	United Nations Environment Programme
UNFPA	United Nations Population Fund
UNWUPR	United Nations World Urbanization Prospects Report
USA	United States of America
WCED	World Commission on Environment and Development

TABLE OF CONTENTS

DECLARATION..... i

APPROVAL ..... ii

DEDICATION..... iii

ACKNOWLEDGEMENT ..... iv

LIST OF ABBREVIATIONS.....v

TABLE OF CONTENTS ..... vi

List of Tables ..... ix

List of figures.....x

List of Plates ..... xi

ABSTRASCT ..... xii

CHAPTER ONE.....1

1.0 Introduction and background of the study .....1

1.2 Problem statement. ....3

1.3 Objectives .....3

1.4 Research questions.....4

1.5 Scope.....4

1.6 Significance. ....4

1.7 Definition of key terms.....5

1.8 Conceptual frame work.....6

CHAPTER TWO .....8

LITERATURE REVIEW .....8

2.0 Introduction.....8

2.1 Factors leading to rapid urbanization .....8

2.2 Effects of rapid urbanization on environmental resources .....10

2.3 Conservation measures being used to ensure better environmental quality .....17

CHAPTER THREE .....21

MATERIALS & METHODS .....21

3.0 Introduction.....21

3.1. Description of the study area .....	21
3.2 Research Design. ....	22
3.3 Target Population.....	23
3.4 Sampling Design.....	23
3.5 Sources of Data.....	23
3.5.1 Primary data.....	23
3.5.2 Secondary data.....	24
3.6 Data collection methods .....	24
3.7 Validity and Reliability.....	24
3.8 Ethical Consideration.....	25
3.9 Data Analysis and Presentation .....	25
3.10 Limitations in the Study.....	26
CHAPTER FOUR .....	27
PRESENTATION OF FINDINGS AND DISCUSSION.....	27
4.0 Introduction.....	27
4.1 Demographic characteristics of respondents .....	27
4.2 Factors for rapid urbanization in Mbarara Municipality .....	29
4.2.1 Residence of respondents .....	29
4.2.2 How people came to know about Mbarara municipality .....	30
4.2.3 Pull and push factors to Mbarara municipality.....	31
4.2.4 Factors for rapid urbanization in Mbarara Municipality .....	33
4.3 Effects of rapid urbanization on the environmental resources .....	35
4.3.1 Rapid urbanization activities that degrade the environment.....	35
4.3.2 Effects of rapid urbanization on the environmental resources .....	37
4.4 Conservation measures used to reduce the effects of rapid urbanization.....	40
4.4.1 Conservation measures used to reduce the effects. ....	40
4.4.2 Recommended measures by the respondents.....	43
4.5 Relationship between rapid urbanization and environmental quality.....	44
CHAPTER FIVE .....	48
CONCLUSION AND RECOMMENDATIONS .....	48
5.0 Introduction.....	48



5.1 CONCLUSIONS .....48

5.2 RECOMMENDATIONS.....47

REFERENCES .....50

APPENDIX I .....53

QUESTIONNAIRE .....53

APPENDIX II .....60

INTERVIEW GUIDE.....60

## **List of Tables**

Table 1: Demographic characteristics of respondents.....	27
Table 2: Area of residence of respondents.....	29
Table 3: How people came to know about Mbarara.....	30
Table 4: Pull and push factors to Mbarara Municipality.....	31
Table 5: Factors for rapid urbanization in Mbarara Municipality.....	33
Table 6: Activities done due to rapid urbanization that degrade the environment.....	34
Table 7: Effects of rapid urbanization on environmental resources.....	36
Table 8: Conservation measures being practiced.....	40
Table 9: Recommended measures by the respondents.....	42
Table 10: Relationship between rapid urbanization and environmental quality.....	44

## List of figures

Figure 1: Map of Mbarara municipality.....	21
--	----

### **List of Plates**

Plate 1: Showing wastes dumped in the bush near the road.....	35
Plate 2: Transport by automobiles in Mbarara municipality.....	36
Plate 3: A gulley formed after heavy rains in Kakoba division.....	39
Plate 4: Showing plastic bottles collected for recycling at Kora-norya.....	41

## ABSTRASCT

Urbanization in Mbarara is one of the most environmental management constraints and has become so rapid especially in the last two decades. Urbanization refers to the increase in the number of people living or working in an area that changes it from the rural structure to town and modern structure, it becomes “rapid urbanization” when it is occurring at a faster rate than before and compared to other urban areas around the same region. This study focused on the impacts of rapid urbanization on environmental quality in Mbarara municipality by identifying the factors leading to rapid urbanization in Mbarara municipality, determining the effects of rapid urbanization on environmental resources and finding out the conservation measures being used to ensure better environmental quality. The study also determined the relationship between rapid urbanization and environmental quality. It was conducted in all the three divisions of Kamukuzi, Nyamitanga and Kakoba using Cluster and Judgmental sampling techniques. The study found out that; rapid urbanization in Mbarara has been influenced by many factors which include: increased population, especially caused by rural urban influx, availability of natural resources like River Rwiizi and good pastures for grazing, strategic location along the highway, government policy and peace and security. Rapid urbanization has led to various effects on environmental resources such as pollution, land degradation, soil erosion and floods, loss of biodiversity and climate change. The conservation measures implemented are; environmental laws and policies, construction of waste disposal sites, public awareness and participation, planting trees and flowers, water treatment and regulation of rural urban influx. Environmental Impact Assessment, strengthening available laws and policies, capacity building and multidisciplinary and multi-sectoral approaches should be applied as suggested by the respondents. Using spearman’s correlation statistical test it was concluded that there is a strong negative correlation between rapid urbanization and environmental quality ( $r_s = -1$ , at  $p = 0.05$ ). The study recommended extension of development projects even to rural areas, better urban planning, and conservation projects like tree planting and implementation of environmental laws and policies.

## CHAPTER ONE

### 1.0 Introduction and background of the study

Rapid Urbanization is one of the most powerful and visible anthropogenic forces on Earth. Since the second half of the twentieth century, the world has experienced the fastest rate of urbanization particularly in developing countries (Anderson, 2008). Rapid Urbanization is the increasing number of people living in urban areas faster than usual. It can also be defined as increasing concentration of the population in urban areas and a transformation of land use and society to a metropolitan pattern of organization (UNWUPR, 2005). It predominantly results in the physical growth of urban areas, be it horizontal or vertical. The United Nations projected that half of the world's population would be in urban areas at the end of 2008 and by 2050 it is estimated that 64.1% and 85.9% of the developing and developed world will be urbanized respectively (UNWUPR, 2005).

Rapid urbanization is influenced by rapid industrialization, high birth rates in rural areas, rural exodus, over population and overcrowding in urban sector which leads to problems like development of shanks and slumps land, stream and air pollution, green house gas emission sporadic outburst of fire, random waste disposal deteriorating urban road network, collapse of bridges and houses, landslides and urban flash flooding are some of the problems faced (World Bank, 2002). According to United Nations Environment Programme (UNEP, 2000), these environmental health problems in developing countries are now exacerbated by emerging problems of industrial and agricultural pollution which are also increasing due to rapid urbanization.

The global proportion of urban population rose dramatically from 13% (220 million) in 1900 to 29% (732 million) in 1950, to 49% (3.2 billion) in 2005) and this figure is projected to rise to 60% (4.9 billion) by 2030 (UNWUPR, 2005). In USA, since the beginning of the industrial revolution 300 years ago, rapid urbanization has increased day by day. The United States underwent a dramatic rural urban shift in the nineteenth and early twentieth centuries. Urban areas between Boston and Washington D.C have merged into nearly continuous Megacities sometimes called Bos-Wash, containing about 35 million people. This affected vegetation cover,

land, water resources and air quality (Cunningham, 2002). About three fourths of the people in Europe, North America and Latin America live in cities hence some urbanologists predict that by 2100 the whole world will be urbanized to the levels now seen in developed countries (Tyler, 2000).

In Asia, the urban agglomerations of Dhaka, Karachi, Jakarta, Mumbai, Delhi, Manila, Seoul and Beijing are each already home to over 20 million people, while the Pearl River Delta, Shanghai-Suzhou and Tokyo are forecast to approach or exceed 40 million people each within the coming decade (by 2015). Outside Asia, Mexico City, New York City, Lagos and Cairo are fast approaching being, or are already, home to over 20 million people (UNWUPR, 2005).

In Zambia, one of the most urbanized countries in Africa, water-borne diseases such as cholera, typhoid and dysentery are prevalent due to lack of access to clean water and bad sanitation. In Malawi, the urban population increased from 5% in the 1960s to 13% in 1995. The urban growth rate is currently estimated at 5.6% annually (World Bank, 2002). The poor are often cramped in inadequate housing along flood plains or other areas that are vulnerable to pollution because that is the only place where they can afford to rent or build accommodation in urban parts of Malawi, South Africa, Zambia and Zimbabwe (World Bank, 2002).

In Uganda, Kampala capital city is characterized by a series of low lying valleys with flat hills. These hills are surrounded by a network of wet valleys which are covered by papyrus swamps (NEMA, 1992). Many of the papyrus swamps have been reclaimed and developed because of poorly planned rapid urbanization process therefore Kampala currently accommodates 40% of all urban residents in Uganda (MLHUD, 1993).

It was originally built on seven hills, but today encompasses 46 hills. This change in land-use from natural vegetation with only a small population to a city of millions of people has exerted pressure on the environment. The major causes of environmental degradation in Kampala include, but are not limited to, poor solid waste collection, inadequate facilities for sewage and sanitation, drainage, increasing traffic and industrial pollution and urban agriculture (MLHUD, 1993). However, in Mbarara, rapid urbanization is blamed for the poor solid waste management, construction of more roads and buildings and industrialization. These activities have increased cases of air pollution, land degradation, water pollution and biodiversity loss (MLHUD, 1993).

## **1.2 Problem statement.**

According to UBOS (2010), Mbarara's population had increased to 83,700. Rapid urbanization goes with industrialization, modernization, and technology which lead to the key factors affecting the environmental quality. Population increase, waste generation due to increased production and consumption are some of the problems affecting the environment. Formerly, Mbarara had more green space within the municipality than today. River Rwiizi, the main source of water to the municipality used to provide clean water that would not necessarily need expensive treatment. Currently, the National Water and Sewerage Corporation (NWSC) has got a good job to treat water expensively before supplying to people. There was much free and fertile land in Mbarara which is different today. The land was encroached on by developers, where buildings and roads were constructed. There is air pollution by the many vehicles moving to and from industries. Land has also been polluted by wastes like polyethene bags (kaveeras), construction debris, organic matter and papers among others which are not well managed. Noise pollution is also evident and affects people especially near streets, workshops, and industries. However, management strategies like treatment of wastes, laws and policy formulation have been practiced though not effectively. This research was meant to assess the effects of rapid urbanization on the overall environmental quality hence forth make recommendations according to the findings obtained illustrating how best sustainable development can be achieved in Mbarara.

## **1.3 Objectives analyze**

### **1.3.1 General objective**

To examine the impacts of rapid urbanization on environmental quality in Mbarara municipality.

### **1.3.2 Specific objectives**

The specific objectives of the study were;

- i. To identify the factors leading to rapid urbanization in Mbarara municipality.
- ii. To determine the effects of rapid urbanization on environmental resources in Mbarara municipality.
- iii. To find out the conservation measures being used to ensure better environmental quality.



#### **1.4 Research questions.**

- i. What are the factors leading to rapid urbanization in Mbarara municipality?
- ii. What are the effects of rapid urbanization on the environmental resources?
- iii. What conservation measures are being used to ensure better environmental quality?
- iv. Is there any relationship between rapid urbanization and environmental quality?

#### **1.5 Scope.**

##### **Geographical scope**

Mbarara Municipality is found in Mbarara district, western Uganda. The research covered all the three divisions of the municipality namely; Kamukuzi, Nyamitanga and Kakoba.

##### **Content scope**

This research was focused on identifying factors that influence rapid urbanization, determining how rapid urbanization affects the environmental resources and finding out conservation measures being used, to determine the relationship between rapid urbanization and environmental quality.

##### **Time scope**

The study lasted for three months that is July to September 2014.

#### **1.6 Significance.**

This research will act as a base line to all academicians and future researchers, developers and politicians who might wish to use it. It has helped me to get more knowledge about rapid urbanization and environmental quality as it is on the ground and be able to make conclusions and recommendations. It provides more knowledge to all other interested readers about the relationship between rapid urbanization and environmental quality. Gaps left for the future researchers were also be clearly identified.

It might help the developers to identify how their activities affect the environment. It also helps them to identify some conservation measures that could be used to conserve their environment and/or following the set environmental procedures like Environmental Impact Assessment (EIA).

It might help the politicians to realize how most of the developing activities influenced and/or owned by them affect the quality of the environment. This also helps them to know the importance of good environmental management and therefore influence conservation through passing and implementing environmental conservation laws and/or by-laws.

### **1.7 Definition of key terms.**

#### **Urbanization**

Urbanization is the increasing number of people that live in urban areas (UNWUPR, 2005).

#### **Environment**

According to the Oxford dictionary, the term environment is the surroundings or conditions in which a person, animal, or plant lives or operates. It is also defined as the natural world, as a whole or in a particular geographical area, especially as affected by human activity.

#### **Environmental quality**

Environmental quality is a set of properties and characteristics of the environment, either generalized or local, as they impinge on human beings and other organisms.

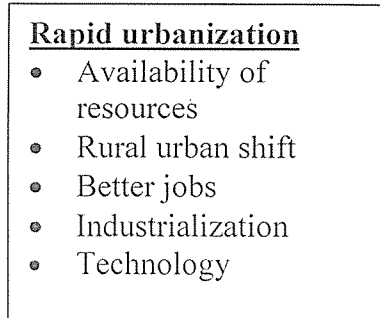
It is a general term used to refer to varied characteristics that relate to the natural environment as well as the built environment, such as air and water purity or pollution, noise and potential effects which such characteristics may have on the physical and mental health caused by human activities (Anderson & Terry 2008).

#### **Impact**

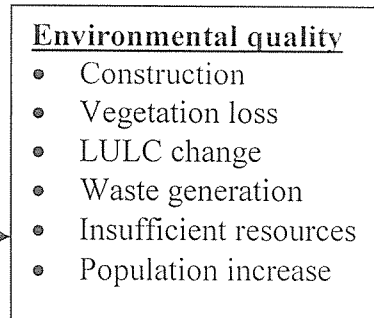
It is the action of one object coming forcibly into contact with another.

### 1.8 Conceptual frame work.

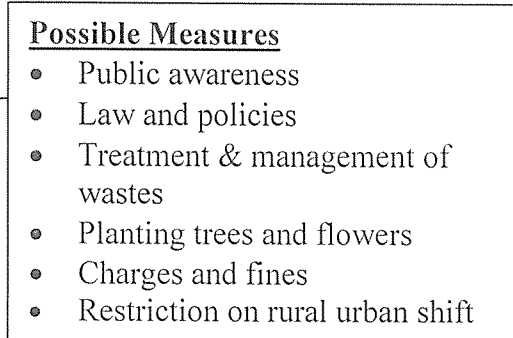
#### INDEPENDENT VARIABLE



#### DEPENDENT VARIABLE



#### INTERVENING VARIABLE



Rapid urbanization (Independent variable) was caused by different factors such as availability of resources like capital, raw materials needed by different industries like water and milk. strategic location on the high way, rural urban shift that increased the population, presence of job opportunities, industrialization and technology advancement. Environmental quality (Dependent variable) was reduced by rapid urbanization through construction activities, loss of vegetation, Land Use and Land Cover change, pollution of air, water and land. There was also scarcity of land, water, and food. Land scarcity was the major cause of congestion in most urban areas.

As a result, reduced environmental quality became evident with effects like diseases such as cholera, typhoid, dysentery, asthma, floods. Loss of biodiversity, soil erosion, changes in temperature because of loss of vegetation and high production of green house gases. In the long run, the climate of the region was also being affected. In most urban areas measures are put in place to reduce on the effects of rapid urbanization on the environment. Such measures include:

public awareness, law and policies, treatment & management of wastes, planting trees and flowers.

However, these measures appeared not to be effective because environmental quality was reduced more rapidly, which formed a necessity of this study.

## CHAPTER TWO

### LITERATURE REVIEW

#### 2.0 Introduction

This chapter presents and reviews secondary data that is related to the topic of study.

#### 2.1 Factors leading to rapid urbanization

Today there are over 400 cities in the world with populations of over 1 million and in the foreseeable future, virtually all of the world's population growth will be absorbed by the urban areas of the less developed regions, whose population is projected to increase from 2.4 billion in 2007 to 5.3 billion in 2050 (United Nations, 2007).

In 2003, 73% of the population in Europe was living in cities or city suburbs, and it is estimated that by 2030 80% of the population will be urbanized. The continued growth of cities today is partly due to rural-urban migration and partly due to an influx of migrants from other countries. The globalization of markets, the desire for higher education, increased use of communication, and new information technologies are the driving forces behind this process (UNFPA, 2007).

In England, the urban population jumped from 17% in 1801 to 72% in 1891 (for other countries the figure was: 37% in France, 41% in Prussia and 28% in the United States). This has been driven by continued migration from the countryside and due to the tremendous demographic expansion that occurred at that time (UNFPA, 2007).

Approximately 60% of urban population growth worldwide is caused by natural increase, with migration accounting for only 25% of growth in Africa and 34% in Latin America. In Asia however, migration remains the dominant factor, providing for 64% of city growth across the continent (Brennen-Galvin, 2001). Urban expansion and subsequent LULC changes in Shanghai have largely been driven by policy reform, population growth and economic development (Kim *et al.*, 2007).

Since the early 1970s, several Sub-Sahara African governments pursued post-independence macro-economic policies that incentivized urbanization. These policies encouraged the

establishment of large scale, capital-intensive industries situated in large cities (Todaro, 2000). In addition, policies related to agriculture, food subsidies and exchange rates have tended to keep food prices low for urban consumers at the expense of the farmers (Nsiah, 2003). Largely due to these policies, the level of urbanization in Sub-Saharan Africa has increased dramatically to nearly 40 per cent today. This translates into a total urban population of about 250 million. The United Nations Population Fund (UNPF) projects that Sub-Saharan Africa's urban population will double between 2000 and 2030 (UNPF, 2007).

Pro-urban development strategies adopted by countries in Africa have left urban areas more developed than the rural areas. The greater opportunities cities offered in the urban areas in terms of employment, education, health and other facilities tend to attract the youth to the urban areas (Nsiah, 2003).

In -Saharan Africa migration from rural areas on average accounts for about 60 per cent of the urban population and in exceptional cases, as much as 75 per cent. Rural-to-urban migration has many causes like poverty in rural areas resulting from low agricultural productivity, aggravated by demographic growth and natural disasters (Todaro, 2000). Rural areas are relatively under-served in terms of physical, financial, social and economic infrastructure. This neglect of rural areas is reflected in the inadequate allocation of resources for operational expenses and insufficient investment in rural infrastructure, agriculture, schools and hospitals (Mediel *et al.*, 2013).

In Bamenda city-Cameroon, the numerous services offered have somehow encouraged rural exodus and accelerated the urbanization process. People, especially the youthful folk migrate into Bamenda in search of jobs and high birth rate in rural areas is the most influential factor (World Bank, 2002).

On one hand, political strife, natural disasters, socio-cultural constraints, religious persecution, economic decline in rural areas are some of the 'push' factors in Ghana. For example, Accra experienced net out-migration during the worst of Ghana's economic crisis in the 1980s (Simon, 1999).

Despite the planning schemes, developments in Kampala especially housing have continued to be haphazard, unplanned and located outside planned area (MLHUD, 1993). This is blamed on

Kampala Capital City's (KCC) failure to implement/enforce the planning schemes, continued political interference, conflicting land use policies, uncoordinated instructions between KCC and Ministry of Local Government and at times State House. Kampala currently accommodates 40% of all urban residents in Uganda (MLHUD, 1993).

## **2.2 Effects of rapid urbanization on environmental resources**

Stewart (2009) argues that the effects of urbanization are primarily positive for the environment. Firstly, the birth rate of new urban dwellers falls immediately to replacement rate, and keeps falling, reducing the risk of environmental stresses caused by population growth. Secondly, migration away from rural areas reduces the prevalence of destructive subsistence farming techniques, such as improperly implemented slash and burn agriculture.

Urbanization leads to economies of scale in provision of water, health, education, electricity and other services. Industries benefit from concentration of suppliers and consumers and allow savings in communications and transport costs. Cities serve as commercial, administrative, and growth centers and are generally places for production and consumption of goods and services. Cities provide big, differentiated labour markets and help to generate new ideas and accelerate the pace of development of technological innovation and dissemination (Gunnar, 2014).

However rapid urbanization has greatly accelerated economic and social development, and global cities are engines of economic growth and centers of innovation for the global economy and the hinterlands of their respective nations, it has also created numerous environmental problems ranging from the local to the global scale (Todaro, 2000). In USA, low-density residential development has become the fastest growing land use (Brown *et al.*, 2005). This type of development is increasingly located adjacent to protected areas and in areas of high biodiversity, as city dwellers seek out natural surroundings (Hansen *et al.*, 2005).

In the USA, urbanization has been cited as a major cause of more than half of threatened or endangered species declines (Czech *et al.*, 2000) and in Canada, almost half of the human population occurs in the same geographic area as almost half its threatened or endangered species (Environment Canada, 2005). Urbanization has generally negative effects on amphibian

communities. Urban landscapes have lower amphibian abundance and species richness than less developed landscapes (Knutson *et al.*, 1999).

Lately, we have also witnessed labour migration from the European countries that were part of the Eastern bloc. This has in a few decades made European cities into multi-ethnic societies. Many of the receiving countries are dependent on low-paid migrant labour to maintain their industries and infrastructure. Most immigrants thus end up having low status and being vulnerable to exploitation and abuse (Gunnar, 2014).

The effect of urban expansion on transportation in growing megacities has become a key issue in the context of global climate change as motorized mobility is a major source of domestic greenhouse gas emissions (Pengjun Zhao, 2010). In Shanghai, increased air and water pollution and decreased water supply, local climate alteration and increased energy demands, insufficient housing and sanitation facilities and traffic congestion, have led to a major reduction in natural vegetation production and carbon storage/sequestration (Kim *et al.*, 2007).

Pollutants can affect human health in many ways with both short-term and long-term effects, and People with health problems such as asthma, heart and lung disease may also suffer more from environmental pollution. Urbanization has become an extremely serious public health challenge, and the increase in coronary heart disease in Asian countries was found to be associated with the growing urbanization, also suggested that the huge increase in the number of motor vehicles associated with the urbanization process had led to serious human health risks in Shanghai. The increasing percentage of patients in Shanghai is partly attributed to the environmental pollution during urbanization (Shanghai Municipal Statistics Bureau, 2011).

In many cities the air is already so polluted that it has been causing illnesses and premature deaths among elderly people and children. Studies show that disease rate rises when the air pollution level increases. Air pollutants are also harmful for water and environment, for example, by causing acid precipitation and acidity of waters. Most of the ambient air-pollution in urban areas comes from the fossil fuels industry, motor vehicles, heating and electricity generation. In some cities the main air polluter is the domestic heating (Somlyódy *et al.*, 2001).



Many people heat their houses with firewood and cheap coal. This kind of heating method will decrease in the future. Although, new heating methods can be even worse polluters. Instead of carbon dioxide the emissions can include various toxic and carcinogenic chemicals, heavy metals, trace organic chemicals and fibers, photochemical pollutants, lead and carbon monoxide, which are much more harmful to human health (HABITAT, 1996).

Rapid urbanization leads to alterations of the local climate, and in particular creates a significant Urban Heat Island (UHI) effect. The phenomenon of urban heat islands has become a growing concern. Incidence of this phenomenon as well as concern about it has increased over the years. An urban heat island is formed when industrial and urban areas are developed resulting in greater production and retention of heat (Kalnay and Cai, 2003).

A large proportion of solar energy that affects rural areas is consumed evaporating water from vegetation and soil. In cities, where there is less vegetation and exposed soil, the majority of the sun's energy is absorbed by urban structures and asphalt. Hence, during warm daylight hours, less evaporative cooling in cities results in higher surface temperatures than in rural areas. Vehicles and factories release additional city heat, as do industrial and domestic heating and cooling units. As a result, cities are often 1.8 to 5.4 °F (1 to 3 °C) warmer than surrounding landscapes. Impacts also include reducing soil moisture and a reduction in re-uptake of carbon dioxide emissions (Gunnar, 2014).

The rapid urban sprawl and the change of land use have resulted in remarkable heat island phenomenon in Shanghai, China in recent years. Urban areas are often jungles of asphalt, concrete, brick and other dark materials for the construction of roads and buildings. All of these man-made materials have a low reflectivity, and function to absorb incident solar radiation. In addition, the urban areas have a large population and dense buildings, which results in the large amount of anthropogenic heat release from vehicles, plants, air conditioners, and other heat sources (Zhang *et al.*, 2010).

According to Davis-Mattis (2005), approximately two thirds of Jamaica's population lives in coastal towns and cities. High and rapid levels of urbanization have led to major problems such

as traffic congestion resulting from poor infrastructure, contributing to environmental pollution and urban decay. Moreover, inadequate social services and poor housing are consequences of overpopulation and high population densities, often leading to the proliferation of squatters in major cities. This scenario is often times intensified when high housing prices force people who are in the lower income strata away from the formal land market and towards illegal squatter settlements frequently situated in forbidden, environmentally sensitive areas; usually state-owned, yet seldom monitored. Compared to other urbanized lands, these areas are usually most vulnerable to natural and anthropogenic hazards (Gunnar, 2014).

Many cities in Asia have no sewers at all. These are not only the smaller cities but also many major cities with a million or more inhabitants have no sewers. If the city has sewers they often serve a small proportion of the population, typically those who are located in the richer residential, governmental and commercial areas. Most of the city inhabitants also lack connection to septic tanks. For example, Jakarta, and some smaller Indonesian cities have virtually no sewage disposal system (Davis, 1993).

Developing countries' major sources of pollution are untreated or partially treated domestic sewage, industrial waste effluent, and domestic and industrial garbage. In urban centers, where the size and density of the settlements are high, sanitation problems are very big. In many cities wastewater are discharged to the rivers, coastal water and water bodies often without any treatment at all. Even the city has central sewage system water can be only partially treated or just conveyed. The polluted water can travel long distances underground when conditions allow. For example laterite soils, commonly found in tropical climate, can allow the piping of water over significant distances. The safe distance between latrine and water source depends therefore on the soil conditions (Somlyódy *et al.*, 2001).

Wells and springs are open to contamination from pit latrines, septic tanks, and other waste disposal sites. Septic tanks and other sewage systems if not properly constructed, located, and maintained, can easily pollute the ground and surface water. Insufficiently treated or untreated industrial and municipal wastes discharged into water bodies pollute water supplies and pose risks to human health. Water supply facilities have advanced faster than wastewater

management. In developing countries 75 per cent of urban dwellers had water supply facilities, and only 66 per cent had sanitation services (Davis, 1993).

The overuse of groundwater resources is common in all the developing countries. The countries that suffer from the bad quality of surface water rely often on groundwater sources. Overusing of these supplies causes land subsidence, which is a serious problem in some cities like Mexico City and Bangkok. Especially in soil, which is clay, is really hard to maintain the water level back to where it has been, because soil dries and it is not possible to fill the waterholes for the size they have been (Somlyódy *et al.*, 2001).

The growing urbanization and associated industrialization may result into over-pumping of groundwater. This leads to the lower water tables and land subsidence. Groundwater levels decrease, the pumping of water from lower levels is more costly. Groundwater is in many countries used for irrigation. In coastal areas, saltwater intrusion into the aquifers can occur. This process decreases access to water supply by lowering supply and increasing contamination (Starke, 2000).

The pollution of groundwater resources is one of the biggest problems of rapid urbanization in many regions. Groundwater has often proven to be a clean and reliable source of water, but now it is threatened due to a careless disposal of organic and chemical wastes. The groundwater resources are also often taken for granted and not being protected (Somlyódy *et al.*, 2001).

Construction activities increase impermeable or near-impermeable surfaces, which results in a reduction of infiltration into groundwater. Storm runoff increases and accelerates, and peak flows grow. Surface runoff from impervious areas may be hundreds of times greater than runoff from some natural areas. Coupled with the effects of soil erosion and sedimentation in rivers and canals resulting from urban construction, flooding in the low-lying areas is more frequent (Kasarda and Parnell, 1993).

Accelerated environmental degradation, food insecurity and poverty, are crosscutting issues that result from rapid urbanization and urban population growth. There are considerable implications

of rapid urbanization and population growth for the future impact of global health, food security, global warming and environmental change. Environmental and social stress, in which disease, hunger, poverty, land degradation, ethnic conflicts and overpopulation also threaten human security and sustainable development are in Africa. Rapid urbanization finds expression principally in outward expansion of the built-up area, converting prime agricultural land into residential and industrial uses. It also leads to the construction of high-rise buildings and vertical commercial development in specific zones (UN-HABITAT, 2008; 2009).

Urbanization in Africa is occurring amid increasing levels of urban poverty. One of the spatial manifestations is the proliferation of slums. A slum household is defined as a group of individuals living under the same roof lacking one or more of the following conditions: access to sanitation facilities, sufficient living area, structural quality and durability of dwellings and security of tenure (UN-HABITAT, 2008; 2009). Slum dwellers' houses are often unfit for habitation and lack adequate food, education, health care and basic services (UN Department of Economic and Social Affairs, 2011).

In Thailand, rapid urbanization has led to urban slums, where it is certainly hardly immune to pestilence or climatic disturbances such as floods, yet continues to strongly attract migrants. Examples of this were the 2011 Thailand floods and 2007 Jakarta flood. Urban areas are also far more prone to violence, drugs, and other urban social problems. In the case of the United States, industrialization of agriculture has negatively affected the economy of small and middle-sized farms and strongly reduced the size of the rural labour market (UN-HABITAT, 2008; 2009).

Wade and Webber (2002) observed that flooding in the city of Montego Bay in Jamaica occurs quite frequently due to deforestation by squatters in the lower watershed areas. Research has shown that deforestation for residential purposes along with 'slash and burn' farming by agricultural squatters in watershed areas have led to the degradation of 17 out of the 26 existing watersheds in the island; eventually leading to a reduction in fresh water resources. This can also be attributed to poor land management practices and inadequate institutional arrangements by the state. Rapid urban growth along with the inadequate provision of housing facilities has resulted in the increasing presence of informal settlements along gullies and on river banks in Jamaica (Simms, 2008).

In Ghana, urban growth inevitably has severe consequences for the physical environment, especially in the fringe areas where land-use change is rapid. The land around the old villages in the peri-urban area of Accra used to be covered with forest but much of this has been cleared over the years, initially by local community members for agricultural purposes and firewood harvesting, and later by newcomers who acquired land for residential purposes. The extent to which the vegetation has been degraded varies, with villages closest to the built-up urban areas having lost a greater amount of vegetation cover (such as La Bawaleshie) due to more intense pressure on the land than in villages located farther away from Accra (Kojo & Gough, 1999).

Due to rapid economic development, Shanghai has experienced one of the greatest rates of change in land use and land cover (LULC) during the last three decades, and this change is mainly urban expansion and cultivated land reduction (Chen, 2007).

The exchange of energy, water, and momentum between the land surface and the atmosphere is strongly influenced by the physical characteristics of vegetation and soils. In the process of urbanization, natural vegetation cover is largely replaced by paved surfaces, and open spaces are maintained for recreational or ornamental purposes, so that the ecosystem dynamics of the remaining green areas of the city are usually quite different from those of the open countryside (Guo & Hu, 2010). Thus, changes in vegetation imply changes in the physical properties of land surface, including surface albedo, surface roughness, leaf-area index, rooting depth, and availability of soil moisture. Research on land surface temperature showed that the partitioning of sensible and latent heat fluxes and thus surface radiant temperature response is a function of varying surface soil water content and vegetation cover (Guo & Hu, 2010).

Urban people change their environment through their consumption of food, energy, water, and land. And in turn, the polluted urban environment affects the health and quality of life of the urban population. People who live in urban areas have very different consumption patterns than residents in rural areas. For example, urban populations consume much more food, energy, and durable goods than rural populations (Kalnay and Cai, 2003).

Energy consumption for electricity, transportation, cooking, and heating is much higher in urban areas than in rural villages. For example, urban populations have many more cars than rural

populations per capita. Almost all of the cars in the world in the 1930's were in the United States. Today we have a car for every two people in the United States. If that became the norm, in 2050 there would be 5.3 billion cars in the world, all using energy (Zhang *et al.*, 2010).

Rapid urbanization also affects the broader regional environments. Regions downwind from large industrial complexes also see increases in the amount of precipitation, air pollution, and the number of days with thunderstorms. Urban areas affect not only the weather patterns, but also the runoff patterns for water (Cunningham, 2002).

Bhopal is a major city in the centre of India. The Bhopal disaster was one of the world's worst industrial catastrophes. It occurred on the night of December 2–3, 1984 at the Union Carbide India Limited (UCIL) pesticide plant in Bhopal, Madhya Pradesh, India. A leak of methyl isocyanate gas and other chemicals from the plant resulted in the exposure of hundreds of thousands of people. The official immediate death toll was 2,259 and the government of Madhya Pradesh has confirmed a total of 3,787 deaths related to the gas release. Others estimate 3,000 died within weeks and another 8,000 have since died from gas-related diseases. A government statement in 2006 stated the leak caused 558,125 injuries including 38,478 temporary partial and approximately 3,900 severely and permanently disabling injuries (Abbassi, 1997).

Kampala currently accommodates 40% of all urban residents in Uganda (MLHUD, 1993). It was originally built on seven hills, but today encompasses 46 hills. This change in land-use from natural vegetation with only a small population to a city of a million people has exerted pressure on the environment. The major causes of environmental degradation in Kampala include, but are not limited to, poor solid waste collection, inadequate facilities for sewage and sanitation, drainage, increasing traffic and industrial pollution and urban agriculture. Unfortunately most of the pollution from the anthropogenic activities in the city ends up in Lake Victoria through channels that drain the city (MLHUD, 1993).

### **2.3 Conservation measures being used to ensure better environmental quality**

In Dharavi, a slum area in Mumbai India, there is a waste a recycling zone. It is claimed that Dharavi's recycling zone could be the way forward to a sustainable future. Everything is recycled from cosmetics and plastics to computer keyboards. 23% of plastic waste gets recycled in the United Kingdom (UK), in Mumbai it is 80%. However, it is humans who work to sift the

rubbish in the tips where children and women sift through the rubbish for valuable waste. They have to work under the hot sun in appalling conditions. They earn around a £1 a day for their work (Abbassi, 1997).

At the edge of the tip the rag dealers sort their haul before selling it on to dealers. The quandary is that people have to work in poor conditions to recycle waste. From the tip it arrives in Dharavi where it is processed. It is sorted into wire, electrical products, and plastics. Plastics in India are continuously recycled. People work in dangerous conditions with toxic substances without protective clothing; this could affect people's life expectancy. Even dangerous hospital waste is recycled (Abbassi, 1997).

As put forward by Bernstein (1994), “For cities undergoing rapid expansion, one of the most important challenges is to achieve a proper balance between urban development and environmental protection”. Essentially, this highlights the need to strive for and achieve sustainable development which relates to positive socio-economic change that does not undermine the ecological and social systems on which a society is dependent.

From this, the term ‘sustainable urbanization’ has been derived which is a term used by Drakakis-Smith (2000) to describe the well-balanced relationship between the social, economic and environmental agents in society, so as to accomplish sustainable urban development. This approach is vital in a Caribbean island such as Jamaica where rapid urban growth and development have largely impacted negatively on the natural environment. If this trend is not curbed then it is the impoverished that will suffer most, as they are the ones who often tend to live on marginal lands, not being able to do much to recuperate in times of crisis. Since planning basically revolves around the health and safety of people in society, it is imperative that steps are taken to achieve a sense of balance as it relates to land-use development in our fragile ecosystem (Drakakis-Smith, 2000).

However, the public provision of social services, even to those who can afford them, is seriously hampered by inadequate physical facilities, poor maintenance and inefficient institutional arrangements. Transport, energy, communications and water supply are among the other municipal services that are often inadequately provided. Furthermore, dissatisfied customers of

utilities are reluctant to pay user charges, and may feel justified in evading municipal levies and taxes. The private sector is unlikely to invest or expand its operations under such conditions. This erodes the tax base, which in turn means that governments both at the central and local levels find themselves with insufficient funds to maintain or upgrade existing facilities (World Bank, 2011).

In Ghana, the department of urban roads is also responsible for constructing storm drains along the major roads and the district assemblies are meant to supply secondary and minor drains within the communities, but very few drains have been constructed anywhere. No authority is taking responsibility for constructing and clearing the local drains, many of which are open sewers and a major health hazard GSS (Ghana Statistical Service), (2002).

As rural settlements grow and become urban centers, and urban centers do so and become large municipal areas, there is always increased competition in the demand for land for different purposes. This requires adequate planning and control of these settlements to ensure harmonious development and functional efficiency (GSS, 2002). To achieve this fundamental activity, layouts of various land uses such as residential, commercial, Industrial, open spaces and recreation, circulation and institutional uses among others are undertaken to standardize and control physical developments and ensure harmonious growth. The forms and patterns of distribution of structures in general to promote the good health, accessibility, convenience and harmonious land use in environment are a function, to a considerable extent, of the rights and methods of dealing with land development (Auber & Tamar, 2013).

Effective urban land control and management particularly in areas with rapid urban sprawl is imperative to tackle the attendant land use problems such as slum formation, rising costs of land, accessibility to urban land for land housing, incompatible use, flooding, overcrowding and congestion among others for the purpose of achieving sustainable city development and ensure the safety and health of the people. The legal structures under which this development control is to be enforced has been identified to be either too weak or inappropriate in addressing the myriad of problems of physical development (International Herald Tribune, 2008).



The cumulative effect of this process is seen in the haphazard distribution of land uses and structures without regard to any planning standards, the attendant problems of congestion, the inaccessibility to some activity areas, pollution and other forms of environmental degradation. It is against the background of such experiences that this investigation has sought to examine the enforcement of development control in Wa Township (International Herald Tribune, 2008).

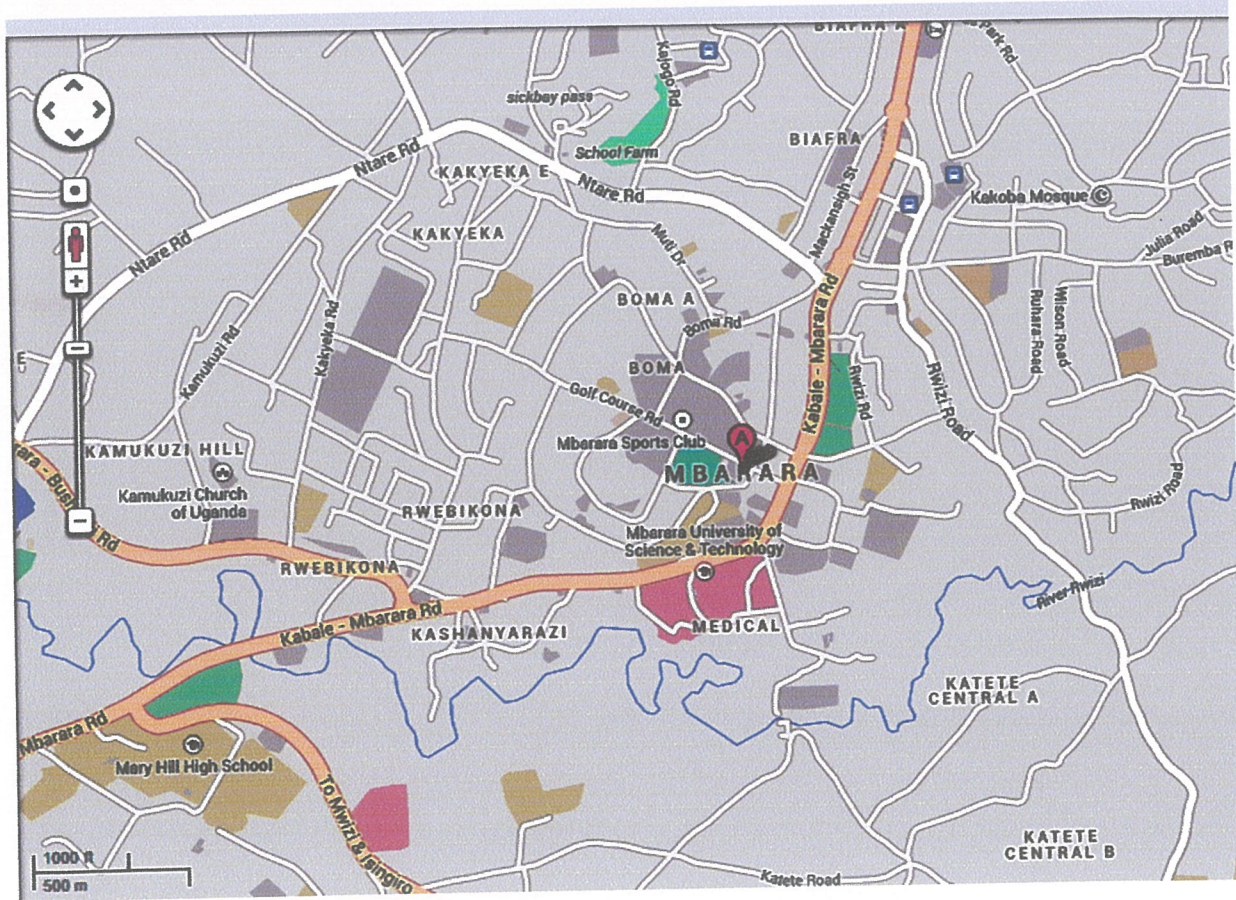
## CHAPTER THREE

### MATERIALS & METHODS

#### 3.0 Introduction

This chapter elaborates the materials and methods the researcher used to collect data, research design, sampling methods, data sources among others. It also gives the description of the study area in terms of location, climate, economic activities, and population, among others.

#### 3.1. Description of the study area



**Figure 1: A Map of Mbarara municipality**

Source: Google maps, 2014.

Mbarara is a district in Western Uganda. It is the main municipal, administrative and commercial center of Mbarara District and the location of the district headquarters. It is also the largest urban centre in western Uganda. The name 'Mbarara' has its roots in the English Colonialist's

mispronunciation of the word 'Mburara' a certain type of grass; a favorite for the cows. Mbarara municipality is mainly divided in three divisions which are Kamukuzi, Nyamitanga and Kakoba. It is further sub-divided into six sub-divisions including Ruharo, Nyamitanga, Nyamityobora, Kamukuzi, Kakoba and Lutti.

**Location:** Mbarara is located about 290 kilometers (180m) by road south west of Kampala, Uganda's capital and largest city. The coordinates of Mbarara municipal center are: 0036 48S, 30 39 30 E (Latitude: - 0.132; Longitude: 30.6582).

Mbarara District is bordered by Ibanda to the north, Kiruhura District to the east, Isingiro District to the southeast, Ntungamo District to the southwest, Sheema District to the west and Buhweju District to the northwest. Mbarara District covers a land area of 1,778.4 square kilometres (686.6 sq mi), with an average elevation of about 1,800 metres (5,900 ft) above sea level.

**Climate:** The district receives an average annual rainfall of 1,200 millimetres (47 in). Temperatures range between 17 °C (63 °F) and 30 °C (86 °F).

**Economic activities:** Both crops and livestock are raised in the district, primarily on a subsistence level, but several commercial farms are located in the district. The Municipality of Mbarara has the largest number of milk processing plants in Uganda. The majority of milk processed is transported to Kampala and other major urban areas in Uganda.

### **Population**

According to 2002 national census the population was estimated to be 69,363. However, UBOS (2010) estimated the mid-year population of the town at 83,700.

### **3.2 Research Design.**

The study used both qualitative and quantitative research designs. Qualitative design was used through asking questions and getting the feedback which was recorded and presented in a narrative form.

Quantitative design was used to reveal the numerical form of data such as statistics, percentages and so forth. It was used to quantify the size, distribution and association of the variables.

### **3.3 Target Population**

The target population was basically all urban residents and urban authorities in that area. These participants were selected depending on how long they had been in Mbarara especially by considering the age and how interested they were in giving out data. This helped to get information about the past nature of the area in a shortest time possible.

### **3.4 Sampling Design**

#### **Sample Size**

The total sample size of the study was 78 respondents. It comprised of 25 people who were settling in each of the three divisions to make 75 in total. One local leader from each division was included to make an overall total of 78 respondents, to get more information on the past and the rate at which people were entering the municipality as residents and how it has affected the environmental quality.

#### **Sampling Method**

I used simple random sampling that gives each member an equal chance to be chosen in the sample group when forming clusters in each division to represent the rest of the population. Cluster sampling method was used since Mbarara Municipality has three different divisions and it would take much time to visit all areas of concern and respondents there. I randomly selected specific areas and chose residents to form clusters representing the whole division. One cluster of 25 people and 1 local leader was formed in each division.

Judgmental sampling which is a non random sampling method was used to select a few individuals like leaders in the area and elders who gave data in relation to the past conditions and future expectations in the area.

### **3.5 Sources of Data**

The source of data of the study was both primary and secondary.

#### **3.5.1 Primary data**

This involved collection of data from respondents who were living in the designated areas.

### **3.5.2 Secondary data**

The secondary data was acquired from reports, which had been compiled by field researchers, internet, text books, magazines and newspapers that concern rapid urbanization and its effects in Mbarara.

### **3.6 Data collection methods**

In order to address the objectives of the research, the researcher used the following instruments which assisted in gathering and collection of data.

#### **Questionnaires**

Questionnaires were issued to the selected respondents, made up of open and closed ended questions. The questionnaires were self-administered amongst the respondents especially the illiterates in order to collect all the complete responses within a short time since clarity to the questions was given on the spot.

#### **Interviews**

This was used on different community members who were the local residents of the area who did not need questionnaires but just an interaction with the researcher through interviews. The researcher conducted personal interviews with the key informants. The key informants involved leaders themselves, environmental officers, clan leaders and some elders of the area, who gave much of the information on how rapid urbanization started and the past conditions of Mbarara.

#### **Observation**

Using all the senses, the researcher obtained data on different environmental concerns in relation to the problem of study. The researcher was much interested in what was exactly on the ground in terms of rapid urbanization and environmental resources.

### **3.7 Validity and Reliability**

The interview guide and questionnaires were cross examined for approval by the research expert, to ensure the appropriateness and consistency information generated.

I used Content Validity Ratio which was suggested by Lawshe (1975) to determine the reliability of data collected.

### Content Validity Ratio

$$CVR = \frac{(n_e - N / 2)}{(N / 2)}$$

CVR = Content Validity Ratio

$n_e$  = Number of respondents who accepted that rapid urbanization had an impact on environmental quality in Mbarara

$N$  = Total number of respondents

2 = Constant

It gives values ranging from positive 1 to negative 1. A positive answer indicates that rapid urbanization has an impact on environmental quality while a negative value shows that rapid urbanization has no impact on environmental quality in Mbarara Municipality.

It gave a positive answer of 0.9, which indicated that rapid urbanization had an impact on environmental quality in Mbarara municipality.

### 3.8 Ethical Consideration

I got an introduction letter from the University to introduce me to the area. This involved seeking permission by the researcher from the senior leaders of the study area. Permission was sought from the relevant authorities like Local Council leaders; with respect to the respondents' views and the Town Clerk of Mbarara. This was important for the protection of the researcher from harm or harassment and the confidentiality of the respondents and their superiors' sensitive information.

### 3.9 Data Analysis and Presentation

Data was analyzed and presented in form of tables, and percentage scores basically showing potential themes, categories and patterns was closely examined to see how they actually emerge from the data in relation to the objectives of the study. Data was analyzed quantitatively using Spearman's (non parametric) statistical test to determine the relationship between rapid urbanization and environmental quality. The correlation test gives an answer ranging from +1 to

-1. A positive answer implies a positive relationship while a negative answer means a negative relationship. Positive relationship means that both variables increase as one increases while a negative relationship means that one variable decreases as the other increases.

### **3.10 Limitations in the Study**

In the course of carrying out the study, the researcher faced several constraints, which in one way or the other limited the findings of the research. They include the following;

Time limitations; scheduling problems affected the researcher's ability to gather information. since all respondents had responsibilities at their job so it was hard to make appropriate schedules for proper information gathering. Also getting the permission from the Town Clerk took much of the time equivalent to three days.

Limited financial resources were also a challenge in terms of accommodation and food. Some people expected some money before releasing any information required.

Sabotage experienced from the people who encroached on different environmental resources like wetlands. Most of the people and industries deliberately refused to give reliable information because of fear of the policies against the work they do in the environment



## CHAPTER FOUR

### PRESENTATION OF FINDINGS AND DISCUSSION

#### 4.0 Introduction

This chapter comprises the research findings which include among others; the demographic characteristics of the respondents, factors for rapid urbanization in Mbarara Municipality, the impact of rapid urbanization on environmental quality, measures that are being practiced to mitigate the effects and the relationship between the two variables.

#### 4.1 Demographic characteristics of respondents

**Table 1: Demographic characteristics of respondents (N=78)**

Demographic characteristics	Frequency	Percentage
<b>Sex</b>		
Male	35	45
Female	43	55
<b>Total</b>	<b>78</b>	<b>100</b>
<b>Age (years)</b>		
<15	17	22
16-35	36	46
36-50	19	24
>50	6	8
<b>Total</b>	<b>78</b>	<b>100</b>
<b>Marital status</b>		
Single	45	58
Married	27	35
Others (widowed & divorced)	6	7
<b>Total</b>	<b>78</b>	<b>100</b>
<b>Education level</b>		



Primary	22	28
Secondary	36	46
Diploma	12	16
Degree	8	10
<b>Total</b>	<b>78</b>	<b>100</b>
<b>Occupation</b>		
Business people	35	45
Official (Civil & Private)	3	4
Students	21	27
Casual workers	19	24
<b>Total</b>	<b>78</b>	<b>100</b>

Source: primary data, 2014

Table 1 shows that females (55%) were the majority of the population in Mbarara while males (45%) were the least, an indication that population must have increased rapidly due to a larger number of fertile females than males.

In terms of age, the youth (46%) were the majority of the population, who are energetic enough to do all necessary activities required during rapid urbanization while the adults were (24%) between 36-50 years who have families in need and are forced to work extensively to maintain their homes through providing the basic needs. The elders (8%) who are not strong enough were the least, therefore it was clear that the youth were more and adults less.

The single were 58% as the majority working for their own interests but not for their families. However, some of those who are single had families in need back in their villages that forces them to work beyond the environmental limits. The married were 35% who are the long term planners, indicating the success of a few conservation measures practiced in Mbarara municipality. However, as said earlier, these people are also forced to work tirelessly for their families which degrade the environment. Only 7% of the respondents were divorced and widowed.

In education level, those who studied up to secondary level (46%) were the majority, an indication that most of the population is able to learn and implement the strategies aimed at

environmental management. The population of people who stopped at primary level was also high 28%, an indication that they do not have other ways of survival apart from exploiting environmental resources because their innovation capacity is also very low. Only 16% and 10% studied up to diploma and degree level respectively, and these are the same people in offices, working in hospitals, schools and the administrators. This category of people is low compared to the rest which implies that their influence on sustainable development is over ridden by the rest of the population.

The highest population in Mbarara was business men (45%), an indicator that most people generate commercial wastes like in markets, packaging materials, food leftovers from hotels, air pollution from transport business among others. Business men are also involved in exploiting and selling of environmental resources like timber, clay products like bricks and over utilization and pollution of water by industries such as Mwebesa steel industry along River Rwiizi (R. Rwiizi). Students were 27% who generate wastes but do not mind about managing them because they take it as some other people's concern. Students in this case are regarded as one of the most environmental enemies through the great human wastes generated; air pollution through cooking for them that claims much firewood and also construction of shanty structures because of the market to business men and therefore more people are attracted. Casual laborers were 24% who do different activities like carrying luggage and urban farming which degrade all environmental components; soil, water, air and living organisms. Only 4% do official work for example doctors, teachers, environmental officers and administrators that still generates wastes. Wastes like papers, old files, pins, pens, expired ink, medical wastes and electronic wastes like old computers, are all generated from offices. In these offices, there is use of air conditioners and refrigerators which utilize much power and again release gases like methane to the environment.

## 4.2 Factors for rapid urbanization in Mbarara Municipality

### 4.2.1 Residence of respondents

**Table 2: Area of residence of respondents**

Status	Frequency	Frequency
Within Mbarara	53	68
Outside Mbarara	25	32
<b>Total</b>	<b>78</b>	<b>100</b>

Source: primary data, 2014

Most of the respondents (68%) are permanent residents in Mbarara where as only 32% are temporal in that they leave for their homes outside the municipality at night and return to the municipality during the day. This clearly shows that most wastes generated during the day reduce by a less percentage at night. Even other activities like construction on some sites continue for a period of 24 hours (throughout the day and night) because labour is available even at night. As a matter of fact, environmental degradation occurs all the time in Mbarara.

#### 4.2.2 How people came to know about Mbarara municipality

**Table 3: How people came to know about Mbarara.**

Channel	Frequency	Percentage
Media	13	17
Friends	17	22
Family	19	25
Born in Mbarara	21	27
While at school	6	7
Unknown	2	2
<b>Total</b>	<b>78</b>	<b>100</b>

Source: primary data, 2014

Table 3 shows that only (27%) respondents were born in Mbarara, an indication that most of the environmental resources are not damaged by the very people of the area since their population is less compared to the sum of the rest. Some people knew Mbarara through their family members (25%), who were/are conducting different activities in the municipality while 22% knew it through friends. This shows that most of the people were influenced by others after testing the good out comes in their activities within Mbarara such as business success and high income generation. Through media, 17% came to know Mbarara especially through Radio West, one of the oldest radio stations in Western Uganda is located in Mbarara and many people used to listen to it. The good area for enjoying life like Agip Motel and Vision Empire were always advertised on the radio and business opportunities were identified which attracted many people.

Some knew Mbarara through schools (7%) where they studied from. Mbarara has some of the best and oldest schools in Western Uganda like Mbarara high school and Ntare School which

attracted many people who could afford to take their children for better education. The respondents who were not clear about how they came to know Mbarara (2%) were just brought by their parents and abandoned. They grew up suffering in Mbarara as street kids, they are the same people who did not go far with education and are just casual workers.

#### 4.2.3 Pull and push factors to Mbarara municipality

**Table 4: Pull and push factors to Mbarara Municipality**

Factors	Frequency	Percentage
Better Jobs	13	17
Business	22	28
Education	10	13
Better life	7	9
Born in Mbarara	21	27
Security and peace	5	6
<b>Total</b>	<b>78</b>	<b>100</b>

**Source: primary data, 2014**

Basing on table 4 above, the majority (28%) of the respondents went to do business in Mbarara because of the increased population of consumers in the municipality. The increased population of consumers has attracted very many people to start up shops expecting quicker sales and higher profits. Some of the customers move for long distances to Mbarara for shopping since it is the main shopping center in western Uganda.

Respondents who were born in Mbarara (27%) were also many, showing that urbanization did not start with immigrants into the area but the local people who stayed there. However, the population of business men proves to be more than that of people who were born from there implying that pull factors into Mbarara municipality have done great in the rapid urbanization of the area.

The business men being many is a threat to the environment because it influences the release of more commercial wastes. For example, super markets release wastes like tins, polyethane bags and paper bags which hardly decompose once in the environment. Hotels discharge sewage that contains more of chemicals from the detergents used. Markets dispose off much biomass that

decomposes within the municipality and produces a bad smell. Industries and factories in Mbarara produce gases composed of smoke, carbon dioxide among others which contribute to the green house effect.

Similarly to Bamenda city-Cameroon World Bank, (2002), the numerous services offered have somehow encouraged rural exodus and accelerated the urbanization process. People, especially the youthful folk migrate into Bamenda in search of better jobs, education and security and it is the same influential factor to rapid urbanization in Mbarara. Better jobs (17%) where they can earn more in Mbarara have attracted many people from their villages to the municipality. For example, the casual workers get various jobs in a single day and collect more money than if they were in the villages.

Education (13%) in Mbarara is better in terms of Schools' performance and this has influenced parents to take their children in schools like Ntare School and Mbarara high school among others. Universities like Mbarara University of Science and Technology (MUST) and Bishop Stuart University (BSU) have also attracted many students.

Better life (9%) without much stress has also contributed to population increase in Mbarara. It has attracted especially the youth whose purpose is to enjoy life at the leisure parks, night clubs, hanging out and living a smart and simple life without too much toiling. There were different classic clubs like Vision Empire, Heat among others which have always attracted many youth.

Peace and security (6%) have also contributed to the migration of people into Mbarara municipality. The presence of Makenke military barracks and various police posts has boosted the security of the area in that it is not common to have cases of robbery, rape, murder among others since there are always night patrols.

#### 4.2.4 Factors for rapid urbanization in Mbarara Municipality

**Table 5: Factors for rapid urbanization in Mbarara Municipality**

Factor	Frequency	Percentage
High population	19	24
Availability of resources	13	17
Strategic location	14	18
Government policy	15	19
Security	17	22
<b>Total</b>	<b>78</b>	<b>100</b>

**Source: primary data, 2014**

Results in table 5 above show that, population increase (24%) which increases market for the goods has led Mbarara to develop rapidly. The business men in Mbarara said that there is ready market for their goods especially when university students like those of Mbarara University of Science and Technology (MUST) are at school. Through the presence of universities, institutions and other schools like Ntare School, Mbarara high school among others made Mbarara gain its development. However, business men even reported that in the months of June and July there are a few customers because universities usually close for holidays.

Security (22%) has played a vital role in the rapid urbanization of Mbarara municipality. The presence of Makenke Military barracks and the various police posts has kept the area at peace that influences smooth running of businesses. Mbarara has not experienced rebel attacks like other areas in Kasese and northern Uganda because it has the military head quarters of western Uganda. More to that, it has got many police stations to keep monitoring around the municipality all day and night which has given security to the traders. Cases of robbery and theft are not so common in Mbarara and this has favored the development of the municipality.

It was found out that government policy (19%) of development in Mbarara is much favorable and encourages rapid urbanization. Mbarara being the main shopping center in western Uganda, it is favored by the government to allow more growth for balanced regional development in the whole country. Similar to Nsiah (2003), policies related to agriculture, food subsidies and exchange rates have tended to keep food prices low for urban consumers at the expense of the

farmers. Largely due to these policies, the level of urbanization in Mbarara has increased dramatically. Traders are not taxed much while rural urban migration is not restricted because the target of the government is to develop Mbarara to the level of a city. More industries are encouraged to be established more over without carrying out Environmental Impact Assessment (EIA).

The strategic location on the highway (18%) has also contributed to rapid urbanization in Mbarara. Being along the highway has connected Mbarara to many areas where some traders come with their goods to sell in Mbarara while others buy from Mbarara and take for sale to other areas. It is connected to Tanzania through Isingiro at Mutukula, Rwanda through Kabale at Katuna and Congo through Kisoro because it is located along the highway to Kampala. The transportation of products like fresh dairy from industries in Mbarara to other areas becomes easier which influences trade and development.

Only 17% of the respondents reported that availability of resources like R. Rwiizi, land, raw materials among others have influenced rapid urbanization in Mbarara. R. Rwiizi is the source of all water used in Mbarara municipality and it is because of its availability that industries have been established. Most industries are established along R. Rwiizi, an indication that if it was not available, industrialization would be difficult. Other resources like land availability has favored the location of different businesses and industries in the preferred areas while raw materials like milk have also encouraged development.

### 4.3 Effects of rapid urbanization on the environmental resources

#### 4.3.1 Rapid urbanization activities that degrade the environment

**Table 6: Activities done due to rapid urbanization that degrade the environment**

Activities	Frequency	Percentage
Construction	21	27
Industrialization	13	17
Solid waste generation	18	23
Deforestation	14	18
Transportation	12	15
<b>Total</b>	<b>78</b>	<b>100</b>

**Source: primary data, 2014**

Table 10 indicates that construction (27%) was the highest activity in degrading the environment in Mbarara municipality, an indication that it is occurring at a very fast rate like the construction of Balya mall and Mbarara city mall among others was rapid.

Solid waste generation (23%) was a big challenge as a result of high population and therefore high consumption, wastes from institutions, markets and construction debris degrade environmental quality. I discovered that increased population leads to rapid construction of buildings for shelter and business and at the same time increasing waste generation activities (Plate 1).



**Plate 1: Showing wastes dumped in the bush near the road.**



**Source: Primary data, 2014**

Deforestation (18%) as a result of construction activities which require much timber, also need for firewood and charcoal has consumed a lot of trees. Most of the buildings that are recently being constructed are storied and they take a number of trees and timber to support the floors before drying. Most households in Mbarara Municipality use charcoal and firewood for cooking on the expense of trees because electricity or use of gas seems to be expensive which leads to deforestation. "It was because of deforestation that soil erosion and floods took their launch in Mbarara," Kansiime a resident in Kamukuzi division said.

Industrialization (17%) degrades the air quality and even causes water pollution. For example, Mwebesa steel industries located along Rwiizi discharge their untreated wastes into the water. Water used for cooling the machines is also released when it is still warm causing thermal pollution. Industries also create noise from the friction caused by moving machines.

Only 15% argued that transportation pollutes air through the carbonic fumes released after combustion of fossil fuels and has also led to construction of tarmac roads (Plate 2) in Mbarara municipality which results into soil erosion and floods. The construction of tarmac roads increases water run offs because it lacks enough space for infiltration causing soil erosion and floods.

**Plate 2: Transport by automobiles in Mbarara municipality**



**Source: Primary data, 2014**

#### **4.3.2 Effects of rapid urbanization on the environmental resources**

**Table 7: Effects of rapid urbanization on the environmental resources**

<b>Effects</b>	<b>Frequency</b>	<b>Percentage</b>
Pollution (air, water & noise)	20	26
Loss of biodiversity	13	17
Climate change	15	19
Land degradation	18	23
Soil erosion and floods	12	15
<b>Total</b>	<b>78</b>	<b>100</b>

**Source: primary data, 2014**

According table 6 above, 26% of the respondents said that pollution is the major effect of rapid urbanization on the environmental quality. There is air pollution that is caused by increased gases released from moving vehicles and industries, which is related to Pengjun Zhao (2010), that the effect of urban expansion on transportation in growing megacities has become a key issue in the context of global climate change as motorized mobility is a major source of domestic greenhouse gas emissions.

There is also water pollution by the industries located near R. Rwiizi like Mwebesa steel industry which discharges its wastes in the river and even sewage from markets, schools and households. This concurs with Somlyódy *et al.* (2001) who stated that major sources of pollution are untreated or partially treated domestic sewage, industrial waste effluent, and domestic and industrial garbage and that in urban centers, where the size and density of the settlements are high, sanitation problems are very big. In many cities wastewater are discharged to the rivers, coastal water and water bodies often without any treatment at all. Noise pollution is another effect of rapid urbanization in Mbarara also caused by industries and factories, construction activities, vehicles and welding activities. Entertainment centres like video halls and clubs such as ‘Heat’ and ‘Two One One’ also create noise to the neighbouring areas especially at night.

Land degradation (23%) occurs primarily because of increased population which requires much land for construction of residential houses, industries, schools, business centers and to carry out urban farming in unoccupied areas. Stone quarrying has also become a daily business in Katete area which was blessed with rocks because there is ready market for the stones due to high rates of construction. Such urbanization activities in Mbarara have claimed much land leading to effects like soil erosion. The sloping areas within Mbarara have been left ugly because of the gullies formed due to soil erosion. In Katete rocks area, stone quarrying has left many depressions and hollows where the rocks were drilled leading to stagnant water that gives chance for breeding to mosquitoes resulting into easy spread of malaria. Land degradation is also due to solid wastes dumped everywhere like construction debris, polyethane bags, plastics, metals which are non biodegradable and the construction of tarmac roads.

Climate change (19%) has also been evidenced in Mbarara municipality as a result of rapid urbanization. It is evidenced by the increase in temperatures and long time of the dry spells than usual and this is in relation to Kalnay and Cai (2003) who noted that rapid urbanization leads to alterations of the local climate, and in particular creates a significant Urban Heat Island (UHI) effect in Shanghai China. The industries that were constructed in Mbarara release many different gases which comprise especially carbon dioxide and carbon monoxide. These gases are released at a very high rate and quantity without control not only by industries but also by moving vehicles that have increased in Mbarara. In addition to that, the biodegradable wastes produced

are also capable of releasing methane during decomposition that is a great contributor to climate change and global warming. Burning of non biodegradable wastes like polyethane and plastics has also contributed to the concentration of carbon dioxide in the atmosphere. Similarly, Gunnar (2014) noted that in cities, where there is less vegetation and exposed soil, the majority of the sun's energy is absorbed by urban structures and asphalt. Hence, during warm daylight hours, less evaporative cooling in cities results in higher surface temperatures than in rural areas. Vehicles and factories release additional city heat, as do industrial and domestic heating and cooling units. Mbarara has also experienced change in land surface temperature due to similar factors. This has been worsened by air pollution caused by the industries and the ever moving vehicles and loss of enough vegetation to absorb carbon dioxide; one of the most common green house gases. Respondents said that Mbarara of today is not the one of yesterday because it used to be cool but now it is warm.

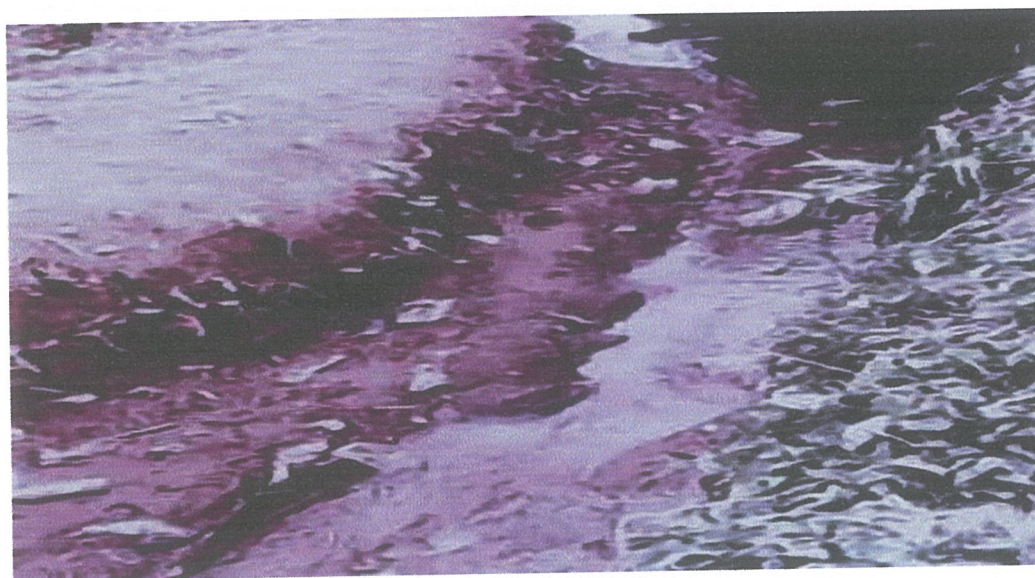
Biodiversity loss (17%) is a clear effect of rapid urbanization in Mbarara that has risen due to increased encroachment on areas like wetlands that support biodiversity. Change in land use and land cover is the evidence that the conditions which favored various species of flora and fauna have been interrupted and therefore forcing the species either to die or migrate. This is in relation to Chen (2007) who revealed that due to rapid economic development, Shanghai has experienced one of the greatest rates of change in land use and land cover (LULC) during the last three decades. For example, the location of Kakyeka foot ball ground in Mbarara is in a wetland but water was drained which affected the existence of many plants and animals. Currently, people are encroaching on the remaining parts of the same wetland constructing houses for both business and residence. Aquatic animals like toads, mud fish, worms and birds like Crested Crane which lay their nests and eggs in swamps are much affected.

Soil erosion and floods (15%) have become continuous challenges in Mbarara when it rains. Soil erosion occurs especially on sloping areas near R. Rwiizi (Plate 3) because the vegetation which would reduce the speed of water was destroyed ago and replaced with smart buildings some of which with cemented compounds that do not allow water to infiltrate into the soil. Even the tarmac roads especially in the middle of the municipality and cemented water channels have increased water levels in low lying areas like Kakyeka in Kamukuzi division leading to floods.



This concurs with Kasarda and Parnell (1993) who revealed that Construction activities increase impermeable or near-impermeable surfaces, which results in a reduction of infiltration into groundwater leading to floods in the low lying areas.

**Plate 3: Showing a gulley formed after heavy rains in Kakoba division.**



Source: Primary data, 2014

#### 4.4 Conservation measures used to reduce the effects of rapid urbanization on the environment.

##### 4.4.1 Conservation measures used to reduce the effects.

**Table 8: Conservation measures being practiced**

Measures	Frequency	Percentage
Laws and policies	16	21
Waste disposal sites	10	13
Awareness	20	26
Public Participation	12	15
Planting trees and flowers	14	18
Regulation of rural urban influx	6	8
<b>Total</b>	<b>78</b>	<b>100</b>

Source: primary data, 2014

Public awareness (26%) has been done through adverts on radio stations like Radio west, TV West and through posters advising people to conserve the quality of their environment. Through schools, outreach to homes and conducting freely attended seminars are some of the ways used in public awareness by environmental officers.

Laws and policies (21%) including Environmental Impact Assessment (EIA) is one of the tools being used including imposing charges and fines to restrict degradation like polluter pays principle.

Planting trees and flowers (18%) also advised as one way of increasing carbon sinks, evidenced by the presence of some trees within the municipality. Trees and flowers are planted in any unused land though it is affected by limited free land because people are constructing structures at a very alarming rate. Trees help in controlling soil erosion by binding soil particles making it stronger and firm to resist the pressure of water at the same time acting as wind breakers. People have flowers in their compounds to act as decorations but at the same time absorbing carbon dioxide. Some of them have potted flowers which are both inside and outside the house to at least absorb the immediate carbon dioxide released by people during respiration.

Public participation (15%) is one of the ways used in environmental conservation in Mbarara municipality. People are advised by the government to work together in cleaning up the environment and also practicing proper waste disposal. This is called '*Burungi bwansi*' in Runyankole meaning '*the better environment*'. This has in small extent reduced on the costs incurred in cleaning up the environment because it is limited by lack of strict regulations to implement it.

Construction of waste disposal sites (13%) like Kora-norya wastes' disposal site by the municipal council is practiced in Mbarara to help in improving the general cleanliness of the area. This has in one way helped in improving sanitation though it is somehow affected by long distances from each municipal disposal site which makes the people even to dispose wastes along the streets or in bushes that creates a bad smell. Waste disposal sites in Mbarara are not big enough instead they are small, various and scattered and therefore not easy to manage. Like In Mbarara, there are waste disposal sites some of which comprise of recycling zones like at Kora-norya site in Kakoba division (Plate 4). Wastes especially plastics and metals are collected.

sorted and then sold to be transformed into other or similar usable products. This is concurs with Abbassi (1997) who noted that there is a big recycling zone in Dharavi, a slum area in Mumbai India and has reduced on the effects of non biodegradable wastes and also given a number of people jobs.

**Plate 4: Showing plastic bottles collected for recycling at Kora-norya.**



**Source: Primary data, 2014**

Regulation rural urban influx (8%) is the least method of controlling environmental degradation in Mbarara municipality. Regulations are not clear on who should come to the municipality and there is no close monitoring of people to check the type of work done by each individual. However, the only way they use this method is through presentation of the identity card or any letter from the person's Local council 1 (LC1) leader whenever the police inquires or else they are taken to the courts of law. People who are new in the municipality are advised to report at the nearby police post and the LC 1 leader to legally allow them in the area.

#### 4.4.2 Recommended measures by the respondents

**Table 9: Recommended measures by the respondents**

Measure	Frequency	Percentage
Environmental Impact Assessment	18	23
Strengthening the laws and policies	15	19
Capacity building	16	21
Regulating rural urban shift	12	15
Multidisciplinary and multi-sectoral approach	17	22
<b>Total</b>	<b>78</b>	<b>100</b>

**Source: primary data, 2014**

EIA (23%) was the greatest measure recommended by the respondents to reduce on the impacts of rapid urbanization. They said that it should be the role of the government to use the laws and policies available in implementing this strategy and if they are weak let them be strengthened. Most buildings, industries and businesses owned by rich and strong people in the government do not go through the right procedures because the EIA practitioners are bribed and they make a report which is no genuine on the expense of the environment and the rest of the people.

Multidisciplinary and multisectoral approach (22%) were also suggested by the respondents in a view that it is one way of involving the public. They said that being environmental officers does not make somebody to understand every aspect of the environment which creates a need to involve other disciplines who have specialized in specific areas of concern like engineers, chemists, hydrologists, meteorologists among others to share knowledge on what should be done to achieve conservation of different components of the environment. Different sectors in the same way should be involved like population sector, environment sector, and health sector among others which are represented by specialists in those particular areas of concern.

Capacity building (21%) was also suggested by the respondents since two heads are better than one instead of leaving it for a few individuals and organizations to manage the effects of the



rapid urbanization on the environment. Capacity building is aimed at public participation where each member is equipped with knowledge and skills to help them conserve the environment. It is the responsibility of bodies responsible like the government, nongovernmental organizations and NWSC in case of water to help facilitate trainings, seminars and environmental exhibitions with the aim of inspiring people into the concept of sustainable development.

The available laws and policies (19%) should be strengthened and well implemented through fighting corruption that has taken over Mbarara and Uganda in general. Policemen and environmental officers have turned it into a good business deal to be bribed by people once they are caught in wrong environmental acts. Police men and officers should be well monitored and if one is discovered should be taken into the courts of law.

Regulation of rural urban influx (15%) is pointed out as the least recommended method because people in Mbarara were attracted by some important factors like business and jobs which might be the same case with other people. Respondents said that it is even useless and impossible to regulate rural urban influx yet the population of people in Mbarara is not too high to make it a city because that is the target of the government with support from Mbarara residents.

#### **4.5 Relationship between rapid urbanization and environmental quality**

##### **4.5.1 Relationship between rapid urbanization and environmental quality**

Using Spearman's Correlation test, I was able to determine the relationship between rapid urbanization and environmental quality by comparing the difference in the quality of environmental parameters like vegetation cover, smell among others as shown in table 11 below before and after rapid urbanization. I asked respondents to raise their hands in support of their observations and thoughts in as far as different parameters were concerned and also to clearly participate in each parameter. This was based on the idea that environmental parameters were in a better situation before rapid urbanization than after. The results were as follows;

**Table 10: Relationship between rapid urbanization and environmental quality**

Parameter	Before	R <sub>x</sub>	After	R <sub>y</sub>	D = (R <sub>x</sub> -R <sub>y</sub> )	d <sup>2</sup>
Vegetation	62	6	16	5	1	1
Good smell	51	4	27	7	-3	9
Temperatures	43	2	35	9	-7	49
Wastes generated	70	9	8	2	7	49
Noise	69	8	9	3	5	25
Clean air	66	7	12	4	3	9
Clean water	54	5	24	6	-1	1
Floods	39	1	39	10	-9	81
Diseases	48	3	30	8	5	25
Population	74	10	4	1	9	81
<b>Total</b>						<b>∑d<sup>2</sup> = 330</b>

**Source: primary data, 2014**

$$r_s = 1 - \left[ \frac{6 \sum d^2}{n(n^2 - 1)} \right]$$

R - is the rank

d - is the difference between ranks

n - is the number of observations

N - is also number of observations

df - is the degree of freedom

r<sub>s</sub> - Spearmen's rank correlation coefficient

$$r_s = 1 - \frac{1980}{10(102-1)}$$

$$r_s \text{ cal} = -1$$

df = N which is the number of observations = 10

$$r_s \text{ tab} = 0.648$$

$$r_s \text{ cal} -1 < r_s \text{ tab } 0.648 \text{ (} r_s \text{ cal} = -1, p = 0.05)$$

Therefore there is a strong negative spearman's correlation between rapid urbanization and environmental quality ( $r_s \text{ cal} = -1$ , at  $p = 0.05$ ) meaning that it is evident that rapid urbanization and environmental quality affect each other in that rapid urbanization reduces environmental quality as evidenced by the results in table 11 which indicate that the environmental quality changed negatively evidenced by the variation in given environmental parameters after rapid urbanization. Population growth in Mbarara is pointed out as the most cause of environmental degradation since it is even the root cause of rapid urbanization. Other parameters like waste generation, noise, air, smell, water, diseases, temperatures and floods were altered primarily as a result population growth which led to rapid urbanization in Mbarara.

Mbarara had few buildings which were even sparse compared to today and that there was more vegetation before rapid urbanization took place while industries were just very few. There was no bad smell since wastes were less generated and well managed, pollution of air, water, land, and noise was minimum because all agents of pollution were less. There was less noise because of fewer industries and vehicles and floods were not evident since there were less impermeable surfaces and vegetation was enough to control floods. Mbarara had cool temperatures in the past than today since industries and vehicles that would increase on the heat were less and climate change causes and effects were absent, an indication that rapid urbanization has contributed to climate change and increase of temperatures. People even revealed that there were fewer diseases especially respiratory ones as air pollution was still very low.

However, they also reported that even today floods are at a minimum because Mbarara has more valleys which have not been so much encroached including the Rwiizi basin that helps in draining the municipality once it rains heavily. Floods only concentrate in the flood plain of R.

Rwiizi where people have not yet started constructing. The only effect of these floods is on the crops grown along the river because people have replaced the wetland vegetation (papyrus) that was formerly there with crops and farmlands.

## CHAPTER FIVE

### CONCLUSION AND RECOMMENDATIONS

#### 5.0 Introduction

This chapter is comprised of general conclusions on the findings of the study and the recommendations.

#### 5.1 CONCLUSIONS

Population increase (24%) was pointed out as the most influential factor to rapid urbanization whereas availability of resources (17%) was the least factor. Business (28%) was the greatest factor that pulled people to the municipality while security and peace (6%) was the least.

Pollution of air, water and noise (26%) and land degradation (23%) were the most challenges faced due to rapid urbanization while soil erosion and floods (15%) were the least effects. Construction (27%) was the greatest activity that destroys the environment while transportation (15%) was pointed out the least.

Public awareness (26%) and laws and policies (21%) were the most conservation strategies being implemented to reduce on the effects of rapid urbanization on the environment and regulation of rural urban influx (8%) was the least implemented. EIA (23%) and multidisciplinary and multisectoral approaches (22%) were the most recommended by respondents whereas regulation of rural urban shift (15%) was the least.

From the spearman's correlation statistical test it was concluded that there is a strong negative correlation between rapid urbanization and environmental quality ( $r_s = -1$ , at  $p = 0.05$ ). This implies that as rapid urbanization increases, the environmental quality reduces hence rapid urbanization leads to environmental degradation.

#### 5.2 RECOMMENDATIONS

The government of Uganda should aim at Extension of development projects in rural areas like rural electrification programmes, better health centers, schools and better roads to help in development of rural areas that will help in regulation of people shifting from their homes to Mbarara where such facilities are found. Also the local processing industries should be

established in rural areas to create jobs for some people while also extending cheaper services to people.

Urban planners in Mbarara should focus at ways that they can provide a real sense of community, with good sanitation, adequate housing, health care and education facilities. Ensure effective urban infrastructure planning and enforce planning laws and regulations. Urbanization can be planned urbanization or organic. Planned urbanization, that is planned community or the garden city movement, is based on an advance plan, which can be prepared for military, aesthetic, economic or urban design reasons. Examples can be seen in many ancient cities: although with exploration came the collision of nations, which meant that many invaded cities took on the desired planned characteristics of their occupiers.

The National Environmental Management Authority (NEMA) together with the government and other organizations should carry out various projects like tree and flower planting with in urban areas to curb down the effects of rapid urbanization as they implement other strategies like policies, recycling of wastes, Environmental Impact Assessment and ensuring better urban planning. Committees from village level to parish and district level should be established and well financed by the government and/or other organizations.

Environmental officers together with the government should promote sustainable co-management of urban natural resources. Sustainable development requires a careful cost-benefit analysis in order to craft development and environmental policies like EIA that will reinforce environmental protection while sustainably improving the welfare of people in Mbarara. Fines and charges should be emphasized under policy guidelines to reduce on the rate of degradation. Principles like Polluter Pays Principle (PPP) need to be established in Mbarara municipality and well implemented.

## REFERENCES

- Abbassi, S.A, (1997). Wetlands Of India –Status of Wetlands in India, Ecology and Threats, Volume I, Discovery Publishing House, New Delhi, pp.84-86.
- Anderson, Terry L. (2008). “Environmental Quality”, 2<sup>nd</sup> edition, USA.
- Auber & Tamar (2013). “Climate change and rapid urban expansion in Africa threaten children’s lives.” UNEARTH News, Retrieved 10 August 2013.
- Bernstein, J. (1994). Land Use Considerations in Urban Environmental Management.
- Brand Stewart (2009). Whole Earth Discipline – annotated extract. Retrieved 29 November 2009.
- Brown, D.G., Johnson, K.M., Loveland, T.R. & Theobald, D.M. (2005). Rural land-use trends in the conterminous United States.
- Chatrath, K.J.S, (1992), Wetlands Of India – Major threats faced by wetlands of India and their conservative measures, Ashish Publication House, New Delhi.pp.22-32.
- Chen (2007). Effects of Land Use and Land Cover Change in Shangai China
- Czech, B., Krausman, P.R. & Devers, P.K. (2000) Economic associations among causes of species endangerment in the United States. BioScience 50: 593–601.
- Davis 1993, Rapid Urbanization and Environmental Conservation in developing countries
- Davis-Mattis, L. (2005). Marine Debris: Jamaica’s Response. UN Open Ended Informal
- Doneika Simms, (2008). The Effects of Urbanization on Natural Resources in Jamaica. 44th ISOCARP Congress
- Drakakis-Smith, D. (2000). Third World Cities: 2nd Edition, London: Routledge
- Environment Canada, (2005). Urban biodiversity [www document]. URL <http://www.cbin.ec.gc.ca/enjeux-issues/urbain-urban>.
- G.Tyler, JR. (2000). Living in the Environment, Eleventh edition, USA.

GSS, (2002). 2000 Population and Housing Census: Summary

Gunnar Tellnes (2014). European Journal of Public Health Association.

H. Lan, C. Martin, C. Froese, T. Kim, A. Morgan, and D. Chao, (2007). “A web-based GIS for managing and assessing landslide data for the town of Peace River,” Canada.

Hansen, A.J., Knight, R.L., Marzluff, J.M., Powell, S., Brown, K., Gude, P.H. & Kingsford. J. (2005). Effects of exurban development on biodiversity: patterns, mechanisms. and research needs. Ecological Applications.

International Herald Tribune (2008). Associated Press, Archived from the original on 9 February 2009.

Kalnay and Cai (2003), Impact of Urbanization and Land use Change on climate.

Kasarda, J. D. and Parnell A. M. (1993). Third World Cities: Problems, Policies and Prospects eds. Sage, London and Newbury Park, Calif.

Knutson, M.G., Sauer, J.R., Olsen, D.A., Mossman, M.J., Hemesath, L.M. & Lannoo, M.J. (1999), Effects of landscape composition and wetland fragmentation on frog and toad abundance and species richness in Iowa and Wisconsin, USA.

Krishna, M.B, Chakrapani, B.K and Srinivasa, T.S, (1996), Water Birds and Wetlands of Bangalore, Karnataka State Forest Department, Bangalore.

L. Starke, (2000). Environmental Science: Creating a Sustainable Future, New York.

Mediel, Michael White J., Catherine Andrzejewski S., (2013). The Urban Crisis in Sub-Saharan Africa: A Threat to Human Security and Sustainable Development.

Ministry of Lands, Housing and Urban Development, (2003). Kampala-Uganda.

Mitsch, W. J, and Gosselink, J. G, (1993). Wetlands. Van Nostrand Reinhold, New York.



- Nsiah-Gyabaah K. (2003). Urbanization, environmental degradation and food security in Africa, Ghana
- Paul William Kojo & Katherine Venton Gough (1999). The environmental impact of rapid urbanization in the peri-urban area of Accra, Ghana, Volume 99(1), pages: 89-100.
- Pengjun Zhao (2010). Sustainable urban expansion and transportation in a growing megacity: Consequences of urban sprawl for mobility on the urban fringe of Beijing
- Shanghai Municipal Statistics Bureau, (2011) Report.
- Simon, D. & Nbrman, A. (1999) Development as Theory and Practice: currents perspectives on development and development co-operation
- Todaro, M (2000). Economic Development. Essex: Pearson Education Limited
- UNEP (2000). World urbanization and sustainable development in the report
- UNFPA (2007). UN State of the World Population
- UN-HABITAT (2008; 2009). State of the World's Cities Report. Nairobi, Kenya: UN-HABITAT.
- UNWUPR (2005). The 2003 Revision (New York: UN, 2004).
- Wade, B. and Webber, D. (2002). "Coastal Zone Management" in Ivan Goodbody and Elizabeth Thomas-Hope (Eds.), Natural Resource Management for Sustainable
- William P. Cunningham (2007). Principles of Environmental Science, (Inquiry and adaptations). McGraw-Hill, USA.
- World Bank (2002). World Development Report; Building Institutions for Markets (New York: Oxford University Press for the World Bank).
- Zhang Taiyang, Xianjin Huang, Yan Liu (2001). Environmental effects of land-use/cover change caused by urbanization and policies in Southwest China Karst area

## APPENDIX I

### QUESTIONNAIRE

I am **Mugarura Alexander**; a student from Kampala International University. School of Engineering and Applied Sciences conducting a research entitled “**Impacts of rapid urbanization on the environmental quality in Mbarara Municipality**”. So please answer all the questions below.

Questionnaire number.....

Date.....

Name of the Division.....

**Circle the right options**

#### **Section A: Socio-Demographic data**

1. Sex

- a. Male
- b. Female

2. Status

- a. Single
- b. Married
- c. Any other .....

3. Age

- a. Young (below 15 years)
- b. Youth (15-35 years)
- c. Adult (35-50 years)
- d. Elder (50 above)

4. Residence

- a. Resident (within Mbarara Municipality)
- b. Nonresident (outside the Municipality)

5. Occupation

- a. Business
- b. Official
- c. Student
- d. Others (specify).....

**Section B: Factors for rapid urbanization in Mbarara Municipality**

6. Were you born in Mbarara Municipality?

- a. Yes
- b. No

7. Where were you staying before coming to Mbarara?

- a. Village
- b. Urban area

8. How did you know about Mbarara?

- |                       |                          |
|-----------------------|--------------------------|
| a. While at School    | d. Born in Mbarara       |
| b. Media              | e. Others (specify)..... |
| c. Family and Friends |                          |

9. What factors encouraged you to come to Mbarara?

- a. Job
- b. Education
- c. Friends
- d. Born from Mbarara
- e. Others (specify).....

10. For how long have you been in Mbarara Municipality?

- a. A year (short period)
- b. 2-5 years (medium period)
- c. 6-15 years (long period)
- d. 16 and above years (very long period)

11. Do you think you will still be in Mbarara for more time? If yes specify.

- a. Yes.....
- b. No .....

Give reasons .....

.....

12. How is your work related to the real factor that brought you in Mbarara?

- a. Exactly the same
- b. Completely different

13. Are you trying to encourage more people to come in Mbarara?

- a. Yes
- b. No

14. What factor encourages you to attract other people?

- a. Job
- b. Business
- c. Security
- d. Education
- e. Others (specify).....

15. Do you think more people will still come to Mbarara in future?

- a. Yes
- b. No

**Section C: Effects on the environmental resources**

16. Have you realized any change on the environmental resources?

- a. Yes
- b. No

17. If yes, what specific resource is affected?

- a. Land/soil
- b. Water
- c. Air
- d. Vegetation

Any other, please mention.....

18. How have the resources mentioned in 17 above been in the past?

.....

.....

.....

19. How are the resources at present?

.....

.....

.....

20. What activities done in Mbarara affect environmental quality?

- |                      |                     |
|----------------------|---------------------|
| a. Industrialization | d. Waste generation |
| b. Construction      | e. Others.....      |
| c. Transport         |                     |

21. What problems are encountered due to rapid urbanization?

- |             |                          |
|-------------|--------------------------|
| a. Diseases | d. Congestion            |
| b. Floods   | e. Others (specify)..... |
| c. Noise    |                          |

**Section D: Conservation measures used**

22. Do you know any measures being used to reduce any of the above effects in question?

- a. Yes
- b. No

23. Do those measures include any of the following below?

- |                               |                          |
|-------------------------------|--------------------------|
| a. Planting trees and flowers | d. Law and policy        |
| b. Awareness                  | e. Others (specify)..... |
| c. Water treatment            |                          |

24. Do you personally practice or have been affected by any of the measures being promoted as listed below?

- a. Planting trees and flowers
- b. Awareness
- c. Water treatment
- d. Follow the laws
- e. Others (specify).....

25. Who is encouraging the above mentioned measures in question 23 & 24?

- |  |                |
|--|----------------|
| a. Institutions and Universities         | c. Government  |
| b. Non Governmental Organizations (NGOs) | d. Others..... |

26. How successful are the prevention measures listed in question 25 above?

- |                        |                                    |
|------------------------|------------------------------------|
| a. Increased awareness | d. Trees and flowers being planted |
| b. Reduced diseases    | e. Others (specify).....           |
| c. Wastes well managed |                                    |

27. What are the failures or problems of the measures in question 23 & 24?

- |                                 |                           |
|---------------------------------|---------------------------|
| a. Lack of enough funds         | d. Weak laws and policies |
| b. corruption                   | e. Others (specify).....  |
| c. Lack of public participation |                           |

28. What other measures do you think should be implemented?

.....  
.....

## Section E: Relationship between rapid urbanization and environmental quality

29. What relationship is between rapid urbanization and environmental quality?

- a. Rapid urbanization degrades the environment
- b. Rapid urbanization maintains the environment.

30. What activities done due to rapid urbanization degrade the environment?

- a. Construction
- b. Industries
- c. Brick making
- d. Solid waste generation
- e. Others (specify).....

31. How was Mbarara in terms of environmental quality in the last 10-20 years?

- a. More vegetation
- b. Less wastes generated
- c. Clean water
- d. No bad smell
- e. Others.....

32. Have the resources reduced or increased?

- a. Increased
- d. Decreased



## APPENDIX II

### INTERVIEW GUIDE

- a. Do you stay within Mbarara Municipality or outside?
- b. What do you do in Mbarara?
- c. What factors encouraged you to come to Mbarara?
- d. Were you from an urban place or rural?
- e. What level of development did you find in Mbarara and how can you compare it with today?
- f. How was the environmental situation of Mbarara in the last 10 to 20 years?
- g. What effects do you consider negative to environment currently in Mbarara?
- h. What are the effects on water?
- i. What are the effects on Soil?
- j. What are the effects on air?
- k. What are the effects on plants and animals?
- l. What conservation measures are being undertaken?
- m. Who is promoting or implementing those conservation measures?
- n. How successful are the conservation measures being promoted?
- o. What challenges are faced by the implementing bodies?
- p. What other measures would you suggest?



KAMPALA  
INTERNATIONAL UNIVERSITY

P.O.BOX 20000  
KAMPALA UGANDA.  
TEL: +256 - 041 - 266813  
FAX: +256 - 041 - 501974  
Mob: +256 - 077 - 557090

OFFICE OF THE SCHOOL OF ENGINEERING AND APPLIED SCIENCES  
DEPARTMENT OF BIOLOGICAL AND ENVIRONMENTAL SCIENCE

TO WHOM IT MAY CONCERN

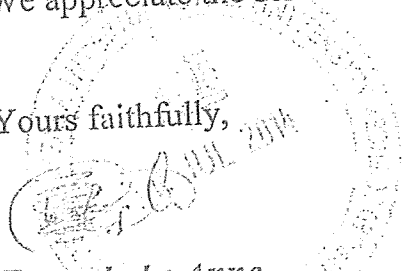
RE: MR. MUGARURA ALEXANDER

I am writing in support of Mr. Mugarura Alexander's request to make a research on the impacts of rapid urbanization on environmental quality in Mbarara municipality.

Mr. Mugarura Alexander with Registration Number BEM/34827/113/DU has finished his Bachelor's degree in Environmental Management in May 2014 which is a three year program at Kampala International University in the department of Biological and Environmental Science.

We appreciate the service rendered to him.

Yours faithfully,

  
Tumushabe Anne  
Head of Department - Biological and Environmental Science

**Appendix V: Research Introduction Letter/Permission Letter (Fig.5)**



**KAMPALA INTERNATIONAL  
UNIVERSITY**

Ggaba Road, Kansanga  
PO BOX 20000 Kampala, Uganda  
Tel: 256 41 267813, 267604  
Fax: 041 501974  
E-mail: admin@kiu.ac.ug

**Office of the Principal.**

**COLLEGE OF APPLIED SCIENCES & TECHNOLOGY  
(CAST)**

Date: 27/02/2012

To THE TOWN CLERK, MAKINDYE  
DIVISION, KCCA.

*Economic Planner  
pls avail us  
information for  
academic visit to  
the location*

This is to introduce to you **Mr/Ms FIKIRI SAMWEL** Reg. No 7/3/2012  
**BEM/42160/91/DF** who is a bonafide student of Kampala International  
University. He/she is working on a research project entitled... ASSESSMENT OF THE  
CONTINUED USE OF POLYETHYLENE BAGS  
BY COMMUNITIES IN UGANDA.

for partial fulfillment of the award of a Degree at KIU. I hereby request  
you in the name of Kampala International University to accord him/her  
all the necessary assistance he/she may require for this work.

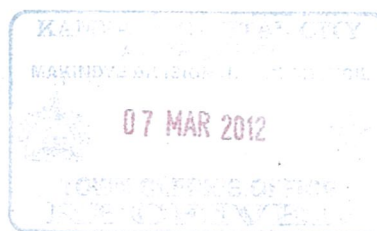
I have the pleasure of thanking you in advance for your cooperation.

Yours sincerely,

**Dominic Byarugaba (PhD)**



**Principal-College of Applied Sciences & Technology**



*"Exploring the Heights"*