UNIVERSITY OF NAIROBI

CHALLENGES IN THE USE AND CONSERVATION OF URBAN GREEN SPACES: A CASE OF KISII MUNICIPALITY, KISII COUNTY, KENYA.

BY

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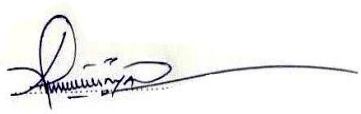
DECLARATION

A) CANDIDATE

I, NYAMACHE M. CYRUS, hereby declare that this report is my original work and has not been submitted or presented for examination or the award of a degree in this university or any other institution.

12TH Nov, 2021.

Signature..  ..Date:…….....

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15/11/2021.

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DEDICATION

This report is dedicated to my Wife Delphine and my Kids Eugene, Shannelle and Sashley, for being very supportive. Their support and patience have been enormous during the entire period of study. I dedicate this project report also to Douglas who encouraged me in carrying out this project at large.

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ABSTRACT

Although, urban areas cover not more than 5 per cent of the earth's land space, substantial amount of the natural world's resources can be found in them. Green spaces are useful natural assets that support livable urban environment in diverse ways. Despite urban green spaces offering critical ecological services, such as improved aesthetic and environmental quality, economic and social gains, studies have shown that, urban green spaces are declining on a worrying rate and they are now occupying small proportion of the landmass of many urban areas. Consequently, resulting to deterioration of urban environment. Other studies, have identified political interference, poverty and ignorance as the most significant factors in the decline of urban green spaces. Further, others indicate that, laxity in enforcement of development control and high competition from other urban land uses were distinguished as the main factors in the reduction of the green spaces in urban areas. Even though, there were a consensus as to what factors and effects on the use and conservation of these natural resources, the inquiry aimed at investigating why, regardless of these factors and effects well known still there was a continued decline of urban green spaces. Thus, probing for specific factors and their effect on reduced green spaces and to propose possible planning strategies for sustainable urban green space development in Kisii municipality. The study employed both systematic and cluster sampling in collecting field data and information. The field data was subjected to both descriptive and quantitative techniques for analysis where observation method was key and finally presented using percentage rating scores, tabular and graphical formats. The inquiry concluded that, high levels of poverty and ignorance of the urban residents, was recorded with highest significance of urban green spaces. Similarly, laxity to enforcement of development controls, political interference, obsolete physical development plans and ineffective legal and policy framework were also noted as the other significant factors for the inquiry. To safeguard the urban green spaces and address the undesirable effects, the inquiry recommended for strengthening enforcement of development controls, strategies to curb high levels of poverty and ignorance, enhance public participation and awareness exercise and develop policies and regulations for urban green spaces conservation. Finally, the study recommended for designating and gazetting all urban green spaces areas.

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ABBREVIATIONS AND ACRONYMS

LUC	Land Use Changes
GS	Green Space
UGS	Urban Green Space
KIP	Kenya Institute of Planners
NEMA	National Environment Management Authority
EIA/EA	Environmental Impact Assessment/Environmental Audit
EMCA	Environmental Management and Coordination Act
RR	Riparian Reserve
SPSS	Statistical Package for Social Sciences
WRA	Water Resources Authority
GWASCO	Gusii Water and Sanitation Company
UN	United Nations
RCEP	Royal Commission for Environmental Pollution
SDGs	Sustainable Development Goals
MDGs	Millennium Development Goals
UR	Urban Resilience
UNS	United Nations Summit
IGSULUP	Integrated Green Space in Land Use Development Plan
IDI	In-Depth Interview
NMTs	Non- motorable transport

CHAPTER ONE: INTRODUCTION

1.1 Background to the study

Globally, the use and conservation of urban green spaces is a major concern to governments and organizations. Studies have indicated that the use and conservation of urban green spaces has benefits not only to the urban dwellers but also to the effective ecological functioning of the environment itself. Wolch et al (2014) and Cohen et al (2006) categorized the benefits into environmental, economic and social. Among these paybacks include: refining air in urban areas; solving mental and psychological disorders; conserving and preserving urban biodiversity; business attraction; and improved property value, government revenue, employment opportunities, aesthetics, and social interaction and cohesion (Mensah2010; Cohen et al, 2006; Wolch et al, 2014).

In North America and Europe, studies have indicated that the use and conservation of urban green spaces is declining in cities and towns due to conversion to residential and commercial use, and increase in urban population (Hansen et al, 2016; Kabisch and Haase, 2013). For example, in Europe, between 7.3 to 41 in a hundred of urban spaces of 25 cities have been lost to other urban land uses (European Environment Agency, 2002). Correspondingly, in the United States of America, studies have revealed that, around 1.4 million hectares of towns and cities green spaces were converted to different urban land activities (McDonald et al, 2010). Similarly in Asia and South America, depletion of urban green spaces is caused by competing land use namely commercial, residential, transportation and urban agriculture (United Nations, 2019).

Whereas this is taking place elsewhere, in African countries like Ghana, Nigeria and South Africa, studies established that there is massive depletion of green spaces in urban areas leading to minimal coverage of urban green spaces in the landmass of many urban societies. For example in Ghana and South Africa, urban green spaces cover less than 10 percent of the total urban land, (Mpofu, 2013; Oduwaye, 2013). Similarly, in Kenya, Makworo and Mireri (2011) revealed that, the depletion of green spaces is attributed to a surge in urban population necessitating a rise in spaces demand for urban human settlement and business activities. Although, there is a general consensus on the use and conservation of green spaces in urban areas due to its huge benefits, the effort to conserve and manage it effectively by governments and organizations seems to be waning over time. And this, is likely to degrade urban green spaces more with time.

From the foregoing discussion, it seems that the use and conservation of urban green spaces is a global phenomenon and Kenya's urban areas are not left out in the prevailing global demographic and urban spatial fluctuations. Kitur (2019), noted that the reduction of urban green spaces was fueled by ineffective governance and institutional structures in urban areas. Consequently, this has led to the decline of the quantity and quality of green spaces in urban areas. However, the phenomenon of the use and conservation of urban green spaces in Africa is still understudied, making this inquiry necessary.

1.2 Statement of the research problem

Worldwide, the major urban land uses include; residential, commercial, industrial, transport, recreational urban agriculture among others. In most urban areas with spatial development plans, these land uses are clearly demarcated and protected by the existing laws and policies governing the use of the land. However, all these urban land use challenges were found to have been linked with the use and conservation.

In Kenya, most urban areas with spatial development plans equally face the challenges of competing urban land use activities. This has resulted to other land uses such as recreational use being converted to other competitive land uses such as commercial and residential.

Kisii Municipality, whose spatial development plan was prepared in 1971, it has always experienced a lot of challenges in the conservation and its use of urban green spaces. Despite the constitution of Kenya 2010 advocating for a 10% forest cover and urban areas and cities Act 2019 providing for adequate provision for recreational facilities, urban green spaces have remained to be a challenge to governments and organizations in attaining sustainable urban green space development. Equally, the Kenya's National Spatial Plan (2016), National land use policy (2017) and Land Act (2012), have all recognized urban green space as an area that call for protection from other competing urban land use activities.

Regardless of the scholars conducting research to establish the factors, effects and their planning strategies, these studies failed to reveal specific factors and their effects on the use and conservation of urban green spaces and how to deal with the resulting detrimental consequences. Therefore, this study aims at addressing this gap by establishing the specific factors, effects, and planning strategies to mitigate the phenomena in urban areas of Kisii municipality. To discourse this gap, the study will establish why, despite availability of physical development plans, urban green space conversion to other land use activities is very high?.

In regard to the preceding discussion, it is observed that, declining of green spaces in urban areas is a global phenomenon and Kenya's urban areas are not left out. Consequently, the phenomena of declining green spaces in urban areas is still understudied. Thus, making this inquiry necessary.

1.3 Research Objectives

The main purpose of the study is to establish the factors and the effects of the changing trend of urban green spaces on the aesthetics and environmental quality of urban dwellers. The study will be guided by specific objectives which are;

1. To examine the trend and magnitude in changes on urban green spaces in Kisii municipality
2. To determine the factors explaining the decline in urban green spaces
3. To establish the effects of the changing trend of green spaces on the aesthetics and environmental quality of Kisii Municipality
4. To propose planning options to mitigate the effects of the changing trend of green spaces in urban areas of Kisii Municipality.

1.4 Research Questions

1. What is the trend and magnitude in the changes of urban green spaces in the study area?
2. What factors explain the changing trend of urban green spaces in the study area?
3. How does the changing trend of urban green spaces affect the aesthetics and environmental quality of Kisii Municipality?
4. What planning options exist to mitigate the effects of the changing trend of urban green spaces in Kisii municipality?

1.5 Justification of the Study

This inquiry if not done, environmental quality and ecological function-ability of urban green space will be compromised. In consequence; there is rapid habitat fragmentation, loss of biodiversity, health challenges, urban flooding, economic losses, soil degradation, unpredictable weather conditions and reduced social life. To mitigate this problem and help in provision of these amenities for a rapidly expanding population in the study area, conducting this study was necessary.

1.6 Scope and limitation of the Study

The inquiry is limited to establishing the magnitude and trends, challenges and effects of the use and conservation of urban green spaces in the study area.

The study was carried out in the central business district of Kisii municipality, on latitudes 0°39'38''S and 0°41'16''S and longitude 34°12'36''E and 34°09'16''E, and it covered approximately 2.7Km^2.

1.7 Definition of terms

The inquiry used a number of terms to explain the phenomena. The study defined the following terms as other studies have done but, this inquiry defined the terms for its own use and adopted others. *Environment:* Includes the physical factors of the surroundings of human beings including land, water, atmosphere, climate, sound, odour, taste, the biological factors of animals and plants and the social factor of aesthetics and includes both the natural and the built environment (National Research Council, 2002). According to this enquiry, environment means the surrounding in an urban setting.

Then, *Ecosystem:* an environment which consists of all living and non-living organisms in a particular area, with similar physical interactions, such as air, soil, water, and sunlight (Country side Agency, 2006). In regard to this study, ecosystem means, a particular locality in an urban setting with specific environmental standards. *Riparian zones: A*re also identified as the transitional areas or zones between terrestrial and wetland/ water systems (National Research Council, 2002). Regarding this study, the riparian zones are green corridors that are adjacent to road and river (road reserve, Riverbank). *Riparian vegetation:* the plants that grow along streams or river banks; riparian areas (Muketha, 2020). In line with this inquiry, riparian vegetation are plants along the green corridors.

Wetland: an area of land that is covered with water at or near the surface either year round or for varying parts of the year; they are either predominantly, seasonally or permanently water logged (UN Habitat, 2018). In respect to this study, wetland is an environmentally sensitive urban area that is predominantly with water. *Land use development:* Refers to the total of arrangements, activities, and inputs that people undertake in a certain land cover type. In this case, it is the activities that are carried within and along the riparian area Management (Government of Kenya, 2016). This study defines the land use development as any human activity on urban land. *Conservation:* The ability of the resource to maintain its ability to fulfil and provide for goods and services for present and future generations (UN Habitat, 1987). The study defines conservation as, the careful utilization and management of urban green spaces. *Sustainability:* the ability of the resource meeting present demands without forgoing future needs or compromising the needs of the future from attaining their needs (UN Habitat, 1987). This study considers the term as, prudent use of green spaces in urban areas.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

The use and conservation of urban green resources on a natural landscape of urban areas is a common phenomenon that cuts across political and socio-cultural divides. Urban green spaces have been recognized to perform a key role in environmental, economic, social and overall well-being of urban areas (Fuller and Gaston, 2009; Tzoulas et al, 2009; Mensah, 2014; Makworo and Mireri 2011).

2.1.1 The concept of urban green spaces

Green space concept can be traced from the urban nature conservation movement in the Europe, it has several definitions (Dunnett et al, 2002; Swanwick et al, 2003). In Europe and North America, these urban vegetative resources covers all natural and artificial spaces (Fratini and Marone 2011). Jim and Chen (2003), notes that, green spaces consists of outdoor spaces with vegetation cover which are found in semi-natural areas. Baycan-Levent et al (2002), argues that these urban natural resources are either public or private and they are primarily covered by vegetation which can be accessible by users directly or indirectly. In undeveloped nations, green spaces are defined as the entire urban greenery which comprises of a network of both natural, semi-natural and artificial ecological systems found at all spatial scales (Mensah, 2014; Cilliers 2013). This study will adopt green space definition as; all natural or vegetative spaces in urban that are either privately or publicly owned and can be accessed by all users.

2.1.2 Greenways and green spaces: Global perspective

In Europe, green spaces developed through the ideas of Garden Cities and the protected designations of green spaces (Howard, 1985). Howard's principles and vision created better standards of living at urban areas by integrating a larger proportion of attractive and functional spaces, thus it brought ecosystem services closer to urban areas (Cervero, 1995). The development of green spaces were linked with the urban greening agenda on high density landscapes resulting to sustainable green spaces in urban areas in European countries (Beatley, 2009).

2.1.3 Green space typologies

In the planning practice, an examination must be made of how these urban green spaces are composed (Davies et al, 2006). Green spaces are of diverse urban land features and components that hold a 'green' value (Jabareen, 2006).

Classifications of green space relies on variables such as ownership, nature and functionality (Dunnett et al, 2002). Dunnett categorized green spaces into four distinctive types: functional, amenity, semi-natural and linear green spaces in urban areas.

Table 1: A typology of urban green spaces

Types of urban green spaces			
Urban green spaces	**Amenity Green spaces**	**Recreational green space**	Parks and gardens
			Informal recreational areas
			Outdoor sports areas
			Play areas
		Incidental green space	Housing green space
			Other incidental green space
		Private green space	Domestic gardens
	Functional green space	**Productive green space**	Remnant farmlands
			City farms
			Allotments
		Burial grounds	Cemeteries
			Churchyards
		Institutional grounds	School grounds (including school farms and growing areas
			Other institutional grounds
	Semi – natural green space	**Wetlands**	Open/running water
			Marsh fens
		Woodlands	Deciduous woodland
			Coniferous woodland
			Mixed woodland
		Other habitats	Moor/health
			Grassland
			Disturbed ground
	Linear green space		River and canal banks, Transport corridors (road, rail, cycle ways and walking routs
			Other linear feature (cliff)

Source: *Dunnett et al. (2002).*

2.2 Importance of green spaces

2.2.1 The garden city model

The garden city model stresses the importance of conserving urban green spaces (Baycan-Levent and Nijkamp, 2009). According to Howard (1902), the idea behind the model was to solve the prevalent environmental and socio-economic problems caused by industrialization in the 18th century. In his work, He recognized that, to deal with the unhealthy lifestyles in urban areas, ideas of green gardens must be integrated in planning of towns and cities. The garden city model is relevant in this study since it explains how green spaces makes urban areas livable. For example, they purify urban air and water, control excessive noise, improve micro-climate; social life, economic value of properties and health of residents. Although the model is relevant in explaining the importance of green spaces in urban areas, it fails to explain why urban green spaces are declining specifically in the study area.

2.2.2 Social contributions of urban green spaces

Recreational activities are the main social contribution in both developed and developing societies. Haq (2011), established that, Finland and Mexico, offers recreational activities which are either indoor or outdoor activities. On the other hand, Manlun (2003), noted that, urban green spaces serve as meeting places, soothing, children play areas, walking pets, discovering and observing wildlife. Equally they offer a chance to children to have close contact with nature, which shapes their view on nature, they develop stewardship skills towards the surroundings, appreciate and love nature (Lowman, 2006). Green spaces also improves psychological and mental well-being (Woo et al, 2009).

Other studies also indicate that, it alleviates stress and psychological problems in young children such as Attention Deficit Hyperactivity Disorder (Louv, 2005; Taylor et al, 2001; Ernstson, 2012; Maas et al, 2009). Barton and Pretty (2010), argue that, urban green spaces truckles the challenges of obesity, cardiovascular disease, musculoskeletal diseases, stroke and cancer by physical activities like walking, jogging, playing football. Despite, all the importance of green spaces to human wellbeing and health, other studies have raised questions on the costs of health and wellbeing of urban green spaces and can green spaces promote urban renaissance and aid in urban sustainability? (Mell, 2007a; 2007b). Therefore, the need to carry out further interrogation.

2.2.3 Environmental contributions of urban green spaces

Urban green spaces assist in climate adaptations (Fam et al, 2008). All urban societies in both developed and developing nations studies have indicated that, conserving these urban natural resources helps to cool down urban temperatures, modify the urban climate and improve urban air quality (Konijnendijk et al, 2013; Getter and Rowe, 2006; Nowak et al, 2006; Kabisch et al, 2015).

Also, trees have been observed equally to enhance urban environmental quality by removing pollutants like carbon monoxide, Sulphur dioxide and nitrogen oxide from the atmosphere (Nowak et al, 2006; Kabisch and Haase, 2013; Hall, 2001). Moreover, the protection and conservation of biodiversity (plants and animals) contain significant amount of biodiversity that enables biological cycles to continue (Alvey, 2006). Additionally in the UK, a study revealed that golf courses have a lot of tree species that provides good habitation for different types of birds (Tanner; Gange, 2005). Green spaces also, control urban environmental problems such as soil erosion that is caused by urban flooding and overflowing of sewerage network (De Baets et al, 2006). In architecture, urban green spaces revamp the overall urban design, enhance urban aesthetic quality, place looks attractive to live, work and invest in and as tourist destinations (Manlun, 2003).

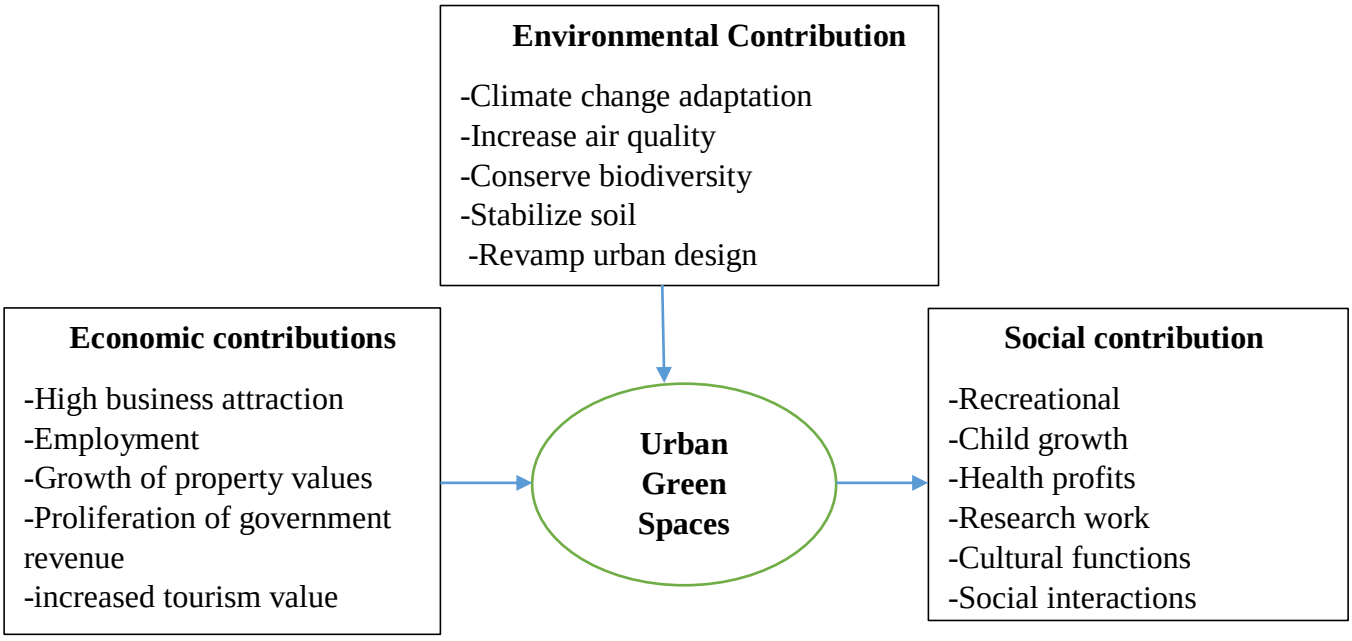
2.2.4 Economic contributions of urban green spaces

Economically, urban greening projects offer both temporary jobs and permanent jobs (Djibril et al, 2012). In European countries, a study revealed that, urban green spaces provide more than 50,000 job opportunities in the gardens and public parks (Ibid). Increasing property values is another contribution of urban green spaces (Lutzenhiser and Netusil, 2001).

Luttik (2000), established that, developments done along the urban natural resources have greater property values than those far away. Further, a well maintained urban natural greenery improves image, attracts businesses, customers and create a good business environment (Saraev, 2012). Green spaces like forests, zoos and community greenery centres increase tourism value (Aiello et al, 2010). Further, a study in China and Ghana indicate that, urban dwellings with sufficient green spaces pricing of properties high and the choice of the area of residing is highly influenced by the quality and quantity of green spaces available (Liebelt et al, 2018; Xu et al, 2018).

Harrison et al (1995), However, argues that, urban areas may lack enough space to allow sufficient accessibility to green spaces and the most worrying issue to Harrison's study is that, despite the advantages of green spaces in urban areas what could be the appropriate size, distance and criteria for green spaces access in urban areas. Thus necessitating this study.

Figure 1: Contribution of green spaces in urban areas



Source: Adopted and modified from Mensah (2014).

2.2.5 Global standards of urban green spaces

Worldwide, there are set minimum standards of urban green spaces in both developed and developing nations that are acceptable by World Health Organisation (WHO) and the Food and Agricultural Organisation (FAO) as $9m^2$ urban green space per urban dweller (Gill et al, 2008; Kuchelmeister, 1998). Similarly, it is recognized that, 20 m^2 park area per capita is the universally accepted space for urban greenery areas (Wang, 2009). In Europe, it recommends that, urban dwellers to access urban vegetative spaces within a walking distance of 15 minutes or less which is approximately 900 metres from the area of residence (Barbosa et al, 2007; Howard, 1985). Further, in UK it recommends for provision of 2 hectares accessible to green space per 1,000 population in an area, and no individual should settle more than 300 metres from the nearest urban green space, this means 5 minutes walking distance (Handley et al, 2003).

In Denmark, city authorities recommends for not more than 400 metres for at least 90 percent residents in an area (Djibri et al, 2012). Most developed countries have adopted similar standards but in Africa the standards are not common. In Cote D'lvoire, the real estate companies' reserves 5 percent of areas under development for greenery spaces in urban areas (Ibid).

In Lagos, Nigeria, they reserve 8-10 percent of the urban land spaces in a residential setting for green spaces (Abegunde, 2011). In Nairobi, Kenya, new housing estates must have an average of 3,588 people per hectare of neighborhood green space (Makworo and Mireri, 2011).

In most developing societies, like Kenya, the reduction of urban green spaces is more disturbing. Therefore, the scenario is bound to increase with time as these urban areas are expected to accommodate high populations thus proliferation of urban environmental challenges in three decades to come (United Nations, 2019). Therefore, there is need to further study the phenomena, thus making this inquiry necessary.

2.3 The trend and magnitude in changes on urban green spaces

2.3.1 Tragedy of commons theory.

The tragedy of commons by William Forester (1833), explains that individuals tend to make the best decisions for their personal interests, regardless of the negative impact they may have on the urban environment. William (1833) notes that, individual's belief that others cannot act in the best interest of a group. For instance, green space faces the challenge of being misused to dumping sites, encroached by commercial and residential land use activities. Further, William noted that, nobody can question why that is happening the way it is happening, thus, urban green spaces faces less concern from the general public and even the government institutions.

This theory is relevant in this study since it shows how common pool resources faces the challenge of either being misused or converted to other urban land use activities. For example, on riparian lands, cultivation is done up to the riverbank causing soil erosion which eventually pollutes the river through agricultural chemicals. Furthermore, the road reserves have been encroached by commercial activities like; vending and hawking, installation of kiosks, roadside garages, waste dumping areas and residential sites for street families. Although the theory is relevant in explaining how the common pool resources are used and conserved, the theory fails to clarify the specific challenges which faces the use and conservation green areas in urban centres.

2.3.2 The discussion on the trend and magnitude of changes on urban green space

Currently, global urban population in urban areas are increasing spatially overtime and this results to loss of urban green land. In particular, the growth of residential and commercial land activities towards the green spaces in urban areas (Yuan et al, 2005). This phenomena has been observed in both developed and developing countries but the high rates experienced at the developing nations (Chiesura, 2004; Tzoulas et al, 2007). Kabisch and Haase (2013), established that, in both European western and southern cities, there were no significant change in urban green space between 1990 and 2000, but found a noteworthy upsurge of urban green space in the period from 2000 to 2006. In another study of 386 European cities, results indicate a theatrical descent in per capita urban green space provision in cities with high population density (Fuller and Gaston, 2009). The study also revealed that access to urban green space rapidly declines as urban areas grow, reducing opportunities for urban residents to experience urban nature (Ibid). Similar studies in 274 metropolitan areas in United States recognized that, there were urban green space loss between 1990 and 2000 (McDonald et al, 2010).

In Malaysia, in the year 2000 the urban population was not less than 57% of the total population and is likely to go beyond 70% by 2025 (Salleh, 2000). Also, speedy urbanization are apparent in urban areas such as Kuala Lumpur and Georgetown, Penang with great inhabitants densities. This increase in urban population sizes will result in a transformation of green spaces to other competing land uses (Ibid).

Du et al (2014), in China, established that, a high rate of land conversion to build up areas in Jiangsu Province, which was demonstrated by decline of green spaces at the expense of build up land. The study also found out that, in the northern part of China, it recorded annual expansion rate of 22.58 times more than that of the period 2000–2005, a challenge attributed to fruitless development control. The study recognizes that, between 2000 to 2005, the area of land use change was about 279,253 ha, and the annual change rate was 55,850.6 ha. Still, it was observed that, Southern Jiangsu urban green space conversion to other land activities was very severe than central and northern Jiangsu. Du et al, (2014), recommended that, governments to consider enforcing urban development control system to enhance urban green space sustainability. Although, Du et al (2014), have critically analyzed the extent and the rate (trend) in which land use change has impacted crop land to build up forms, their findings show that, there are high rates of acceleration of land use change from crop land to build up areas and water bodies in Jiangsu province between 2005 – 2008 at a rate of 58.54% and 91.6% and 39.75% and 47.62% water bodies.

In view of this study, Du et al (2014), fails to recognize that, when crop land is converted to build up space, the water catchment area is destroyed thus a decline in water bodies, consequently, necessitating this inquiry.

Similar studies done in Ethiopia, Gumara watershed by Wubie et al (2016), established that, forest cover, shrubs, grasslands and wetland degraded at a high rate. The cultivated and residential land extended by 21.99 %, whereas forest land, shrub land, grass land and wetland declined by 85.30, 91.39, 76.15 and 72.54 % over the analysis period respectively. The study recommended for, strategies of managing urban green space resources through participation of local people in the management and decision making. Also, an appropriate land use planning by identifying the proper land for specific purpose so that the marginal lands will not be put into agricultural land use. This study by Wubie et al (2014), uses aerial photograph (1957 and 1985), these methodology may not give current trends and changes of an area under study, therefore, the phenomena is still understudied, thus, making the research necessary.

In Kenya, a study by Wamino (2017), indicate that, competing urban land uses are common and they happen rapidly, causing urban deforestation, urbanization and grey development. The study recommends for formulation of policies and regulation to protect urban green spaces and develop monitoring and evaluation procedures. Omollo et al (2017), in Kisii town established that, built-up areas recorded the highest expansion (275.73%), followed by forest areas (188.26%). Conversely, transitional areas recorded the lowest decline (81.89%) followed by grass/cultivated land (-35.30%). Also, results indicated that with R2 = 94%, population increase significantly predicted spatial expansion of built-up areas, F (1, 11) =29.518, p = .000, thus, an increase in population by one unit/person increased expansion of built-up areas by .026 units/hectares. There was a significant positive correlation (r = .854, p = .005), suggesting that a decline in LAC increased LCR. In addition, regression coefficients showed that an increase in one unit of LCR led to a decline in LAC by .124 unit.

The study therefore recommended that, a comprehensive integrated urban green space development plan to be used as a strategy for sustainable urban development. The study done by Omollo et al (2017), findings indicate that, build up areas and forest areas increased by 275.73%) and 188.26% respectively. This study by Omollo contradicted by findings on google earth images which show a decline in forest cover, therefore, there is need for further inquiry to clarify this contradiction.

2.4 The factors explaining the changing trend in urban green spaces

A study conducted in European cities established that, the decline of urban green spaces are as a result of high population growth and demand for more space for transport and industrial land uses (Kabisch and Haase, 2013).

Baro (2016), similarly conducted a study in Barcelona city and established that massive decline of green spaces is due to Ineffective policy and legal framework which poses challenges for the adoption of appropriate urban management strategies. Further, the study observed that, there were obsolete **e**xisting physical development plans which often lacked capacity to deal with new urban changing developments relating to urban green space conservation (TEP, 2005; Madureira et al, 2011).

Still, other studies indicate that, most of the urban green spaces have been polluted and high demand for fuel wood for construction and cooking (Sharifi et al, 2014; Todes, 2012). Similar studies show that, there is inadequate urban landscape planning, poor management and decision-making in urban green space planning (Seto et al, 2012). Subsequently, the present understanding of the spatial effects on urban green spaces arising from rapid unplanned urban development remains unclear and poorly understood these results to massive destruction of green spaces that were initially available (Sharifi et al, 2014). Likewise, a study by Langer and McNamara (2011) showed that, low priority by planning authorities towards conservation of green space was the main factor for the deterioration of green space in urban areas.

A related study in United States of America by April et al (2014), the study recognized that, key factors that lead to decline of urban green spaces are; insufficient finances for management and maintenance of urban green spaces, green space fragmentation, urban areas experiencing urban sprawl and opportunity cost on environmental aesthetics over economic gains in urban areas. In South Africa**,** studies established that, on the existence of lost urban green spaces, there is poor integration between the built environment in human settlements and the landscape or surrounding environment. Further the study show that, laxity in enforcement of development control systems, disobliging attitudes of the urban dwellers towards conservation of urban green spaces, subdivision of urban green spaces for human settlements and agricultural activities were also other challenges that cause the decline of green spaces (Makworo and Mireri, 2011; Cilliers et al, 2013). Similar studies in Kumasi, Ghana indicate that, the predominant challenge for the deterioration of urban green spaces in most African countries were, poverty and ignorance among the urban dwellers (Fuwape and Onyekwelu, 2011; Tibaijuka, 2007).

Further, the studies observed that, there were proliferation of informal settlements (slums) and urban sprawl at reserved lands for urban green spaces (agroforestry, urban parks, urban gardens and riparian reserve areas) to contain unplanned developments UN Habitat (2011). Correlated studies done in Nigeria, Morocco and Ghana, show that urban green spaces are declining due to ineffective operation of urban planning regulations Fuwape and Onyekwelu (2011).

Although, land planning regulations for urban green spaces were available in most African countries, operation of such regulations was problematic (Ibid). For instance, ownership of urban green space areas was found to be under the care of chiefs who allocated themselves or fragmented green space area to their own will to the general public or relatives and green spaces were most affected (Hammond, 2011; Sellers, 2002).

Moreover, the inquiry revealed that, most of the developing nations have the challenges of, inadequate skilled personnel, polluted urban green spaces, insufficient logistical facilities, financial constraints, political interference (Tibaijuka, 2007). According to Mpofu (2013), the study argue that, poor coordination among government institutions, private organization and NGOs on urban green spaces was, the major factor in the decline of urban green spaces. Similar studies by Muderere (2011), established that, non-functional nature of urban planning regulations, lack of political good will, ineffective monitoring and evaluation and bureaucratic processes for development approvals and high cost in issuing development permits (Awuah et al, 2010; UN Habitat, 2009). On considering the foregoing discussion, this inquiry will interrogate further to identify the specific factors for the decline of green spaces in urban areas.

Studies in Kenya done by Muketha (2020), established that, there was inadequate spatial information and high competition from other urban land use activities were to blame for the encroachment and degradation of urban green spaces. Finally, the study revealed that land users have limited or no roles in conservation of riparian zones. Although Muketha's studies touch on pertinent factors that really affect the urban green spaces, there is need for a further inquiry to clarify the role of political class in enforcement and compliance of urban development plans. Thereby making this inquiry necessary.

A study done in Kiambu, Kenya by Kiio and Achola (2015), the study show that, agricultural land was being converted into residential and commercial uses. There was also a general decrease in grassland, forest land and wetland (with the exception of 1984). It is worth noting that in general, only built area increased significantly from 1.9% in 1984 to 33.5% of the total area of Kiambu County in 2013.

In the same period the most diminished land cover/land use are agricultural land (from 39.7% in 1984 to 15.8% in 2013) and grassland (from 19.7% in 1984 to 2.0% in 2013). At the same time population increased significantly in the same period from 686,290 in 1979 to 1,623,282 in 2009.

The trend in agricultural land indicates that agricultural food production in Kiambu County will significantly diminish by the year 2030 if no remedial action is taken to improve crop farming. The study found out that, inadequate spatial information on green space as a factor, has led to no action being taken to control massive green space destruction. However, this study by Kioo and Achola, specifically identified specific factors that results to decline of green space on agricultural lands. Therefore, this inquiry will further interrogate the factors that are responsible for green space decline in urban areas. Hence, necessitating this inquiry.

In summary, the factors which lead to decline of urban green spaces are specific to individual urban areas. However, studies alluded the following as the foremost factors fueling the reduction of urban green spaces; Ineffective policy and legal framework, laxity in enforcement of development controls, conflicting institutional roles, low priority by planning authorities towards green space conservation, obsolete **e**xisting development plans, polluted green spaces, green space fragmentation, population growth High levels of poverty and ignorance, political interference, ownership challenges, lack of awareness and public participation Lack of finance/budget, lack of coordination between community and municipality and high competition from other urban land use activities.

2.5 Effects of the changing trend of green spaces on the aesthetics and environmental quality

2.5.1 Systems Theory

The theory explains the relationship/interconnectedness that exists between two or more groups or parts that are interrelated or interdependent to each other and are either natural or human made (Montuori, 2011). Every system is bounded by space and time, influenced by its environment, defined by its structure and purpose, and expressed through its functioning (Ibid). Laszlo (1974) notes that, systems support each other from failing. Further, he recognized that, if one system fails all the system will collapse. The goals of systems theory are to model a system's dynamics, constraints, conditions, and to elucidate principles (such as purpose, measure, methods, tools) that can be discerned and applied to other systems at every level of nesting, and in a wide range of fields for achieving optimized equifinality (Beven, 2006).

The systems theory is relevant in this study since it shows how urban land uses interact with each other. These interactions can be through competition by urban land use activities.

For instance, urban land activities like commercial and residential land uses sometimes may displace the original intended land use activity. Thus, if urban green spaces are converted to other land use activities, it means that, the humble environmental benefits the urban dwellers get are denied. The lapse in the connectedness may result to reduced ecological functioning of the urban green spaces like wetlands, landfills, cemeteries, playing fields, sporting areas and green corridors among others.

Consequently, due to the failure of proper functioning of one system, "green space" environmental and socio-economic challenges will set in which will cause effects like; loss of economic gains, poor urban environmental quality, health challenges, biodiversity loss and eventual collapse of the whole system.

Although, the theory helps in explaining how the interconnectedness of urban land use activities are dependent for each other to succeed, the theory fails to clarify why green spaces are declining in Kisii municipality. Thus making this inquiry necessary.

2.5.2 Discussion of the effects

In Europe, studies done by Fuller (2009), indicates that, population growth in urban areas has caused rapid urban developments that have led to decline of green spaces both privately and publicly owned. This has seen cities experiencing poor environmental quality and quantity on ecological services and aesthetics. However, studies done by Jabareen (2006) and Masnavi (2007) argue that, population pressure in developed urban areas can cause huge developments that are compact, which results to shorter journeys to work and access to facilities and services, more walking, cycling or use of public transport, better access to green spaces and encouraged social interaction. A study done in European cities by Kabisch et al (2015), established that, reduced urban green spaces has the following effects; high risk to epidemic diseases, degraded soils, low property values and reduced social lifestyles.

Similar studies carried out in South Africa, studies by Liu (2013), they established that, lack of green spaces, especially in urban areas, may result to; unpredictable weather patterns, high levels of soil degradation, inadequate shading in urban areas, high noise levels and also reduced habitats for wildlife and eventual loss of biodiversity. Other studies done in West Africa by Fuwape and Onyekwelu (2011), agree that, despite the importance of green spaces keeping cities cool, reduced green spaces in urban areas also have the following effects; poor quality of natural resources; soil, water, wildlife and forests, reduced social life, health challenges, increased urban land use conflicts, reduced business attraction thereby unable to harness economic value of properties. Consequently, poor urban living standards and working environments.

Similar studies in Kenya by Oyugi et al (2017), findings show that, the decline of urban green spaces has diverse effects like; misused/blocked NMTs and reduced burial space for the destitutes. Other studies by Mureti (2014), the findings of the study indicate that, there are serious effects that arise from the decline of green spaces in urban areas which include; urban flooding, destruction of infrastructural facilities, increased grey development, loss of job opportunities, reduced government revenue and increased of heat intensity. Although, the foregoing discussion has looked at the effects for the decline of green spaces in urban areas, this inquiry will further clarify specific effects that are responsible for the reduced green space and their mitigation measures, thus making this phenomena understudied.

Comparable studies by Omollo et al (2017), the studies found out that, the decline of green space is as a result of interplay of factors that has resulted to massive alteration of green areas in urban places to residential and commercial land uses. This has resulted to; high rate of species extinction, climate change, urban green space fragmentation. To curb the effects that were witnessed, the study recommended that, there is need for policy adoption. Strict enforcement and monitoring regime that ensures overall compliance to planning standards to safeguard green spaces. Although Omollo et al (2017), investigated on the factors and effects of declined green space, there is need to further inquire on the adequacy and professional competence of the planning authorities and the criteria for conducting public participation and awareness exercise. Thus, conducting this study is necessary.

To sum up the effects, studies show that; Biodiversity loss, unpredictable weather patterns, urban flooding, soil degradation, reduced property value along main highways, increased grey development, loss of job opportunities, low business attraction, reduced government revenue, misused/blocked NMTs, reduced burial space, reduced social life, health challenges and increased urban land conflicts were the prominent effects on the reduced urban green spaces on urban environment.

2.6 Planning Options to mitigate the implications of urban developments on green space.

Urban green space planning strategies are viewed as planning openings to promote resilient urban green areas. However, the implementation of the legal and policy frameworks have been noted to face serious challenges which has resulted to total fail in implementation.

Urban green space planning, depends to be embedded in a comprehensive plan of urban and regional planning approaches, so that it can be sustained. On the same aspect, spatial planning may contribute to providing a platform for its institutionalisation and proper implementation.

2.6.1 Green urbanism theory

The theory of green urbanism is a practice of creating communities that are beneficial to human beings and the natural environment in totality (Karlenzig, 2007). Green urbanism applies green building principles, processes and technologies at the neighbourhoods scale; linking buildings, infrastructure and natural systems (Ibid). The theory explains that, the major goals for green urbanism model are; urban areas with sustainable and healthful living, developing urban centres to be green and function in ways equivalent to nature; and designing urban areas that strive to live within their ecological limits (Harrison, 1995).

The theory is relevant in the study in that, it recommends for integration of urban green spaces in urban landscape to mitigate the effects of urban heat island and other environmental problems (Harrison, 1995). Further, it supports the incorporation of urban green spaces into physical landscape as a means of conserving the environment. Though, the theory helps in explaining how integration of green spaces and urban developments can be done in urban areas, there is need for further interrogation, why green spaces are declining in Kisii municipality.

2.6.2 Planning options

Curbing high levels of poverty and ignorance on urban dwellers. Most urban dwellers settle and draw their economic living from green spaces. There is every need to strategize on other economic activities which will attract low and middle class urban dwellers so that we can decongest them from these areas. For instance, along the road reserves, the strategy will be constructing accessible market centres and providing all public services and utilities such as infrastructure and other social services. Introducing capacity building programs on specific cadres of urban dwellers to improve level of dependence and creativity. By so doing these, urban green spaces will be relieved from excessive exploitation, thus sustainable green space development.

Decentralization of Economic Activities; using the theory of industrial location by Weber (1929), decentralization of key economic activities like industries have emerged to ease population pressure at the urban areas. To ensure the promotion of sustainable diversity in all forms of green spaces, their needs to strike a balance between competing land uses and the green space sustainability.

This will allow multiple resources to balance current homogenizing trends on green space and embracing a range of management strategies (scenarios) to face uncertainties.

Due to the multifunctionality of green space, the spread of economic livelihood to local people will foster economic, social and ecological benefits in the same spatial area in turn reducing pressure to green space at fast developing towns. Green space projects can be considered a win-win, integral strategy tackling several challenges within a financially viable framework. Their multi-functionality character makes green space strategies different from "grey perspectives" which tend to be designed to fulfil one function such as humble grey parking (Fuwape and Onyekwelu, 2011).

Manage control variables; Control variables are those that govern the role and impacts of inhabitants in urban setting and can be planned or modified to achieve urban green space resilience. Thus, land use zoning, strategic master plans, norms and legal systems are control variables that can influence the preparation for and reaction to uncertainties (Herrfahrdt-Pahle; Pahl-Wostl, 2012).

With regard to choosing the level of control of the variable (e.g. incentives, penalties and compensation measures), each strategy will produce different patterns of spatial interaction. Green space projects can be a management tool serving different needs and in different contexts. For instance, according to Geller (2003), nations like U.S green space has become a resource for smart conservation and protection while in the U.K it is more concerned with controlling urban development (e.g. Green Belt policy).

In Germany, recreation and urban control functions have been extended in practice to climate change adaptation initiatives. Standardizing and regulating green infrastructure initiatives involves more than writing new regulations (e.g. on zoning, subdivision and environmental standards). The planning authority need to review the set standards for granting planning permission to meet new criteria such as connectivity and multi-functionality. It is necessary to review existing laws, policies and practices affecting land-use decisions. Green space initiatives can also help maximize benefits and manage conflicting land use demands and pressures, like those of housing, transport, nature conservation, recreation and aesthetics. However, involvement of stakeholders is key to reduce any arising conflict of interest hence using appropriate mediation instruments or collaborative implementation practices.

Developing an integrated urban green space development plan; the world population is increasingly urban and most future growth is expected to take place in small and medium cities. Moreover, "if current trends in population density continue and all areas with probabilities of urban expansion undergo change", around 60% of the projected total urban area in 2030 has yet to be built.

Since urban areas are in constant change, it is necessary to revise regularly existing land use development plans to accommodate the integration of green space in urban areas.

It requires learning from other experiences, adding to codified knowledge and proposing future interventions that will promote green space uptake in the planning and development context (United Nations, 2019; Masnavi, 2007; Seto et al 2012). In the planning context, integrated green space and land use plan approach will help to establish or strengthen networking among different stakeholders at different spatial scales. However, this may face considerable challenges on legal, political, institutional, environmental and inadequate resources to facilitate the same in which the nature and value of building urban green infrastructure resilience is contested. There is every need to provide a systematic guidance to planning practitioners on how green infrastructure can be enhanced and promoted through planning systems. For instance, small initiatives or isolated projects can enhance green infrastructure efforts enabling city resilience or leading to transformation at a larger scale. Green spaces can promote urban sustainability and resilience by retrofitting interstitial spaces that have little value otherwise into the urban fabric (Cilliers et al, 2013).

Promote public sensitization and awareness creation; in the application of participatory principle, the incorporation of all stakeholders in decision making improves legitimacy, expands the depth and diversity of knowledge and helps to detect and interpret change and disruptions. Resilience grows as the network of stakeholders is strengthened and expanded. There are links that are created which promote dialogue and collaboration to address emerging problems or crises. Green space functions cross scales and jurisdictions which needs the involvement of all local and regional stakeholders. Engaging all actors in green infrastructure planning and design encourages commitment, builds trust, and creates resilient outcomes in green space. The two levels of government can partner together and improve green space in an urban area. The county and national levels, green space approaches have recently broadened, strongly promoting partnership, For instance, the county government can provide a piece of land and the national government can provide seedlings for urban agroforestry.

Promote Good Governance and Political Good will; an urban setting is a complex system of interrelated stakeholders where multiple interactions occur at the same time on different spatial levels. Therefore, good governance helps in reducing the high appetite for competing land uses.

In practice, political good will means to build and sustain confidence of the stakeholder that you lead or govern, it helps to accept and prepare for uncertainties, sudden change of environment and to recognize diverse development perspectives (adaptation and transformation). The system good governance provides for an alternative option for dealing with the issues at hand. However, Forester (1989) in the study, planning in the face of power, the study argue that, that is the time planning is poorly done.

For instance, an area that is set for recreational purposes, preservation of cultural heritage, and natural pasture land for cattle and a habitat for wildlife. Political good will, will enable governance to be done well. However, most urban areas are governed by several administrative units which poses a challenge on management of ecological, social and economic dynamics which needs a careful thought on governance and political support to avoid mismatches. For instance, the EU strategy clearly mentions the role of national and regional authorities in guiding, planning and managing green spaces (Baro et al, 2016).

Strengthen enforcement of development control systems; most developing countries face the challenge of urban population pressure, which led to increased competition for urban space. Urban centers experience challenges that are associated to weak development control systems, in this regard, the urban development threats set in. For instance, most developing urban areas have increased illegal developments that are not approved.

Therefore, precautionary principle can be applied by the decision makers to control haphazard upcoming developments that have led to decline of green spaces in urban areas. An urban area, may be deemed degraded due to poor planning practices that exist in an area. All stakeholders need to be incorporated in the setting of strategies, plans and norms that interact across hierarchies and spatial levels. Normally, formal and informal planning instruments can overlap in objectives, providing a diversity of responses of differing strengths (Baro, 2016).

Introduction of the concept of green space planning in learning institutions; developed countries green infrastructure concept is within the curriculum of learning. In Singapore, the developers cannot develop the whole space and destroy nature without giving back to the environment. The culture of Singaporean country is such that ecological areas are conserved with or without supervision. If developers carry out development covering the whole space provided for development, if they do, they will compensate elsewhere (Baycan-Levent et al, 2002). The concept of green space in planning is given a big stake and whatever it takes the government is committed in doing it.

Therefore, there is need for the concept of planning to be introduced into the school curriculum to enable basic green space concepts to be enhanced in the mindset of the learners (Benedict and McMahon, 2006). This will ensure that, ecological functions of green space, are conserved (Cohen et al, 2008). In a bid to conserve and sustain the environment in which many migrants in the area sought to enjoy when they moved in, the green space concept has to be introduced and enforced early (Baro et al, 2016).

Establishment of GIS and Remote Sensing Department; to establish GIS can help to remotely monitor the depletion of the ecologically sensitive areas overtime. The developing countries have depleted ecological zones at an alarming rate. This has fueled to the change in the weather conditions that has led to catastrophic events in an area. Land conversions to other competing land uses are increasing daily. The technology can easily detect the change by the use of GIS enabled gadget which will help in setting up mitigation measures. The creation of the one shop point for green space data information will be helpful. This will help to update the maps and determine the amount of green spaces available and reverse the trend of declining (Kironde, 2006; Baro et al, 2016).

Designate green space areas and gazette them; this planning option will apply sustainability principle in regard to conserve green spaces in urban areas. In urban areas, green spaces improves the ecological and socio-economic functions to the urban dwellers. Green spaces need to be designated and protected for easier conservation (Hansen et al, 2016; Geller, 2003; Dunnet et al, 2002). Though mapping and protecting of urban green spaces has a challenge as argued by Forester (1989) planning in the face of power, the protection ought to be done for sustainable urban green space planning. Also, designate green space areas and develop them. Avoid rezoning of green space areas to other urban land use activities. Finally, introduction of punitive measures to those encroach the green space areas.

2.7 Policies, development plans, institutional and legal framework on green spaces

Policies and laws are a set of rules and regulations, principles and guidelines formulated and adopted in an urban setting to guide and direct the general urban growth and development Olson et al, (2004). They ensure long-terms goals are attained as set out (Ibid). They influence decisions and actions to be taken in an area. This section discusses various policies, legal and institutional framework and their relevance in the implications of urban developments on green spaces.

2.7.1 Policies and development plans

The National Spatial Plan (NSP) of 2016 aims to localize sustainable development goal No 11 on making cities and human settlements to be more inclusive, safe, resilient and sustainable. Further the policy recognizes that, it is necessary to deliberately provide adequate and functional green spaces in urban places. The County Integrated Development Plans (CIDPs) of 2018 – 2022 targets to do river cleaning. For example cleaning river Nyakomisaro and Nyanchwa that passes through the study area. This enables reclaiming encroached portions of the riparian reserve which is part of this study.

The National Spatial Plan complements the vision 2030 to achieve sustainable population and human activity distribution on urban green space to attain socio-economic development, sustainable use of land and sustainable green spaces. Kenya's urbanization agenda is also geared towards the fulfillment of the Sustainable Development Goals (SDGs) which include the promotion of urban resilience in infrastructure and making cities inclusive, safe and sustainable. The Forest policy, 2014 aims at achieving the national forest cover target of 10% of land area, which emphasizes on afforestation effort on community and private lands.

The National Land Policy (GoK, 2009), promotes sustainable urbanization as enshrined in the SDGs. The NLP (GoK, 2009), aims in guiding on efficient, equitable and sustainable use of land to address socio-economic, environmental and political concerns. National Environment Policy (2012), provides a holistic approach to guide the management of the environment and natural resources in Kenya. This policy gives clear guidelines on the conservation and preservation of green spaces as well as the environmental resources in general. Draft National Urban Development Policy GoK (2013), creates a framework for sustainable urbanization through infrastructure, housing, land, environment, and climate change management.

In view of these policies that are well set out, this study will therefore ask "If there are good policies why is green spaces declining in urban areas?" Despite the fact that, these policies have holistic approach to sustainable green spaces, all of these policies, Forest Policy, NSP, SDGs, KCIDPs, Kenya Vision 2030, NLP, NEP and NUDP recognizes that urban green spaces is under immense pressure from other competing land uses. This is fueled by the fact that, there is weak development control, ineffective regulatory framework, weak enforcement of planning standards, high population pressure that demands more space and massive green space fragmentation (Kisii County Government, 2013; Government of Kenya, 2016).

While, planning policies and development plans give comprehensive approach to sustainable green spaces in urban areas, this study wanted to find out why there is weaknesses in implementing these policies and plans (Ayonga, 2019; Kitur, 2019). Besides, the forest policy giving guidelines on achieving 10% of forest cover, it is not specific on green spaces at urban areas. Therefore, there is need to interrogate further on implementation methodologies of these policies and plans to ensure resilient urban green space. Thus making this inquiry necessary.

2.7.2 Legal Framework

The constitution of Kenya (2010) is the supreme law of Kenya. All planning laws that are related to land are anchored in the main law (2010 constitution of Kenya). It establishes a devolved system of governance and formation of County Governments (County Government Act, 2012) with departments of Physical Planning under Physical and Land Use Planning Act (PLUPA 2019), the 2010 constitution grants powers to the county government to control the use and development of land and to consider approval of development applications. The County Governments Act (2012), gives effect to Physical and Land Use Planning Act (2019), through the county planning department to maintain a viable system of green spaces for a functioning eco-system and the same Act of the county government gives powers to the county environment department to manage green spaces and other ecologically sensitive areas are maintained.

The Physical and Land Use Planning Act (2019), recognizes that there is need to reserve and maintain all the land planned for green spaces in accordance with the approved physical and land use development plans. The Urban Areas and Cities Act (2011), provides for the classification, management, and governance of urban green space areas. Environmental management and coordination Act (2015), recognizes for the submission of Environmental impact assessment (EIA) and audit for expansion of green space areas and any other environmentally sensitive zones before carrying out a development. This will ensure that illegal land conversions to different land uses are controlled. National Land Commission Act (2012) provides for administration and management of public land in an efficient, sustainable and equitable manner. The act also mandates the National Land Commission with the responsibility of monitoring and providing oversight over land use planning and alienation of public land which includes green spaces to private entities, monitoring and registration of rights and interests in land.

The need to equitably and efficiently utilize green spaces is further reinforced by Land Act (2012) and Water Act (2012) which collectively provides the legal foundation to consolidation and rationalization of management of these resources.

The Physical Planning Handbook (2008) provides guidelines for the preparation and implementation of physical development plans which considers for the protection and conservation of green spaces. The handbook is largely as a reference in the preparation of local and county physical development plans; guidance of the use and conservation of green spaces.

Though, the laws recognize that urban green spaces needs to be conserved, there is need to further address the specific challenges facing the use and conservation of these resources. These are attributed to futuristic nature, ambiguity and overlaps in the responsibilities and roles to various institutions in charge of urban green spaces.

2.7.3 Institutional Framework

These sector identifies the different institutions and organizations and their functions which they are mandated to undertake in the management of green spaces. These institutions are discussed below; - *Kisii County Government*. Has the county planning unit that is responsible for coordinating integrated development plans. County plans will have the goal of promoting harmony with national and other county plans, land-use plans, urban planning and environmental conservation. *Kisii Municipal Board*, they have the overall mandate of planning and developing the municipality.

They consider development approvals of various land uses within the municipality. They also control the encroachment and conversion of green space areas within the municipality Kisii County government (2018). *Kisii County*, *National Environment Management Authority (NEMA)*, is established under the Environmental Management and Co-ordination Act No. 8 of 1999 (EMCA) repealed 2015, as the watchdog of the government for the implementation of all policies relating to environment. The object and purpose for which NEMA is established under EMCA is to ensure sustainable management of the ecologically sensitive zones.

Water Resources Authority (WRA), is a state corporation established under Section 11 of the Water Act, 2016. Pursuant to Section 6 of the Act, It is responsible for regulating the management and use of water resources. Kenya Urban Roads Authority (KURA), is a statutory body established by the Kenya Roads Acts, 2007. KURA Kisii branch is responsible for the management, development, rehabilitation and maintenance of all public roads in cities and municipalities except where these roads are categorized as national roads. The institution is important in the study since it demarcates the road reserves and protects it.

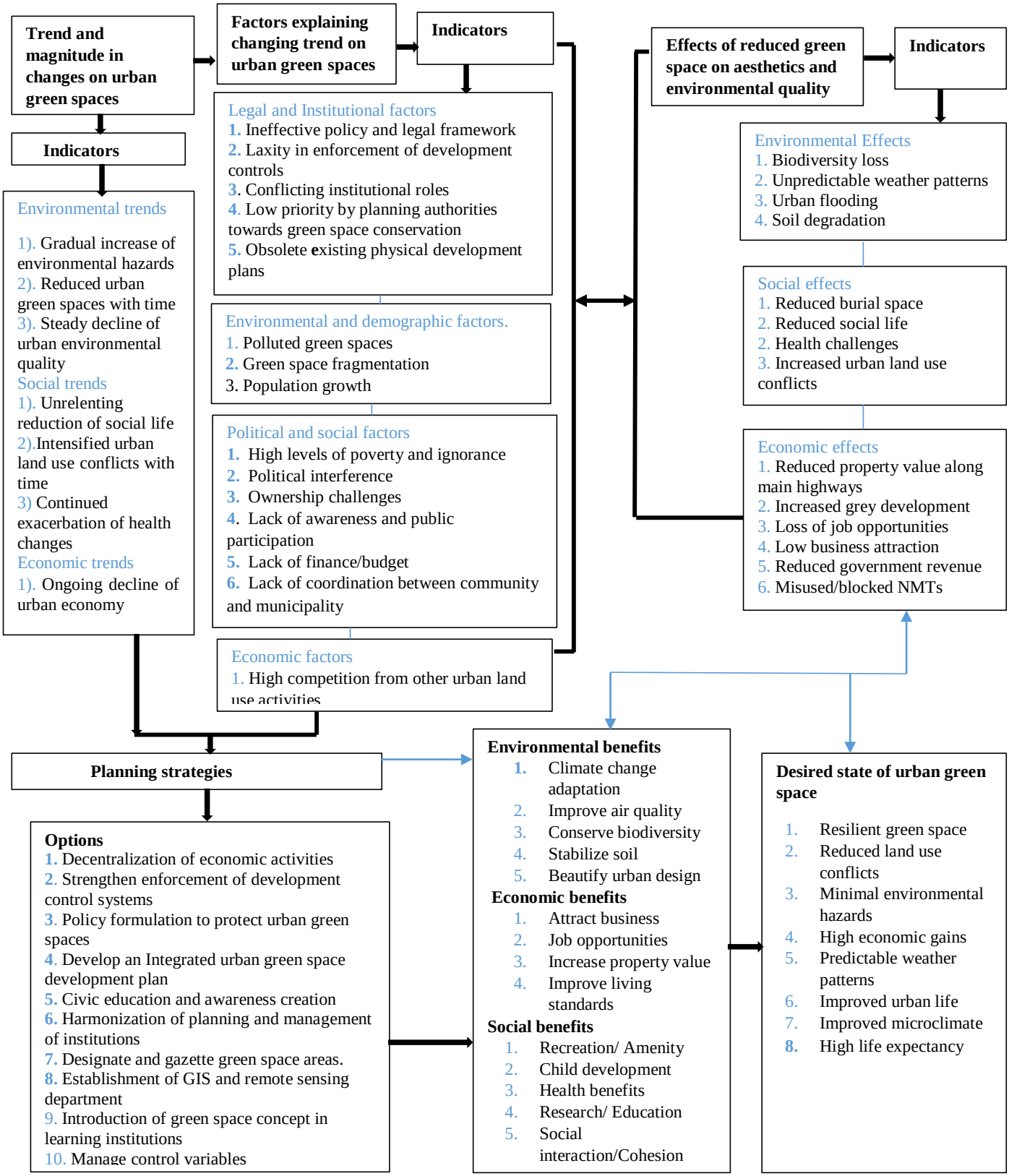
Despite the availability of the institutional framework in the study area, there is need to investigate further and clarify on institutional overlaps on duties and responsibilities. Thus making the study necessary.

2.8 Conceptual framework

The conceptual framework is based on the factor-effect relationship between the use and conservation of green spaces in urban areas. The evaluation of the theoretical framework, tragedy of commons, the garden city model, the systems theory and distributive justice theory, helped this study to establish the relationship between the green spaces and other land uses, the historical background of green spaces and the factors that affect its development in an urban area. However, these theories simply show the relationship between two or more variables but they don't give satisfactory strategies on how to manage this phenomena. Therefore, there is need to interrogate further to clarify on the specific challenges and effects on the use and conservation of green spaces in urban areas. Thus necessitating the study.

Challenges which explain the decline of urban green spaces are depicted as the Independent Variable (IV) and the effects of declined urban green spaces are depicted as Dependent Variable (DV) of the study. However, this relationship may be modified and tempered by environmental, economic, political and social factors that intervene from time to time, these forms the moderating variables in this relationship. The study will look at each variable in accordance with the interrelationships depicted as shown.

Figure 2: Conceptual framework



Source: *Author, 2021.*

CHAPTER THREE: METHODOLOGY

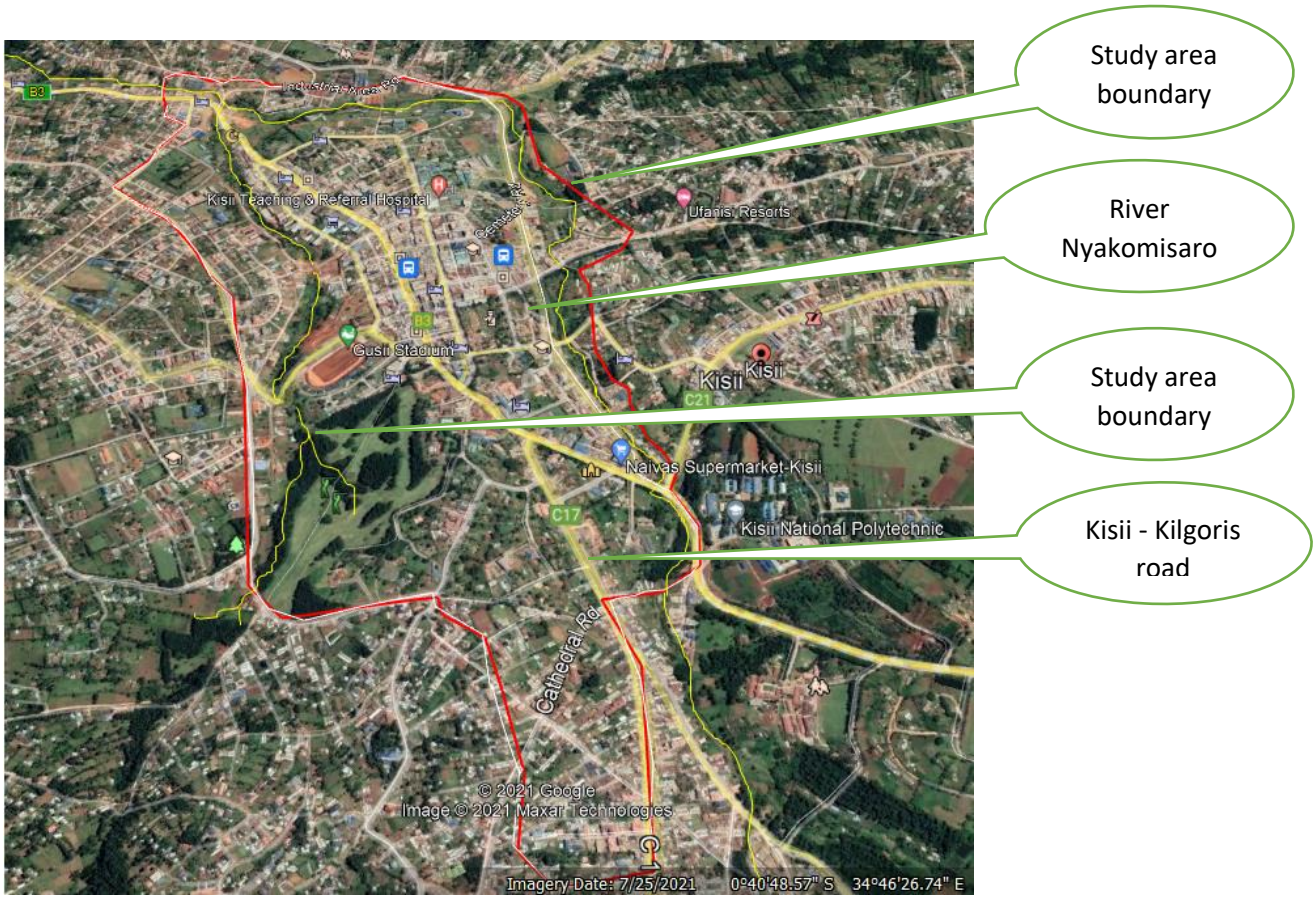
3.1 Introduction

This chapter gives a methodological direction of the study. It describes the type and sources of data, sampling techniques, data collection instruments, description of variables for measurement, data analysis and presentation techniques.

3.2 Selection and demarcation of study area for field study

This study was conducted in Kisii municipality. The study area comprises, part of Bobaracho ward, Kisii Central ward and Kitutu Central ward forming the municipality. Geographically, the area's coverage is measuring 2.7km². Using geographical features and google earth images, the boundary of the study area was demarcated and the shape file to ArcGIS 10.7 was exported for further review. The demarcation was done capturing the initial land use allocations of the study area. Figure 3 indicates the study area map.

Figure 3: Map of the study area and boundary



Source: *Google earth, 2021.*

3.3 Sampling Procedure

3.3.1 Target Population

A sample size is the actual number of elements in a population under study. In this case, the target population included; River riparian lands, road reserves, recreational spaces within residential areas, public park, stadium, playing fields, the cemetery, sports areas, wetland and church grounds. Also, the study targeted land owners/developers, tenants and relevant government planning authorities. These were the accessible population and represented the target population of the study.

3.4 Research Design

In in order to answer the research questions, urban green spaces were categorized. The riparian reserve of roads and rivers, recreational spaces within residential areas, Public Park, church grounds, cemeteries, ply grounds, stadia and wetlands. Table 2, the summary of the respondents who were involved in the study.

Table 2 : Overview of the sample size in the study

Green space type	Category	Sample population	Selected section	Respondents
1). Recreational spaces within residential areas	a). High density b). Medium density c). Low density	A total population size of 80 respondents. i). 40 respondents (33 tenants and 7 Land lords) ii). 20 respondents (13 tenants and 7 landlords) iii). 20 respondents 14 landowners and 6 tenants)		Landowners and tenants
1). Riparian land	a). Road	Out of seven roads on the study area, the study considered two roads. i). Kisii Uyugis road ii). Kisii Kilgoris road	i). Daraja Mbili lower to Daraja Moja junction (Kisii Bypass) ii). Daraja Mbili to Daraja Moja junction iii). Mashauri to Mwembe road	Landowners/developers, Business people and Tenants
	b). River	Out of five rivers in the study area, the inquiry considered two rivers i). Nyakomisaro ii). Nyanchwa	i). Daraja Mbili to Daraja Moja junction ii). Daraja Mbili to Mwembe	Landowners/developers, Business people and Tenants

Green space type	Category	Sample population
1). Cemetery	Open space	One, Nyambera Cemetery
2). Playing fields and church grounds	Open spaces i) Schools ii) Churches	Out of six playing fields, the study took 2 playing fields i). Kisii primary field ii) Kisii national poly.
3). Stadia	Open spaces	Only one stadium i). Gusii stadium
4). Wetlands	Open spaces	Out of three wetlands the study investigated two wetlands i). Daraja Mbili adjacent to new Daraja Mbili market building ii) Sakawa next to Diplozz hotel
5). Sporting areas	Open spaces	Two sporting areas i). Kisii sports club ii). Kisii golf course
6). Public park	Open spaces	i) The people's park
Kisii Municipal Authorities	Sample population	
1. Dept. of physical planning	Three (3) Key informants (Chief officer, Director physical planning and county physical planner)	
2. Dept. of lands	Two (2) key informants director lands and county surveyor	
3. Municipal management	Three (3) Municipal manager, Environment officer and urban Engineer	
4. NEMA	One (1) county director NEMA	
5. GWASCO	Two (2) managing director and the technical manager	

Source: *Author's construct, 2021.*

3.4.1 Recreational spaces within residential areas

The study sampled a total of 80 residences and they were categorized into three; high density (Mwembe), medium density (Nyanchwa) and low density areas (Milimani). Forty residences were sampled from high density areas and out of forty, thirty three were tenants and seven were landlords. On medium density areas, out of twenty 20 residences that were sampled, thirteen were the tenants and seven were the landlords.

Finally, on the low density areas, out of twenty sampled residences, fourteen were landlords and six were the tenants. The samples were picked systematically so that they can answer the research question. The inquiry interrogated to know how they used open spaces like; kitchen garden, playing areas, washing points, flower gardens and emergency assembly points.

Figure 4: Low, medium and high residences at Milimani, Nyanchwa and Mwembe estates

Source: *Field Survey, 2021.*

3.4.2 Riparian reserves

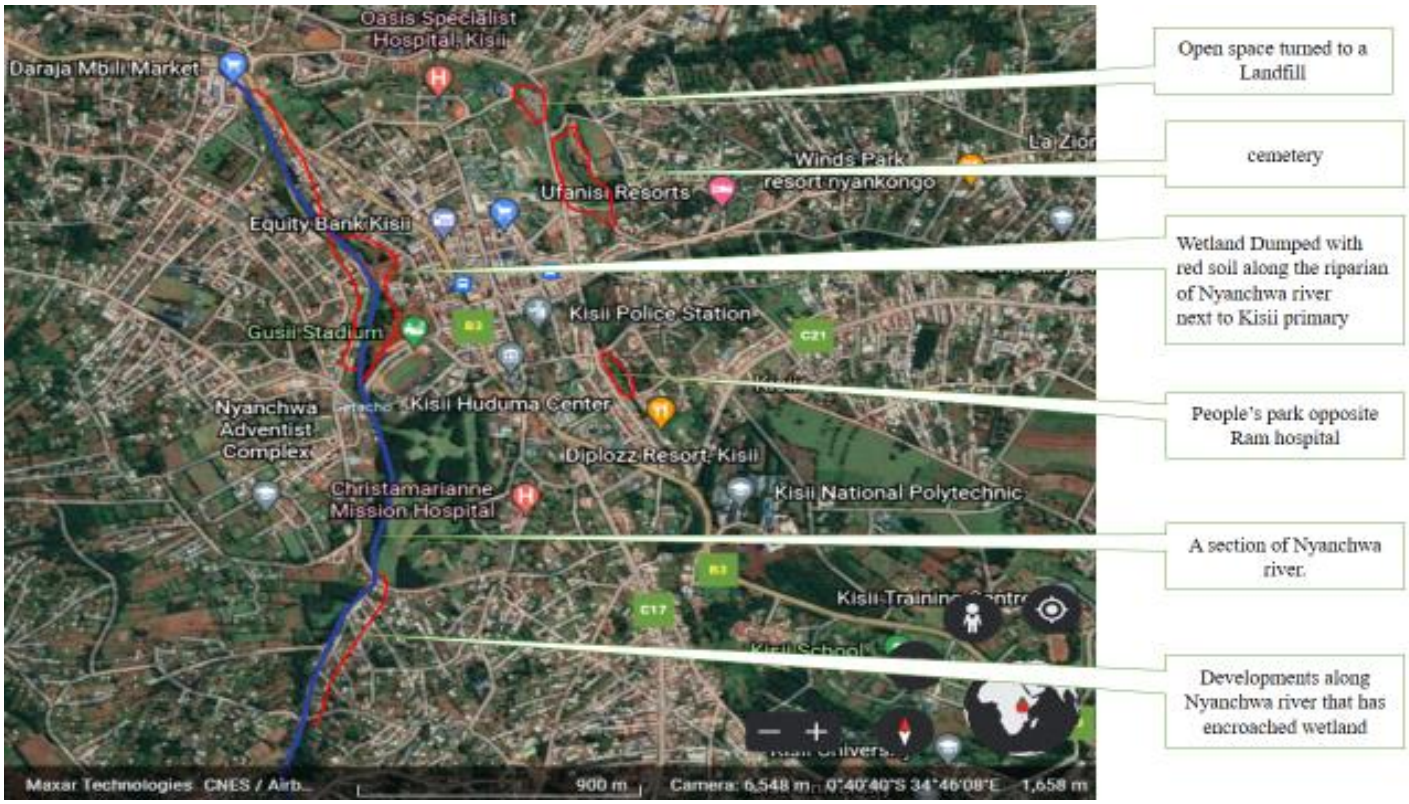
The study categorized the riparian reserves into two; roads and rivers. Out of seven rivers in the study areas, two rivers were picked which was Nyakomisaro and Nyanchwa rivers. The research picked Nyakomisaro and Nyanchwa rivers since they transected the study area on either side, hence picked for interrogation. Further, on the two rivers hat were selected the inquiry selected sections for in-depth inquiry. A section of river Nyakomisaro was picked from Daraja Mbili to Daraja Moja junction and a section of Nyanchwa river was selected from Daraja Mbili to Mwembe. The riparian land of Nyakomisaro and Nyanchwa was selected for cross-examination to establish how the riparian reserve of the two rivers are used and conserved. Further, due to resource constraints, the study selected Daraja Moja to Daraja Mbili riparian river section stretch for analysis in the years 2000, 2010 and 2020.

Figure 5: Riparian land of Nyakomisaro and Nyanchwa Rivers

Source: *Field Survey, 2021.*

The selected river sections of Nyanchwa and Nyakomisaro for the study;

Figure 6: A map showing a section of Nyanchwa river at the study area



Source: *Field Survey, 2021.*

Figure 7: A map showing a selected section of Nyakomisaro river

Source: *Field Survey, 2021.*

On the roads, out of five roads on the study area, the research picked two roads. Further, the study selected a portion of roads for in-depth investigation; Daraja Mbili to Mashauri road, Mashauri to Mwembe road and Daraja Mbili lower to Daraja Moja junction road sections. The study wanted to establish how the road reserves were used and conserved.

Figure 8: Photo showing a section of road reserve

Source: *Field Survey, 2021.*

3.4.3 Wetland

On wetlands out of three wetlands in the study area, the study selected two wetlands for its inquiry. This was because, the study postulated that, the two wetlands have been encroached by both the government and the private developers. The Daraja Mbili wetland and Sakawa wetland next to Diplozz hotel. The two wetlands were selected due to the magnitude of its challenges. The study therefore, wanted to inquire how these wetlands are used, managed and conserved.

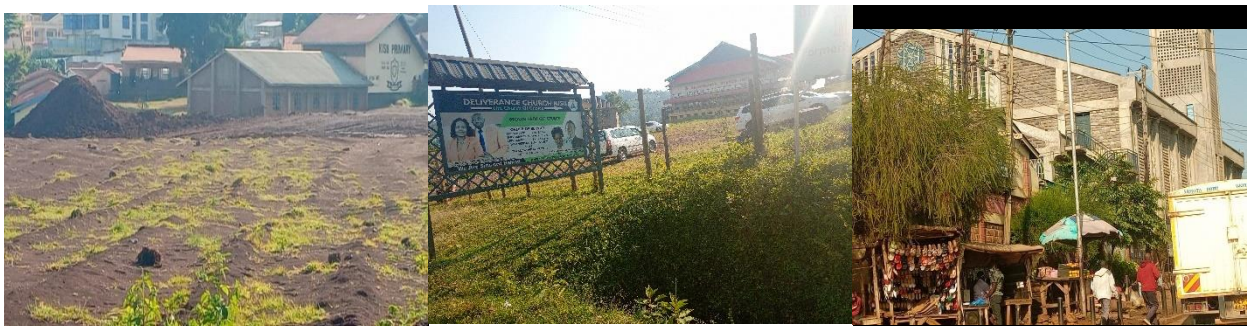
Table 3: Diplozz Hotel and Daraja Mbili market sited on wetland

Source: *Field study, 2021.*

3.4.4 Sporting areas, playing fields and church grounds

Similarly, the study went ahead to investigate the sports places which was Kisii sports club and Golf course. Further, out of eight playing fields the study sampled two which was Kisii primary and Kisii national polytechnic field. Moreover, out of five church grounds, the study sampled two which were Kisii Catholic Church and deliverance church. See below;

Figure 9: Kisii primary playground, Deliverance and Catholic Church grounds



Source: *Field Survey, 2021.*

3.4.5 Stadium

On the same spirit, the study found out that, there is only one stadium, Gusii stadium. The study interrogated to find out accessibility, use and conservation of the green space. See below;

Figure 10: Photo showing Gusii stadium at the study area

Source: *Field Survey, 2021.*

3.4.6 Cemetery

Finally, on open spaces, the inquiry proceeded to get information from the cemetery at Nyambera and the Muslim private cemetery at Nyanchwa. The motivating issue was, to find out how the cemeteries were used and maintained.

Figure 11: Cemetery converted to other urban land use activities

Source: *Field survey, 2021.*

3.5 Sampling technique

The study used systematic and cluster sampling techniques in data collection. The inquiry intended to get specific responses from specific participants (known participants) like government offices and other key informants. Equally, cluster sampling technique was relevant in classifying the green spaces that were available at the study area and putting them into clusters for easy data collection. For example, the river and roads reserves, the study only selected few for answering the research questions. Although, the techniques showed some bias but this was neutralized by the literature that was gathered during the field work.

3.6 Data collection instruments

The study used three types of instruments to collect field data and information. They were, household questionnaire, interviews, discussions, measurements and observations. On the household questionnaire, the study used multiple choice and open ended questions for the participant to pick from, rating scales and give his/her opinion concerning the research question.

The household questionnaire was used to gather information on the study objectives. They were administered to high income residential area (Milimani), Medium income residential area (Nyanchwa) and low income residential area (Mwembe). Also, the questionnaires were administered to the individuals adjacent to river riparian lands and road reserves. Finally, the questionnaires were also administered to the key informants. (The Director Physical Planning, Director NEMA, Municipal Manager, County Director of Environment, Director Trade, Director Survey, Water Resources Authority (WRA) officer and the chair chamber of commerce).

Data gathered helped to understand the opinions of the land users about green space, its status, challenges which explain the decline of green space, the trend over time and determine the effects of urban green space decline on aesthetics and environmental quality. Finally, to propose planning interventions in the use and conservation of green space within urban areas of Kisii Municipality.

The study also used observations guides. The observation was key where household questionnaire and the interviews could not capture. It was essential for observing the current land use which is within the green spaces like agricultural activity at Nyakomisaro riparian river. During the field surveys and physical examination at the study area, qualitative and quantitative elements were recorded using the observation guides. Recording the level of encroachment into the riparian reserve and road reserve, the type of activities and management of the green spaces at the study area.

The condition of green space at low and medium income residential areas were observed and compared with the high income residential areas. The study observed the threats that face the green space. An observation matrix on the different elements was filled to achieve the set objectives of the study area. Measurements were taken on Nyakomisaro and Nyanchwa riverbanks to disclose the level of encroachment and to verify whether the riparian land is maintained as it is indicated in the literature review and information from the County Director of NEMA.

Measurements were taken at the peoples' park to ascertain whether the original land space is maintained. Also, measurement of the wetland at Daraja Mbili market was taken to disclose how much space that was converted to market building and this was aided by the information from the physical planning department. The study was aided by the use of a tape measure. Taking measurements was necessary to see the trend of change of green space over time. The interview schedules were prepared to help in gathering data from the key informants. The booking for interviews was done early enough with specific days and time. Interview schedules were conducted with the Municipality Manager, Director Physical planning and County Director of NEMA on day one. On the second day, Manager Water Resources Authority (WRA), Director Lands, Director Survey, Director of Environment Kisii County, Director Trade were interviewed.

Data collected through the interviews was useful in understanding the implications of urban developments on green spaces and helped to make sustainable planning strategies to mitigate the decline of green spaces in the study area. Taking of Photographs. Photos were taken at riparian lands and activities along the strip of Nyakomisaro and Nyanchwa rivers. At the same time, photos were taken at different categories of residential areas and this was used to pin out the exact status of green spaces at various residential areas. Further, the photos were taken at the road reserve to acknowledge how green spaces has been destroyed and replaced with commercial activities along the road reserve.

Finally, photos were taken at misused green spaces at settlement areas where it's used as a dumping point for solid waste and used as open defecation points. Photo taking was used to aid in decision making on the trend and changes of green space in the study area.

3.6 Data analysis and presentation

When the field work and data collection from other sources ended, quantitative and qualitative data collected was cleaned, after which it was entered, analyzed and finally, presented using tables, graphs, bar charts, maps, pie charts, photographs, drawings and text.

The statistical package for social sciences (SPSS) was used to run descriptive analysis that gave out frequency distribution and percentages for instance the trend and changes of green spaces overtime. The qualitative data generated from observations and interview guide was organized according to research objectives and recorded in narrative form same as quantitative data presentation. Both data from quantitative and qualitative was processed to answer the research questions of the study.

3.7 Ethical considerations

This is the conduct and ethics of the researcher which refer to upholding of ethics with respect to personal privacy, confidentiality and anonymity of data, informed consent, and no deceit or lying in the course of research, while collecting, analyzing, reporting and publication of information on study subject. The study team sought consent from the Kisii County administration before embarking on the field work and taking of photos. Also, appointments were booked for key informants prior to the interview day. Further still, introduction was well done, making it clear the purpose of the study and why the study picked them as key informants. The conversation was guided by the ethical standards of the society.

3.8 Data needs matrix

In this study, this section gave a detailed explanation on how each variable contained in the conceptual framework was measured to provide relevant information required to answer study questions. The data need matrix contained research objectives; types of data needed (factors and effects of urban developments on green spaces, planning options to mitigate the changes on urban green spaces; methods of collecting the data; sources of data; data collection instruments and data analysis techniques. Lastly, data presentation techniques. A detailed data need matrix is as shown in appendix 1

CHAPTER FOUR: THE STUDY AREA

4.1 Introduction

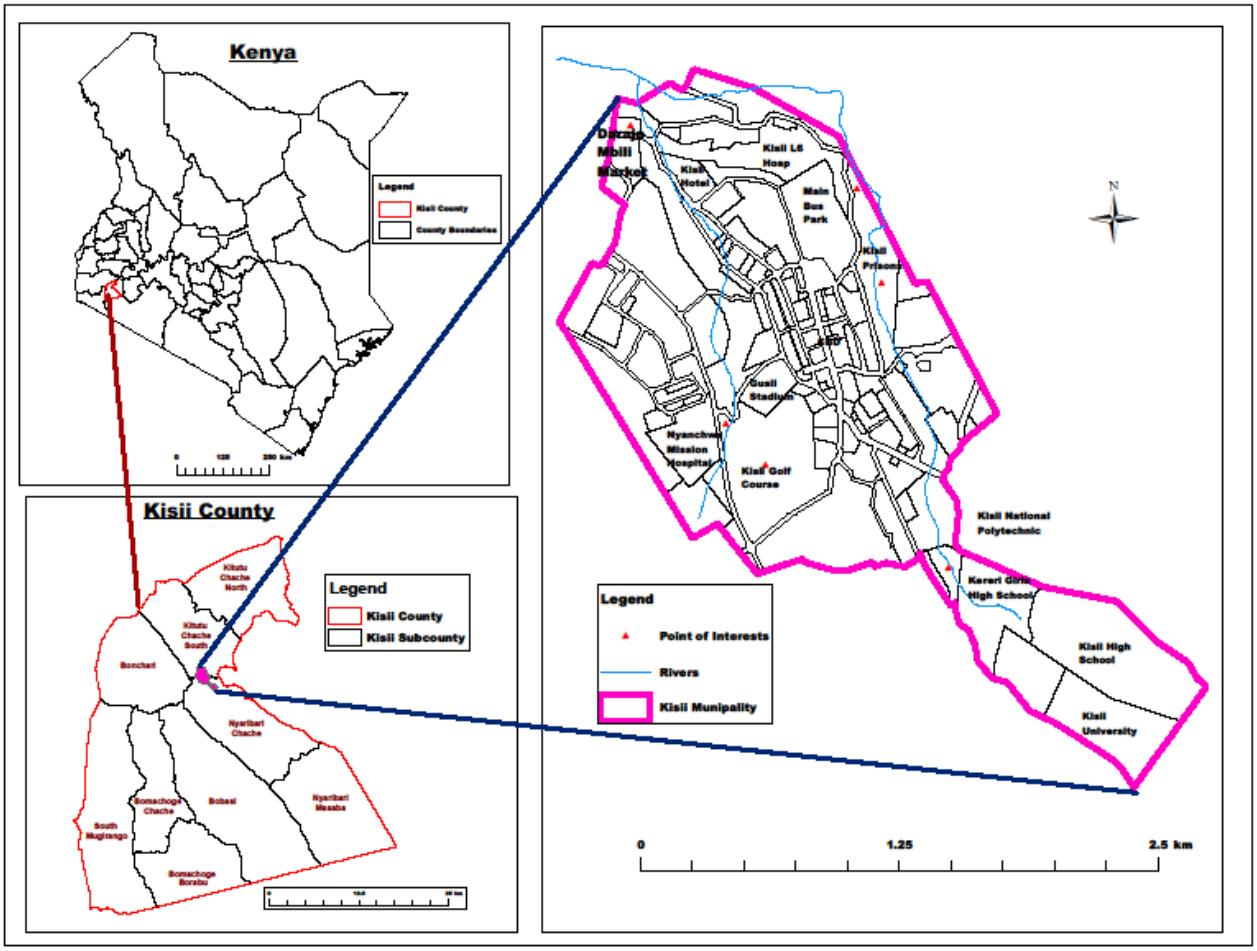
The study will focus on a section of Kisii Municipality. It will outline the location, size, demographics, climate, vegetation, relief drainage, economy and other descriptions of the study area. These features enables to describe the study area more and helps to understand the socio-economic dynamics of an area.

4.2 Background to the Study Area

4.2.1 Location and size

This study selected a section of Kisii Municipality old Kisii town central business district (CBD). It is within the latitudes 0°43'16''S and 0°39'13''S and longitude 34°26'17''E and 34°39'09''E. the study area covers 3.7km^2. The study boundary covers; Kisii central and Kitutu central wards, in Nyaribari Chache and Kitutu Chache south sub counties respectively. Old Kisii town covers a total land mass of 29km^2 as per to the physical development plan of 1971.

Figure 12: Map showing the study area



Source: *Author's construct, 2021.*

4.2.2 History of the Study Area

Kisii town started during the coming of the colonialists when British soldiers were forced to retreat from Lake Victoria by heavy gunfire from German soldiers' gunboats during pre-colonial wars. The town was originally called 'Getembe' by the Gusii people. Later, it was renamed 'Bosongo' referring an area occupied by the whites, settled in the town. The town was made the administrative centre in 1905, thereby becoming an administrative headquarters of the region then known as South Kavirondo comprising of Kisii and Nyanza Districts in 1907. Then, the town was raised to township status in 1911, with a boundary covering 8km². In 1973, it was a town council and later a municipality after its boundary extended into rural areas of Nyamataro, Nyanchwa, Menyinkwa, Gesonso, Jogoo and Bobaracho covering a total land mass of 29km².

In 1963, the town had a population of 300 people which has grown to over 80,000 people currently. Today, Kisii municipality is an attractive hub for residential, commercial, educational recreational and industrial land uses just to mention a few. Much of the town developments occur along the main highways to Kisii-Uyugis road, Kisii-Keroka, Kisii-Nyamira, Kisii-Kilgoris, and Kisii-Migori highways. This has caused the development into the interior parts of the region.

4.2.3 Demographic dynamics of the area

The study area is predominantly inhabited by the Gusii community. Other residents of Kisii municipality includes; the Indians, Arabs, Nubians, Luo, Luhya, Kuria, Somali, Kikuyu, among others (Kisii County Government, 2013). Demographic information is important in planning of essential services in an area. This is why the policy and fiscal decisions must be based on factual demographic data that addresses the needs of people. It is therefore important to understand the demographic factor of Kisii municipality in general and the study area in particular so as to address the study objectives. The study area falls within the land mass of approximately 70km². Kisii municipality had a total population of 61,892 people and Kenya population census of 2019 the municipality had a total population of 74,098 people (Kisii County Planning Unit, 2018; KNBS, 2010).

Table 4: Population of Kisii Municipality

Year	Male	Female	Total
2009	31,329	30,563	61,892
2019	37,507	36,591	74,098

Source: *KNBS, 2009 and 2019.*

4.2.4 Topographic and drainage features

The study area has an altitude range of 1600m and 1700m above sea level Jaetzold et al (2009). Kisii municipality receives rainfall almost throughout the year. Kisii municipality, the terrain rises sharply towards the Nyanchwa and Milimani hills to the South in Kisii Central ward. In Kitutu central ward to the south west, it gently slopes to Daraja Mbili and Nyanchwa lower areas. Thus most river tributaries heads towards the south feeding river Nyakomisaro passing through the inner municipality starts from hills areas in the south of the study area. The general slope of the land is from east to west with depressions and valleys.

The study area is traversed by permanent rivers which flow westwards into Lake Victoria and among the notable ones are river Gucha, Mogusii Isanta, Riana, Mogonga, Chirichiro and Iyabe Rivers.

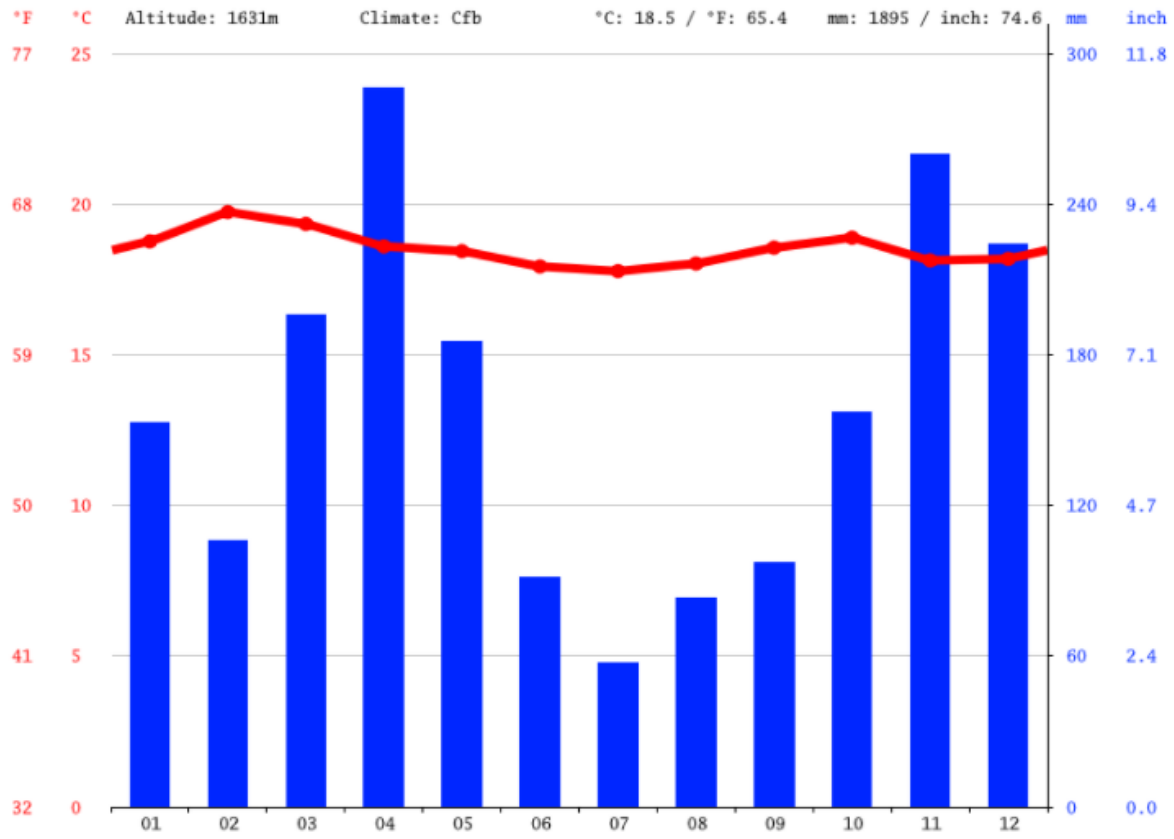
4.2.5 Geology and soil characteristics

Seventy five percent of the study area has red volcanic soils (nitosols) which are deep in organic matter. The soils of the study area has clay soils which have poor drainage (phaezems); red loams; and, sandy soils. In the valley bottoms, there exist black cotton soils (verisols) and organic peat soils (phanosols).

4.2.6 Climatic Conditions

The study area exhibits a highland equatorial climate resulting into a bimodal rainfall pattern with an average annual rainfall of 1,500mm. The long rains are between March and June while the short rains are received from September to November; with the months of January and July being relatively dry. The maximum temperatures in the County range between 21°C and 30°C, while the minimum temperatures range between 15°C and 20°C.

Figure 13: Weather distribution at the study area



Source: *Climate Data Organization, 2016.*

Humidity is the amount of water vapor in the atmosphere usually presented as a percentage. The average annual relative humidity of the study area is 87% while the average monthly relative humidity range is from 90% in April and 93% in May (Kisii meteorological Department, 2017).

4.2.7 Green spaces available at the study area

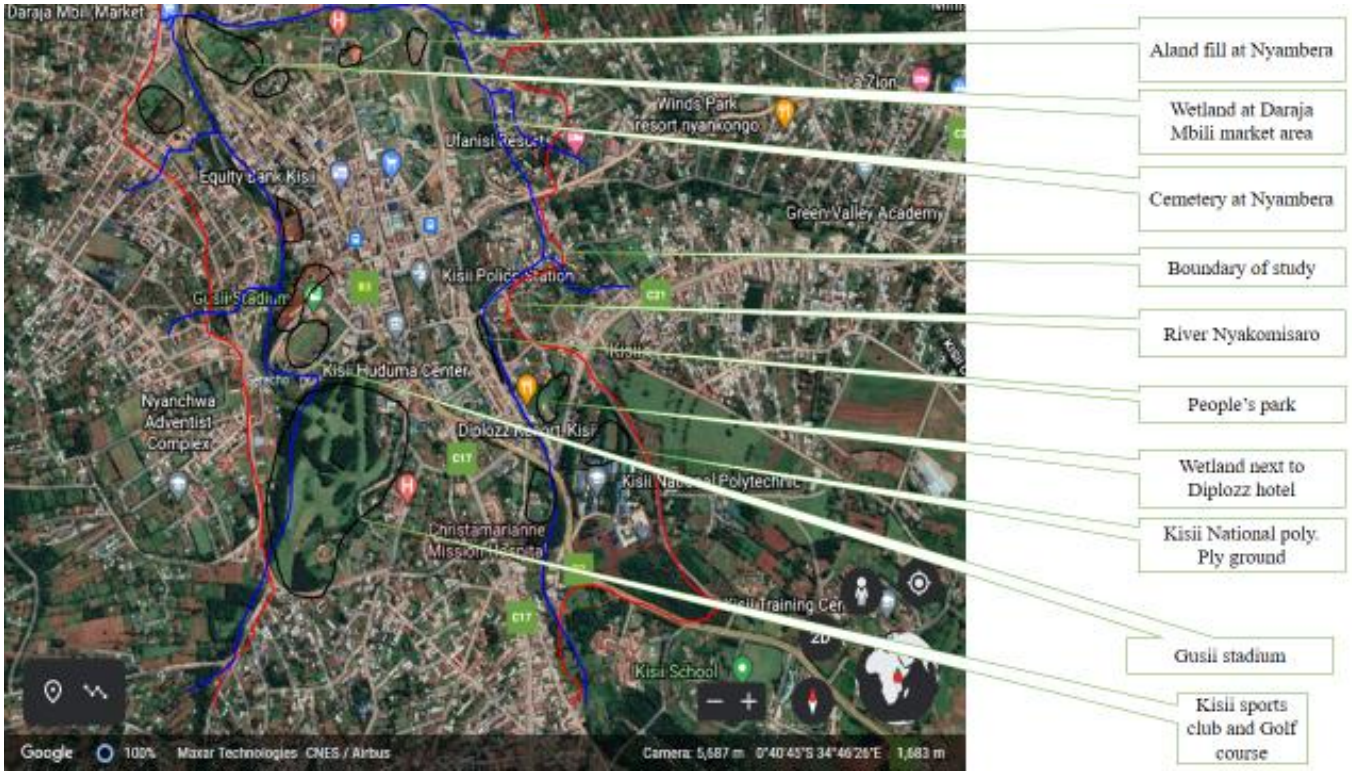
At the study area there is a diverse composition of both natural and semi-natural green spaces, of which most of the green spaces are not gazetted. The table below shows the type and location of green spaces at the study area.

Table 5: Available green spaces in the study area

Type	Example	Location
Green corridors	**a)** Riparian land of Nyakomisaro and Nyanchwa rivers **b)** Road reserves, Daraja Mbili to Mashauri, Daraja Mbili lower to Daraja Moja, Mashauri to Mwembe.	**a).** At river Nyakomisaro and Nyanchwa along the study area, **b).** Kisii Kilgoris and Kisii Keroka main roads. Both, the study has taken a section for easier inquiry. Shown on the map below.
Amenity green space	At Neighbourhood; **a)** Low density residential area **b)** Medium density residential area **c)** High density residential area	**a).** Milimani **b).** Nyanchwa **c).** Mwembe
Play grounds and outdoor sport facilities	**a)** Kisii sports club **b)** Gusii stadium **c)** Kisii Pri. and Kisii University play grounds	**a).** Next to state lodge Kisii **b).** Next to Kisii primary school **c).** Kisii primary next to Gusii stadium area and Kisii university along Kisii Kilgoris road
Parks and gardens	**a)** People's park **b)** Kitchen gardens	**a).** Opposite Ram hospital **b).** At residential neighbourhoods; Mwembe, Nyanchwa and Milimani areas
Natural and semi natural green spaces	**a)** Urban agroforestry **b)** Wetland	**a).** Between sonic hotel and the place hotel **b).** At old Daraja Mbili open air market, next to new market building along Nyakomisaro at Diplozz hotel and along Nyanchwa river behind Gusii stadium and Kisii primary school.
Open spaces	**a).** Cemetery; Nyambera cemetery **b).** Church grounds; Kisii central church (SDA), Kisii catholic church and Kisii deliverance church **c).** Landfills	**a)**. Along Nyakomisaro river opposite Kisii referral hospital mortuary. **b).** Opposite Kisii hospital mortuary, opposite Kisii jumbo hardware along hospital road and next to Kenya medical training college. **c).** at Nyambera area, next to the cemetery opposite Nyambera primary.

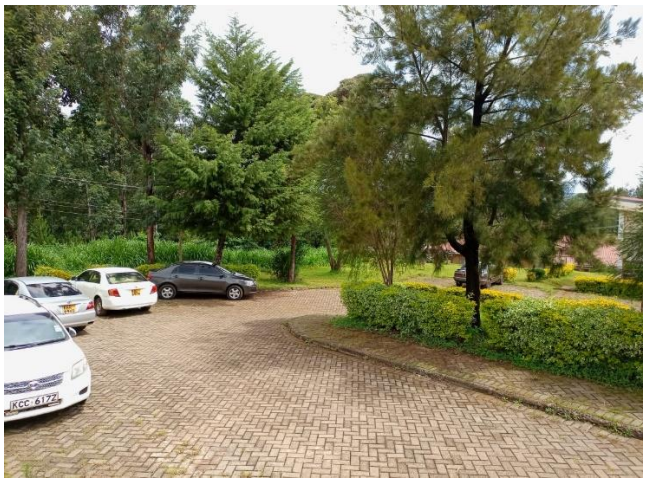
Source: *Field Survey, 2021.*

Figure 14: Map showing available green spaces in the study area



Source: *Field Survey, 2021.*

Figure 15: Green spaces at low density residential neighbourhoods at Milimani



Source: *Field Work, 2021.*

4.2.8 Energy Access

The main sources of lighting in the County are paraffin, solar and electricity. According to 2015/16 KIHBS Basic Report, 56.9 percent of households use paraffin, 29.5 percent use electricity, 12.3 percent use solar, 0.3 percent use generator, and 1.0 percent use other forms of lighting. The high dependence of kerosene has led to high respiratory tract and eye infections due to the fumes.

The report further indicates that 76.3 percent of households use firewood as a source of cooking fuel compared to 54.6 percent nationally, 10.3 percent use charcoal, 6.8 percent use Liquefied Petroleum Gas (LPG), 4.3 percent use kerosene, 1.0 percent use electricity and one percent use other forms of energy. This higher usage of firewood has led to the depletion of forest cover which has negatively impacted the environment. At the study area, the 49.3 percent use charcoal, 27.9 percent use fuel wood, 21.2 percent use Liquefied Petroleum Gas (LPG), 9.5 use paraffin and 3.7 use electricity.

4.3 Settlement patterns

There are two types of settlements in the study area; clustered and scattered. Whereas clustered settlement is predominant in urban areas, scattered settlements are on the boundary of the study area. However, Kisii municipality has witnessed ribbon type of development along the major highways creating centres which pose challenges in massive destruction of green spaces along the road to create space for unplanned developments like kiosks, vending and hawking places and shoe polishing activities that are adjacent to residing places. These activities have posed a challenge in service delivery especially in waste management, water network, power lines, communication cables, sewerage network and accessibility during emergency which is very poor.

4.4 Transportation

The study area is made up fairly good road network comprised of all-weather roads. The main highway, Kisii - Kilgoris passing through the study area from inner municipality is tarmacked. It covers a total distance of 3.18km long in the study area. The rest of the roads classified as rural access are all murram and tarmacked, road transport is the only mode of transport in the study area.

4.5 Water supply

The study area is supplied with water by Gusii Water and Sanitation Company (GWASCO), the supply is not enough Kisii county government planning (2018). There are a number of borehole dug in the study area which supplements the supply especially at the central business district. Also, there is water springs, rivers and shallow wells that supplies equally water to the study area.

However, clean and safe water for use is mainly from the GWASCO which is not adequate. The nearby water sources of river Nyakomisaro and Nyanchwa are contaminated by raw sewage that is directed from the residential houses at the riparian areas.

4.6 Waste management

Solid and liquid waste management is under two departments. The solid waste is managed by the environment department in municipality and liquid waste is handled by Gusii water and Sanitation Company. Solid waste, is managed by the county government by the department of Environment. The waste is collected from designated holding bays where the county has directed the residents to orderly place for later picking by the waste trucks.

The solid waste management has zoned the study area into three zones that are management by the casuals who load the waste into the trucks for dumping. The county has no formally area for waste dumping, the usual area for dumping was decommissioned by county NEMA office in the year (2016) due to sanitation and management issues. The study area is not well covered with the sewerage network, some areas use septic tanks to dispose of their liquid waste in the event the tanks get filled up, and they contact the private exhausters for exhausting service for owner cost.

4.7 Communication services

The study area no longer uses the old communication facilities. Mobile communication takes lead and the residents are subscribed to the following networks; Safaricom, Telkom, Airtel, Orange and YU. The study area uses Faiba and fibre optic cables for data networks for browsing and networking. Also, the residents receive news through the television signet, Pang, STV and other network enabled system.

4.8 Infrastructural facilities

In the study area there are a number of infrastructural facilities like; public administration; Kisii county government, Kisii central police station, Kisii law courts, Kisii anticorruption offices,

health; Kisii Teaching and referral hospital, Nyanchwa hospital, Kisii Eye hospital, Ram and HEMA among others, recreation like Kisii stadium, Kisii sports club, people's park Kisii, churches; Kisii central, Kisii New life, education; Kisii University, Kisii school, Kisii national polytechnic and emergency services.

4.9 Economy

The economy of Kisii Municipality is derived from commerce and agriculture. Crops and fruit cultivated around the area include maize, managu, beans, bananas, pineapples, avocados, pawpaws etc. the Municipality is dotted with tall commercial buildings and is ever-bustling with activity. The Municipality is the fastest growing in western Kenya due to its high population, political stability and general tranquility. New businesses are steadily being installed. Other components are in food processing, health care and education. Although it has are few industrial activities, it has potential for larger agro-based industries due to its location in a rich agricultural area. There are large supermarket chain stores, e.g., Naivas, Shivlings, Kisii Matt, Best Choice and Tursky's. Besides, it hosts Central Bank Branch and 19 commercial banking and financial institutions' branches. These include the long-existing;

- Kenya Commercial Bank (KCB), Barclays Bank, National Bank, Post Bank, Co-operative Bank (two branches), Equity Bank , I&M Bank
- CFC Stanbic, Credit Bank, Kenya Women Finance Trust Bank, Family Bank
- Chase Bank , Eco-Bank
- Diamond Trust Bank, K-Rep Bank

Which have taken advantage of the large population and the positioning of Kisii as an increasing commercial hub town. Mwalimu Cooperative Savings & Credit Society Limited (Mwalimu Sacco), the largest Sacco in Kenya, it has a branch in Kisii. Moreover, like many of Kenya's major urban centers, there is an influx of numerous other business ventures such as the hospitality sector with hotels, bars, restaurants, sports pubs, among other commercial activities.

CHAPTER FIVE: RESEARCH FINDINGS AND DISCUSSIONS

5.1 Introduction

This chapter discusses results and findings of data analysis on the trends, factors and their effects on the use and conservation of green space in urban areas. Further, it provides a detailed planning options for the mitigation of the effects of declined green space in the study area.

5.2 Trend and magnitude in changes on urban green spaces

This study sought to address the first research question which was;

What is the trend and magnitude in changes on green spaces in the study area?

To answer this research question, the research made use of a physical development plan of Kisii municipality (1971) as the reference point for the determination of any changes to green spaces in urban areas of Kisii municipality. Further, a digitization of the municipal plan was done to establish the green spaces which were available in the municipality. This was followed by the actual site visit and measurements to confirm the actual green spaces for use and conservation in the study area. Moreover, household questionnaire was administered to obtain information in respect to trends of the study. Furthermore, field observations and photographing to capture any changes on the green spaces was equally done. From this discussion therefore, the proceedings are the discussion of the results and findings of the study.

From the Kisii municipality physical development plan of 1971, the study established that 186.9 acres of land within the study area was allocated to recreational use. These include river and road reserves, sporting areas, cemetery, Public Park, stadia and wetlands. Other areas within the area of study which this study considered for further inquiry included recreational spaces within the residential areas which were categorized into high, medium and low.

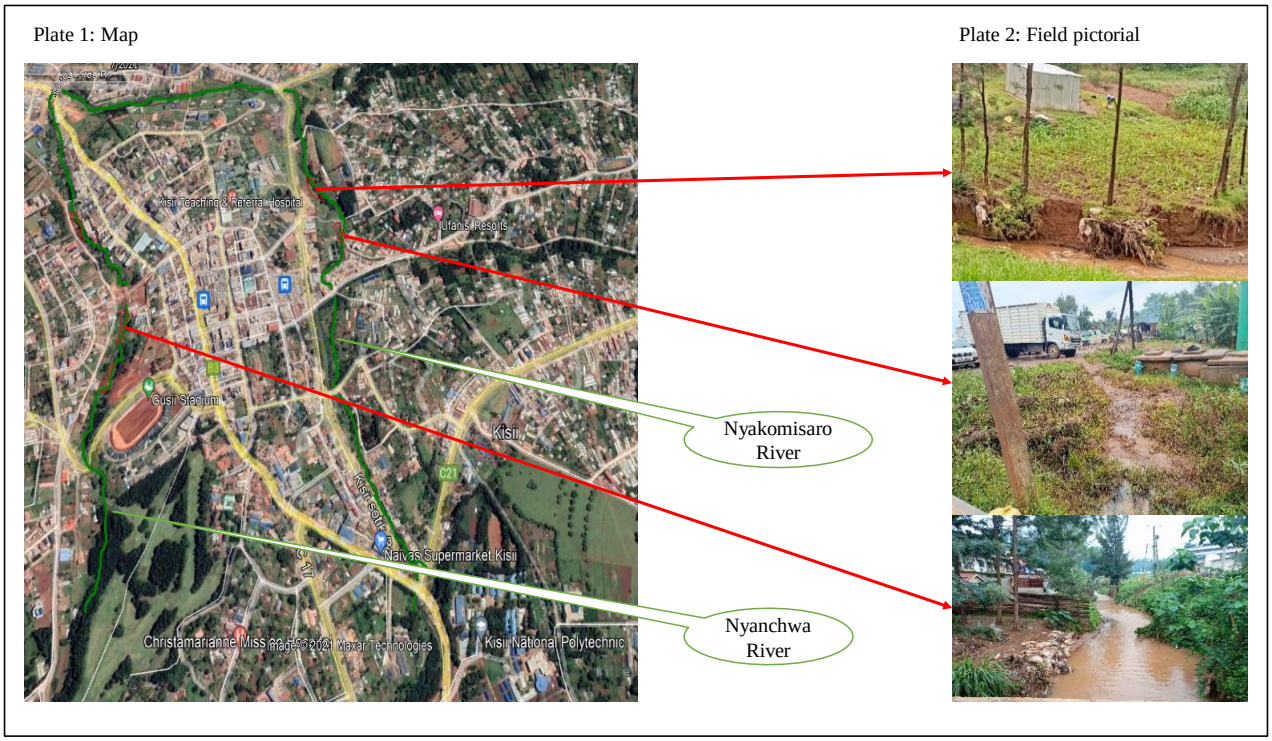
5.2.1 Riparian land

a) River riparian areas

The study categorised riparian land into two. These were river and road reserves. The area of study is traversed by two rivers namely Nyanchwa and Nyakomisaro. These rivers are permanent with approximate width of 3m to 6.5m. On Nyanchwa the study selected from Daraja Mbili to Mwembe lower and Nyakomisaro from Daraja Moja to Daraja Mbili area. The study noted through observations that, along river Nyakomisaro, there were car wash, crop farming and residential activities. To start with, the study noted a residential house which was built on the riparian area.

Through the study observations and later confirmed by the inquiry measurements, it was revealed that, the structure was approximately 1.5m into the water stream. Equally, the residence was fenced blocking the access to the other side of the riparian area. On the same note, the research noted that, there was another permanent private structure which was used for commercial (Diplozz restaurant). On taking measurements to ascertain the level of encroachment of the property into the riparian land of Nyakomisaro, the study revealed that, only 2 metres were left into the water stream. Still, the inquiry revealed that, there were permanent and semi-permanent structures which were introduced to accommodate car wash activities in the year 2017. For instance at Daraja Moja, along the riparian area, the study noted several car wash points along the riparian stretch, for example, at Daraja Moja, along river Nyakomisaro. Figure 17 Plate 1 shows the map and location of the car wash, residential activity and agricultural activity while plate 2 indicates a pictorial presentation of the activities.

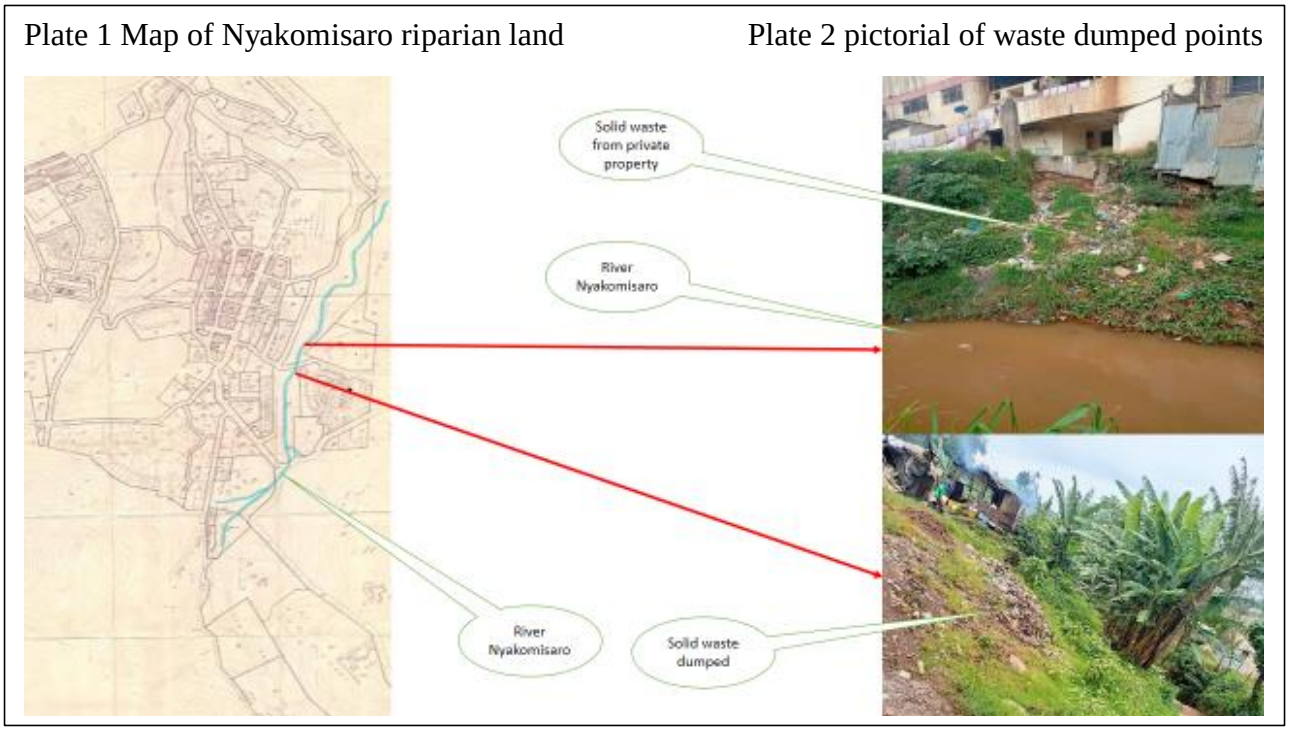
Figure 16: Showing urban land uses on riparian land of Nyakomisaro river



Source: *Field Survey, 2021.*

Further, through the study observations along the Nyakomisaro riparian land stretch at Masosa area and bridge to Kenya prisons road, it was noted that, the riparian land was misused by dumping solid waste. However, on in depth interview with the land owner where the dumping of solid waste was done, the inquiry noted that, the open space which was used for collecting solid waste was taken by a private developer who fenced it as a private property on the year 2019. Thus, the residential areas were lacking a dumping point awaiting for county government collection for disposal. Figure 18 Plate 1 shows the location of the misused riparian area while plate 2 indices the pictorial points.

Figure 17: Showing the dumping of solid waste along the Nyakomisaro river



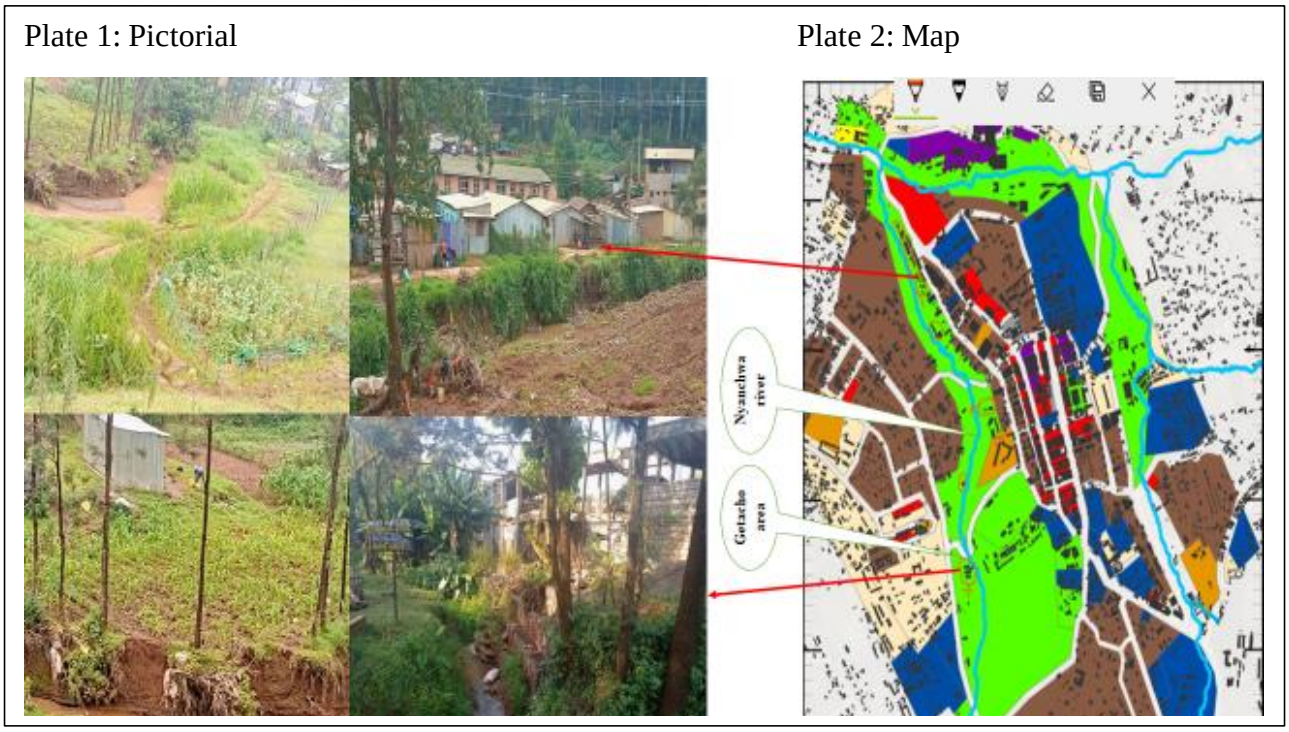
Source; *Field Survey, 2021.*

The research proceeded to Nyanchwa riparian area. Through the study observations, it was revealed that, crop farming, eucalyptus tree planting, permanent and semi-permanent structures for both residential and worship were noted. For example, at the Kisii new life church, it was revealed that, there were eucalyptus tree plantations along the riparian stretch of Nyanchwa. Though, the tree planting was okey according to the study, but the eucalyptus tree causes more harm than good thus, the intended purpose is no harnessed due to its detrimental effects to the riparian area. Further, the trees were fenced blocking the accessibility for the general public use. On further interrogation with the land owner, the study revealed that, the trees were given by the Kenya forest service which ended up being planted at the wrong site. Further, the study observed that, at Daraja Mbili along Nyanchwa riparian land, there was maize and kales planted.

Through the measurements by the inquiry, it was revealed that, only 1metre was left into the river stream for kales and for maize other points were actually eroded by the river stream. Moreover, at Nyanchwa Getacho junction, the inquiry noted that, a permanent building was done for worship purposes. Through the study measurements, it was revealed that, the church structure had left only two metres into the river stream of Nyanchwa.

Figure 19 indicates; plate 1 pictorial points along riparian land of river Nyanchwa and plate 2 shows the map and locational context of the urban land uses on the riparian land of Nyanchwa river.

Figure 18: Encroachment of urban land use activities along river Nyanchwa riparian land



Source: *Field Survey, 2021.*

The study traversed to road reserves. Through the study observations it was noted that, permanent and semi-permanent structures were noted along the road reserves in the study area. For example, along the Daraja Mbili to Mashauri road reserve, there were installed kiosks, roadside garages, solid waste dumping points, Boda Boda shades and shoe shinning activities which were within the road reserve. For instance, the study observed that kiosks were installed at many points fronting the road especially at old Kisii Kisumu stage. Equally, garages were spotted next to Kisii Juakali and the Kisii mosque area which the study felt that it was blocking the pedestrian walk ways. At the same note, the study noted that, at opposite the county offices, the study noted a shoe shinning activity.

Figure 19: Showing urban land use activities on road reserves

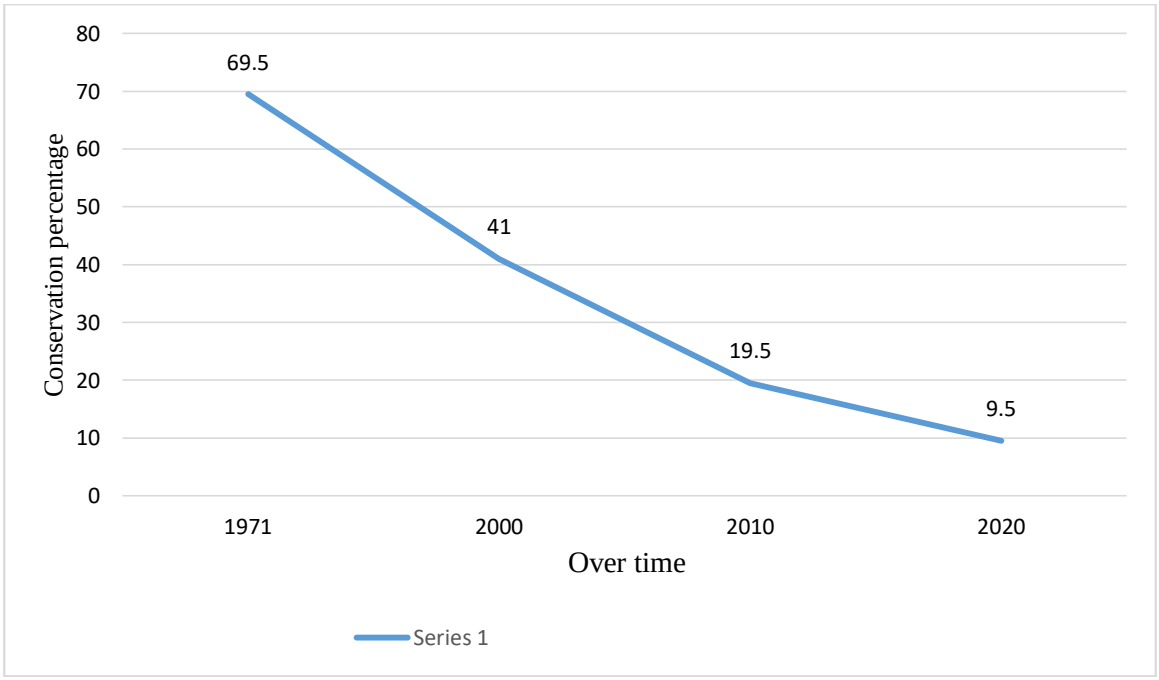
Source: *Field Survey, 2021.*

Further, the study carried the investigation to Daraja Mbili to Daraja Moja bypass (Lower) and it was noted that, car wash activities, Boda Boda stages and shoe shinning activities were common. For example, at Dara Moja junction, there was a concreted structure for the activity which was introduced in the year 2017 according to the study inquiries. However, on inquiring from the physical planning official, it was noted that, the structure was done on 2017 by the incumbent member of county assembly when the elections were almost to be conducted. Still, on inquiring from the google earth for previous years, it was noted that the structures were not available. Equally, the study observed that, there were a number of Boda Boda stages along the road reserve. Although the Boda Boda activities generates income, the study noted that, they were blocking the land owners from accessing their properties. At the same note the study observed a landfill along the road at Makutano junction opposite Nyambera cemetery. Figure 21 indicates plate 1 which shows a map and the locational context of the Daraja Mbili to Daraja Moja bypass and the misused road reserve and plate 2 indicates pictorial sites.

Figure 20: Showing misused road reserve of Kisii Bypass

Source: *Field Survey, 2021.*

Figure 21: Graph showing the conservation trend of riparian land use over time



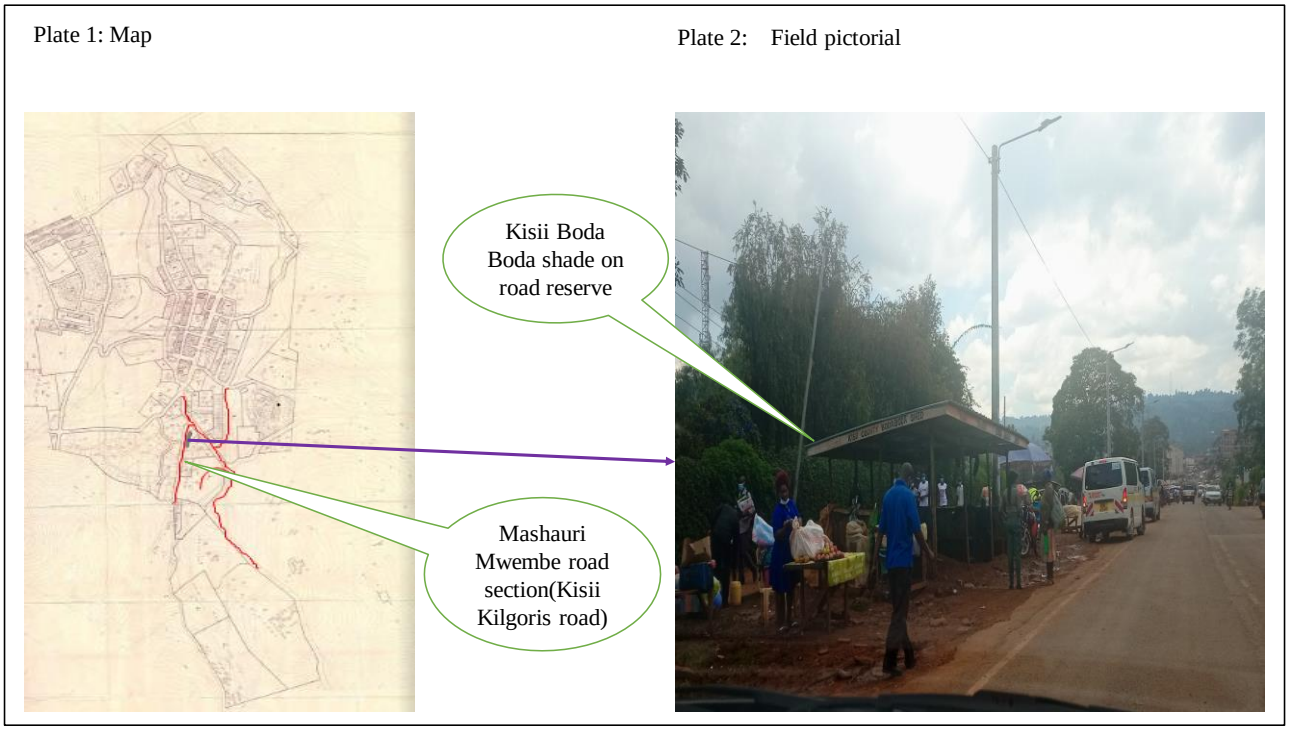
Source: *Field Survey, 2021.*

Graph 22 indicates that there were 69.5% urban green spaces which available in the year 1971 when the study area was planned. However with time the degradation of urban green space was equally observed by the inquiry highest being noted between the years 2000 to 2020.

b) Road reserves

Road reserves act as puffer zones in urban areas. For instance, they provide a space for public utilities like power lines, communication cables, water and sewerage network. Contrary to the well-known functions the study found out that the urban residents prefer using the riparian reserve for; installing kiosks, car wash activities, shoe shining, road side garages, hawking and vending, solid waste dumping and motor bike shades. The study acknowledged that all these activities were done between 2010 to date. The inquiry further noted that, before the years (2013/2014), the selected section of a riparian reserve had no such activities or they were very minimal. However, some activities on the road reserves, the study found out that, most of them were county government sponsored. Specifically, the investigation noted from the inquiry that, the construction of Boda Boda shades along the road reserves were done by the county executive officials in the electioneering year of 2017 to attract more votes to their political side.

Figure 22: Boda Boda shade on road reserve



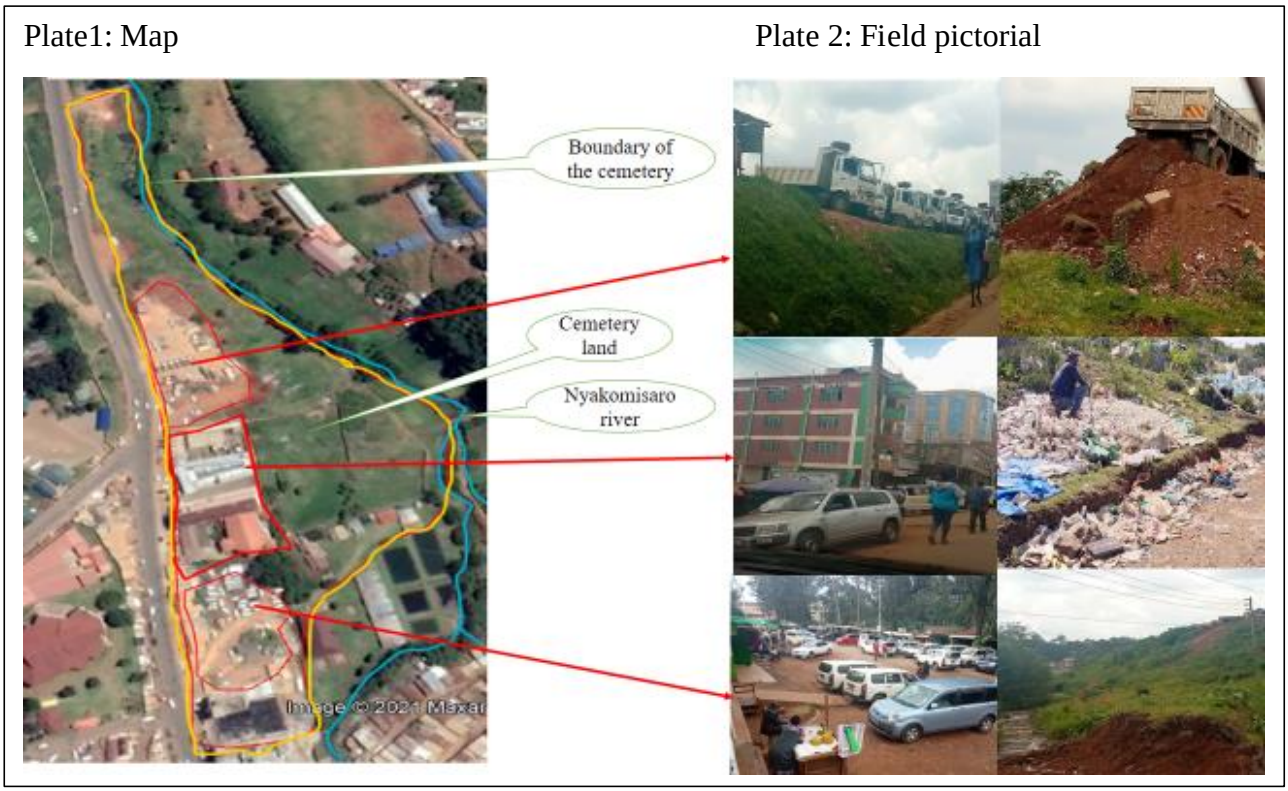
Source: *Field Survey, 2021.*

5.2.2 Cemetery

The study established that, there was one cemetery land which was used by the general public. The inquiry revealed that, the area is managed by the county government and originally, it was approximately 8.15 acres of land when the municipality was planned in 1971.

Through the study observations, it was noted that, other urban land use activities had encroached the cemetery land. These were; car wash activities, dumping of solid waste, garages, permanent and temporal residential and commercial buildings, kiosks for commercial activities and parking lots for vehicles and Lorries. Further, the inquiry noted from key informants that, the cemetery ground was fenced till the year 2016 and it was demarcated into sections; Christians, Muslims and Hindus where they could bury their dead. However, when the Muslims purchased a piece of land at Nyanchwa, the political class went in for the Muslim cemetery section which was subdivided amongst themselves and converted it to private properties like Mwamotumbi building and Stage plaza. On further inquiry, the study noted that, Mwamotumbi building was built in the year 2017, by the incumbent member of county assembly and the chairman for the urban development committee in Kisii county assembly by then. Further, in the year 2019, a section of the cemetery which was fenced was vandalized, kiosks were lined up and dumping of red soil to accommodate Nyamataro parking slot for Matatus, Lorries and tippers for sale of building materials.

Figure 23: Showing urban land use activities on cemetery land at the study area



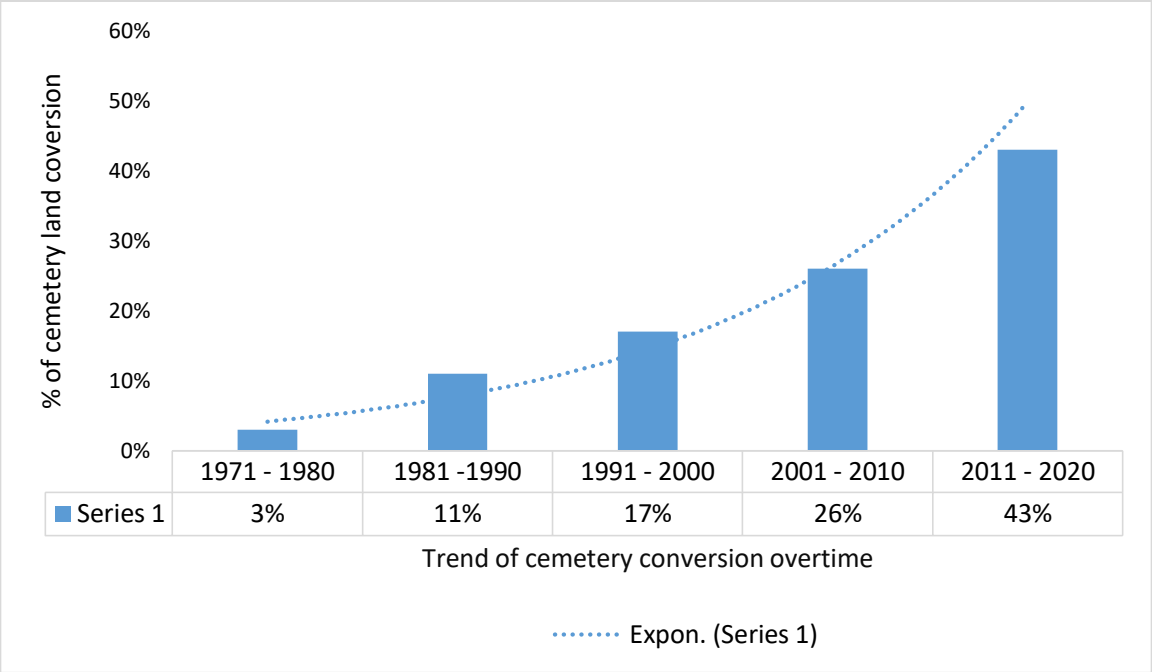
Source: *Field Survey, 2021*

The inquiry through measurements, it was established that, 0.84 acres of cemetery land had been already converted into garages by the year 2016. Further, in the year 2017, permanent and semi-permanent buildings had taken 0.95 acres of land, car was activities had also taken 0.47 acres of cemetery land and 0.56 acres of land had been converted into parking lots for Matatus and lorries for sale of construction materials by the end of the year 2019. However, on an in depth discussion with the physical planning official it was established that, all developments on the cemetery land was done with impunity and no developer had development approvals from the department and this findings agreed with the sentiments from the office of lands and survey.

Moreover, through the study inquiries, the research investigated on the rate of conversion of the cemetery land over time. This was done from the reference point when the municipality was planned in 1971. The results indicated that, between the years 1972 to 1980, the conversion rate for the cemetery land was 3%, 1981 to 1990 the rate was at 11%, 1991 to 2000 was at 17%, 26% was between the years 2001 and 2010. Finally, 2011 to 2020 the rate was at 43%.

The study therefore linked the decline of cemetery land with time. Possibly, the study postulated that it could be because of weak enforcement of development controls.

Figure 24: Trend of cemetery land conversion to other urban land use activities



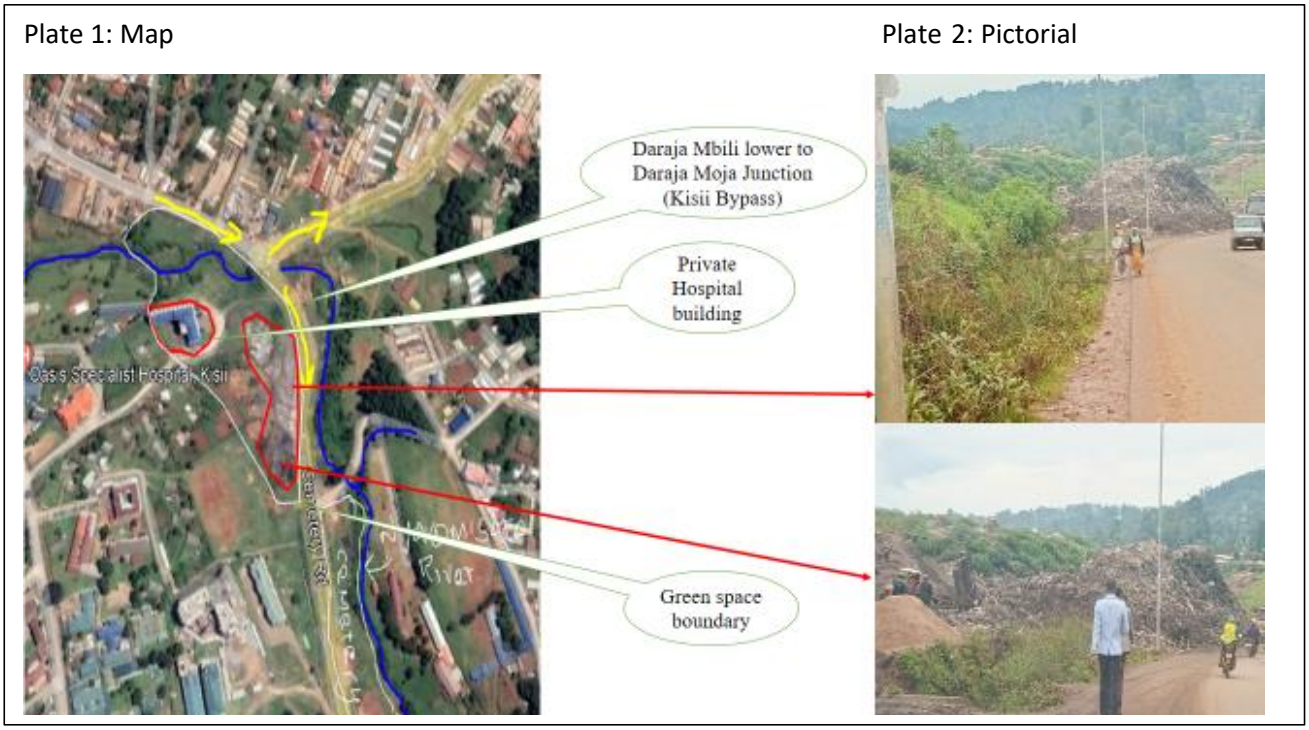
Source: *Field Survey, 2021.*

In graph figure 25 it showed that, the cemetery land conversion increased over time worst being between the years 2010 to 2020 (26% to 43%) and the study anticipated that this could be due to political influence, impunity and fraudulent means in acquiring the cemetery space. Besides the cemetery land, the study traversed into an open space which was directly opposite the cemetery land and adjacent to the quarry mining activity. It was observed that, the space was used as a land fill for all the municipal waste.

On further, interrogations with the county official who was present at the dumping area, the study noted that, the space was claimed as a private property by a developer who had built a private hospital which was operational. However, on further inquiries from the physical development plan of 1971, the study noted that, the space was meant for recreational purposes. Moreover, on an interview with the planning official, the study noted that, even though the space was converted and used for other different urban land uses, the developer had no legal documents and this findings agreed with the results attained from the lands office. Equally, the study noted that the space was approximately 8.34 acres of land by the time the town was planned in 1971.

However, the landfill had taken 1.78 acres of land, and the private developer for the hospital 0.92 acres leaving 5.64 acres of land by the year 2021. Figure 26 indicates plate 1 which shows the google earth map of the open space and the locational context while plate 2 shows pictorial status of the other urban land use.

Figure 25: Showing urban land use activities on open space at Nyambera area



Source: *Field Survey, 2021.*

5.2.3 Playing fields

The study noted that, most of the fields within the research area were maintained well. However, on interrogating the management on specifically Kisii primary school and Kisii national polytechnic on how they use and maintain these playing grounds.

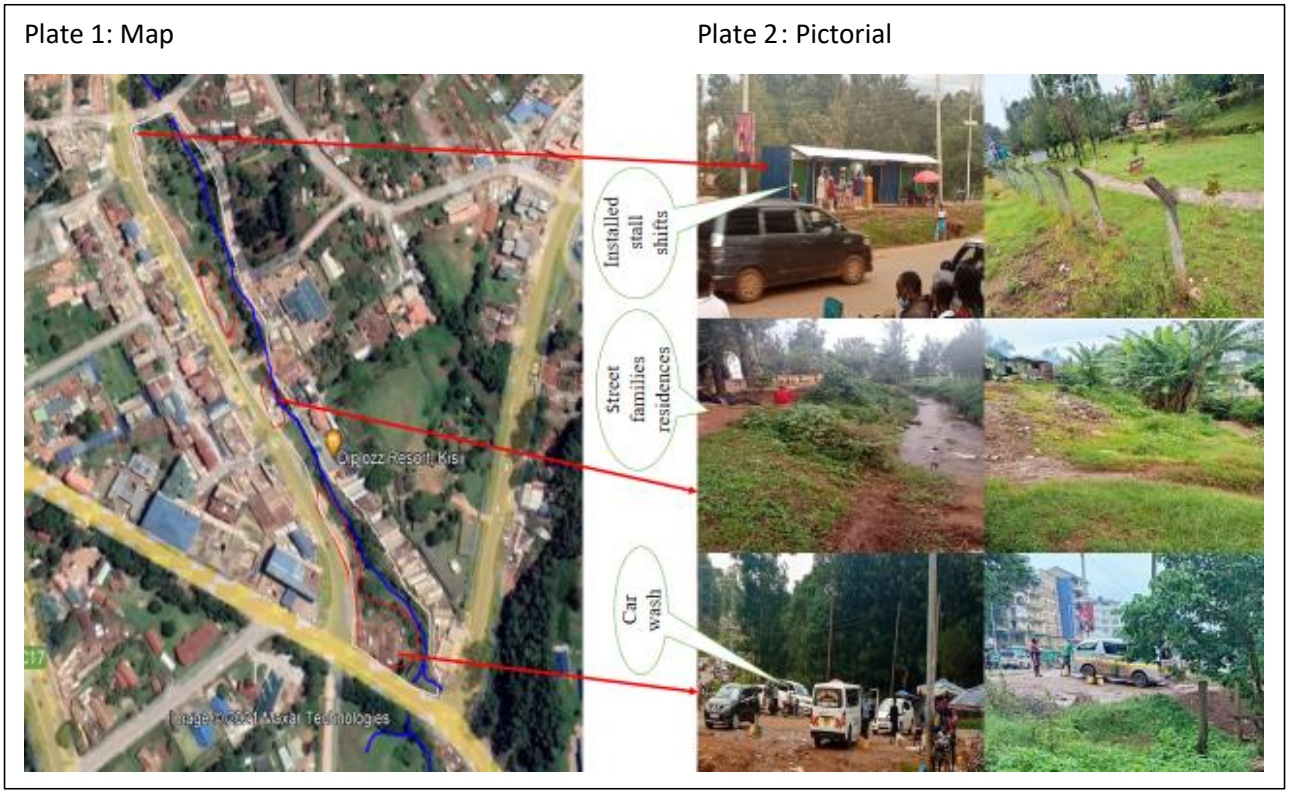
The study specifically inquired on Kisii primary playing ground. The study noted from the records retrieved from the office of physical planning and lands that, there were a total of 3.7 acres of land when the town was planned in the year 1971. But through the study observations and inquiries from the management, the research revealed that, there were approximately 2.7 acres of land as of the year 2018. These findings agree with other studies which were found at the survey office and the ministry of education when they were conducting a survey to issue tittle deeds to all public schools.

On further interrogations with the management official of the school, the study noted that, the outgoing leadership fraudulently subdivided the school land which was demarcated for future expansion to an Asian developer in the year 2012 when the devolution was about to take effect. This finding was acknowledged by the study observations and the study investigations.

5.2.4 Public park

The study traversed to an open green space which was called people's park. Through the study measurements, it was established from the physical development plan and google earth images that the area was approximately 4.78 acres of land. However, through the field observations, it was noted that, some sections of the space were well fenced and installed with resting benches while the other end was under other urban land use activities like; car wash, street families residences, dumping of solid waste and other portion the inquiry revealed that it was being reclaimed by the county government. Through the study measurements on the ground, it was noted that, the car was had misused 1.3 acres, residences for street families had taken 0.3 acres cumulatively and dumping of waste 0.87 acres of land.

Figure 26: Showing urban land use activities on people's park green space



Source: *Field Survey, 2021.*

However, on in-depth discussion with the planning official the study established that, the green space at people's park was being reclaimed. The inquiry noted equally from the official that, there were no developments in the year 2000 up to the year 2010. Though at the year 2015, the study revealed that there were developments which were temporary at the green space.

On the year 2019 the study was notified that, a multi-agency team was created by the county government and the national government agencies to clear the Nyakomisaro River which foresaw a lot of illegal structures being demolished especially at the people's park. Figure 28 indicates plate 1 Map and locational context of the people's park green space and plate 2 showing field pictorials which were taken.

Figure 27: Showing the trend of urban land use activities over time on Public Park

Source: *Field Survey, 2021.*

Although the study observed car wash activities and handcarts for water vending activities, the green space area reclaiming was at advanced stage. Through the google earth inquiries by the study, it revealed that very few urban land use activities which were noted at the people's park green space.

5.2.5 Stadia

The study found out that, there was a public stadium called Gusii stadium. Through the study inquiry from the physical development plan of 1971, the inquiry revealed that the stadium land was approximately 9.85 acres.

Through the field observations, the stadium was protected by the perimeter wall all its demarcated land. Equally, it was noted that, the field was under major renovations and this was confirmed by the sports official at the county government. Also, at the far end at the gate A, there were demolished structures which the study revealed that, they were illegally constructed on the space demarcated for other sporting activities. Moreover, through the satellite images of the year 2000, the study revealed that, the encroachments were high since the stadium was not protected.

Further the study learnt that, not only the county government had demolished hotel structures at gate 'A' but also they demolished other structures which were illegally done to accommodate residences, agricultural show case crops, private ablution block, car wash and garages. The research revealed that, the structures were not only built by the county residents but also some were owned by the county officers. Figure 29 shows the map and locational context of the stadium and plate 2 indicates the pictorial of the urban land use activities within the stadium space.

Figure 28: Photos of Gusii stadium at the study area

Source: *Field Survey, 2021.*

Additionally, the study noted from the county physical planner that, all these stadium works were facilitated when the county was preparing to host inter county sports activity in the year 2016.

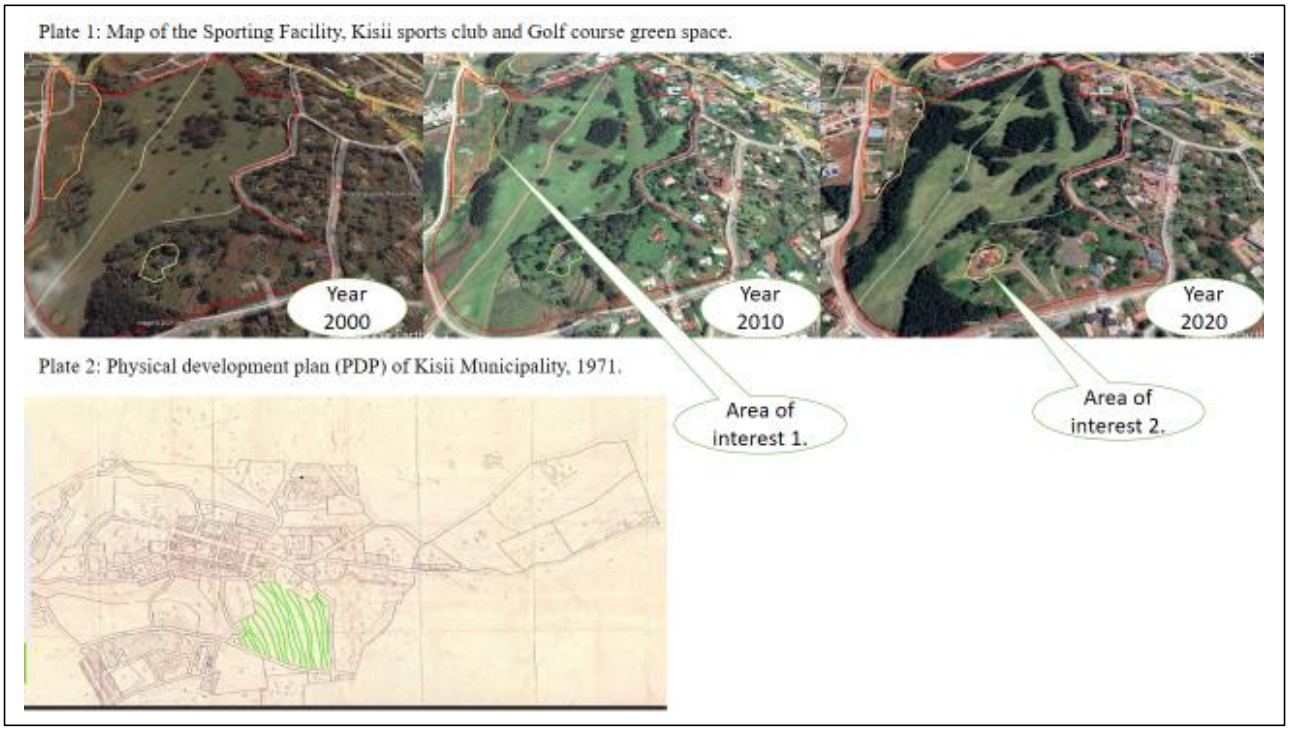
Although, the protection of the stadium was a noble idea, the study noted that, accessibility to the general public was a challenge thereby downgrading the essence of the stadium.

5.2.6 Sporting areas

The study revealed that, there were only one sporting facility which had Kisii sports club and the golf course within the same space. From the physical development plan of 1971 when the municipality was planned the space was measuring approximately 75.47 acres of land. Also, the inquiry through Google earth images revealed that, the demarcated space was not protected till 2012. Equally, the Google earth images of the year 2000, 2010 revealed that very minimal permanent and semi-permanent structures were within the demarcated area.

Further, from the sporting official at the site informed the study that, at the inception of the county government, some areas which were designated for the sporting activities were taken up in the year 2016 for building residential houses for the county and national executive. On the same breathe, part of the golf course space was used to build a presidential lodge indicated figure 30 at plate 1 as area of interest 2 which followed by other residences for the security personnel as indicated in the map. On worse scenario the study noted from the satellite images of the years 2000, 2010 and 2020 that a big portion of land which was demarcated for golf course activity according to the physical development plan of 1971, the stretch of approximate 8.67 acres of land from Nyanchwa junction to Mashauri Bypass road up to the entry of the presidential state lodge gate ‘B’ which the study noted was under massive construction for residential and commercial land uses indicated at plate 1 as the area of interest 1.

Figure 29: Trend in the use of the sporting facility in Kisii municipality.



Source: *Field Survey, 2021.*

5.2.7 Recreational spaces within residential areas

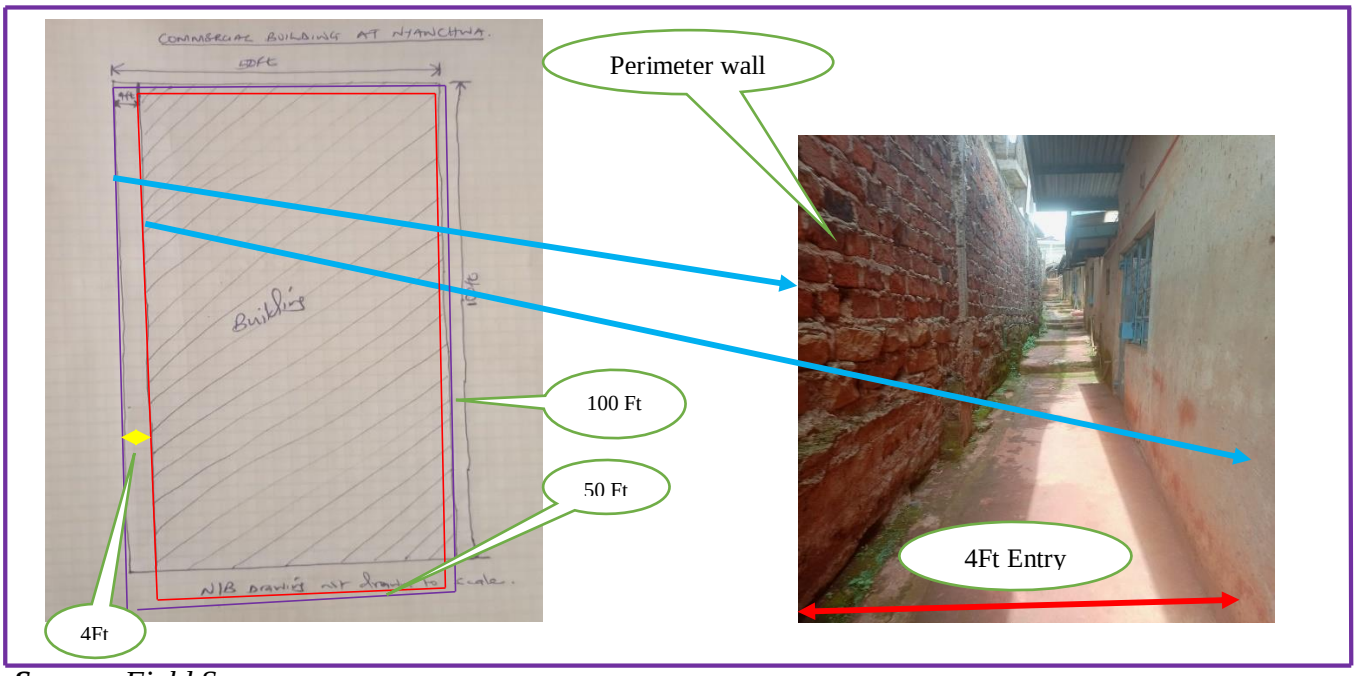
The study categorized residential developments into high, medium and low residential areas. Mwembe area was categorized as high, Nyanchwa as medium, while Milimani as low residential development areas.

In Nyanchwa area, which is within the municipality, all the spaces were planned and designated for residential purpose including access roads within it.

This implied that whoever was allocated land for development had to prepare development application for approval by the former municipality and this had to comply with the planning standards as stipulated in the Physical Planning Act Cap 286 of the laws of Kenya and the Physical Planning Handbook (2007). According to Physical Planning Act Cap 286 of the laws of Kenya and the Physical Planning Handbook (2007), a developer is supposed to develop 75% of the total land mass and use the remaining 25% for recreation purpose. Today, all development applications approved by the Kisii Municipality on behalf of Kisii County Government, also has to comply with these planning standards.

From the field study, it was established that most of the developments contravened the planning standards. This is because, in most of the sites visited, the areas occupied by permanent structures were more than 80%. Other developers developed 100% of the land mass with permanent structures. The study established that some plots were converted into commercial, public purpose, educational and agricultural uses. Figure 31 is an image indicated one of the sites where actual development contravened the planning standards.

Figure 30: Field case study of a building at Nyanchwa area

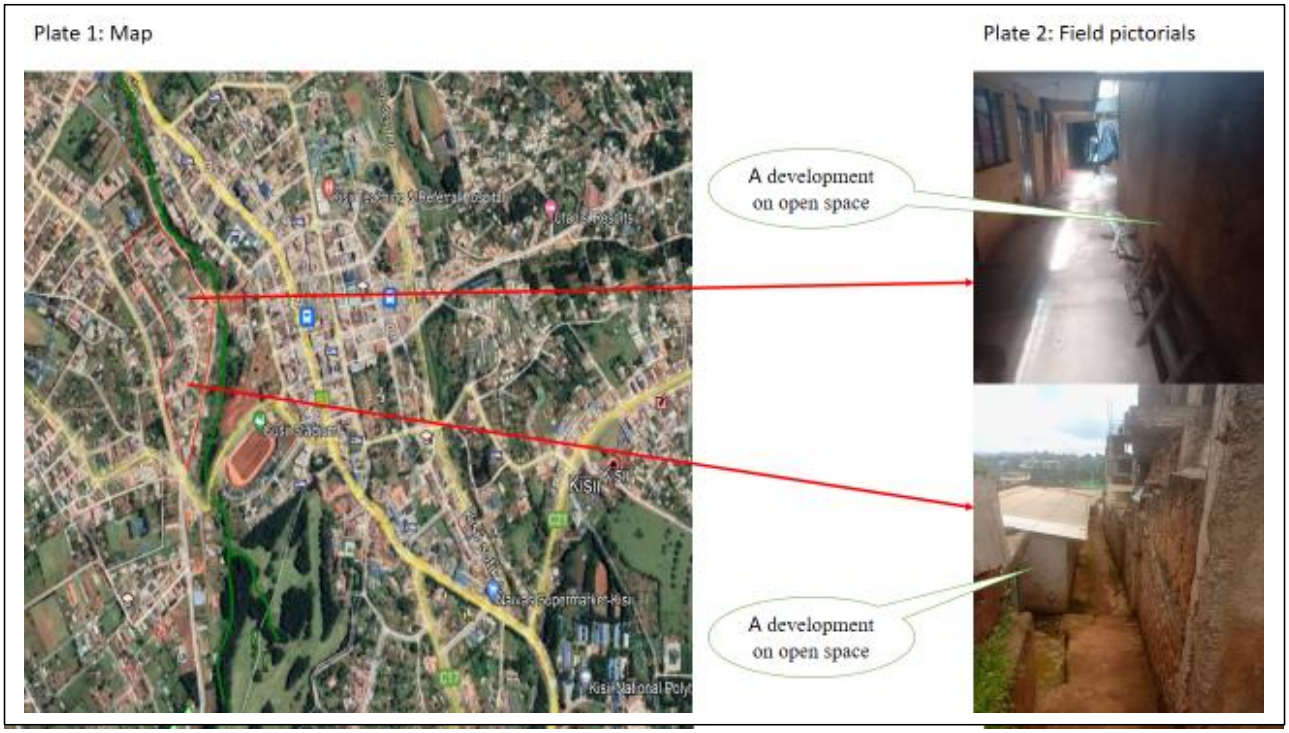


Source: *Field Survey,*

Figure 29 showed the actual land size which was measuring 50 Ft by 100 Ft at Nyanchwa residential area. Through the study findings it indicated that, the developer left only 4Ft entry point from the gate along the building to the end. The study revealed that, the developer had developed more than 92% of the total land mass leaving 8% concreted walkway pavement to the door steps of the residences.

The study noted that, most of the green spaces which were demarcated such as parking lots and washing area was long gone. Further, figure 32 indicated a development done on a designated parking and kitchen garden area in Nyanchwa residential area.

Figure 31: Showing additional residential houses at Nyanchwa area.



Source: *Field Survey, 2021.*

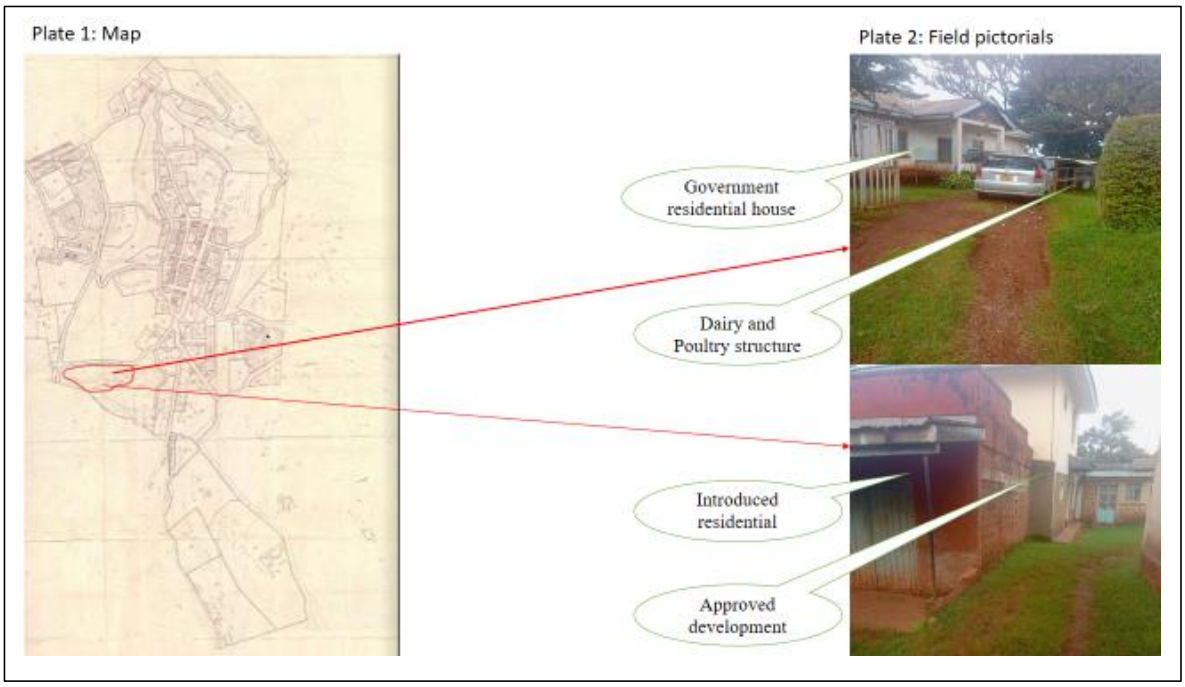
This finding concurs with the results from the head of county physical planning directorate who affirmed that because of weak inspection and enforcement of development activities by the former municipality, most of the developers took advantage by altering the approved development application and implementing their own choice of development. The head of the planning directorate also explained that in some instances, some officers colluded with developers hence defeating the planning requirements.

Finally, it was established that, because the former municipality could not commission the revision of the physical development plan from time to time to capture changes in situ, this paved way for further damage to the use of space by unsuspecting developers. This trend to date, is still on because of failure to revise the said plan. Appendix 2 is the 1971 physical development plan of former Kisii municipality.

In Milimani area, adjacent/neighbouring Nyanchwa, a similar phenomenon was noticed taking place. However, the study noted that, part of it was under leasehold while the other was under freehold.

It was observed that, as compared to Nyanchwa, most of the land parcels were large in size and fairy well planned. Though, the study noted through field observations that, some residences had started introducing some structures on designated green space such as poultry and dairy animal structures.

Figure 32: Showing permanent structures on designated green spaces in Milimani area



Source: *Field Survey, 2021.*

Figure 33 indicated plate 1 map and the locational context of Milimani residences and plate 2 showed pictorial status of the development which were done on the designated green space. Respondents on government residences revealed that, they added other structures on open spaces to accommodate dairy animals and poultry keeping activities. Further, it was noted from the private developer that, the additional residences were necessary for earning extra money for the idle space.

Furthermore, the study progressed to Mwembe a high residential area. Through the inquiry measurements, it was established that, most of the land parcels were very small ranging from 30 ft by 60 ft to 50ft to 100ft size. However, these contravened the physical planning handbook 2007 and the physical and land use planning Act of 2019 regulations on medium residential minimum land holding sizes.

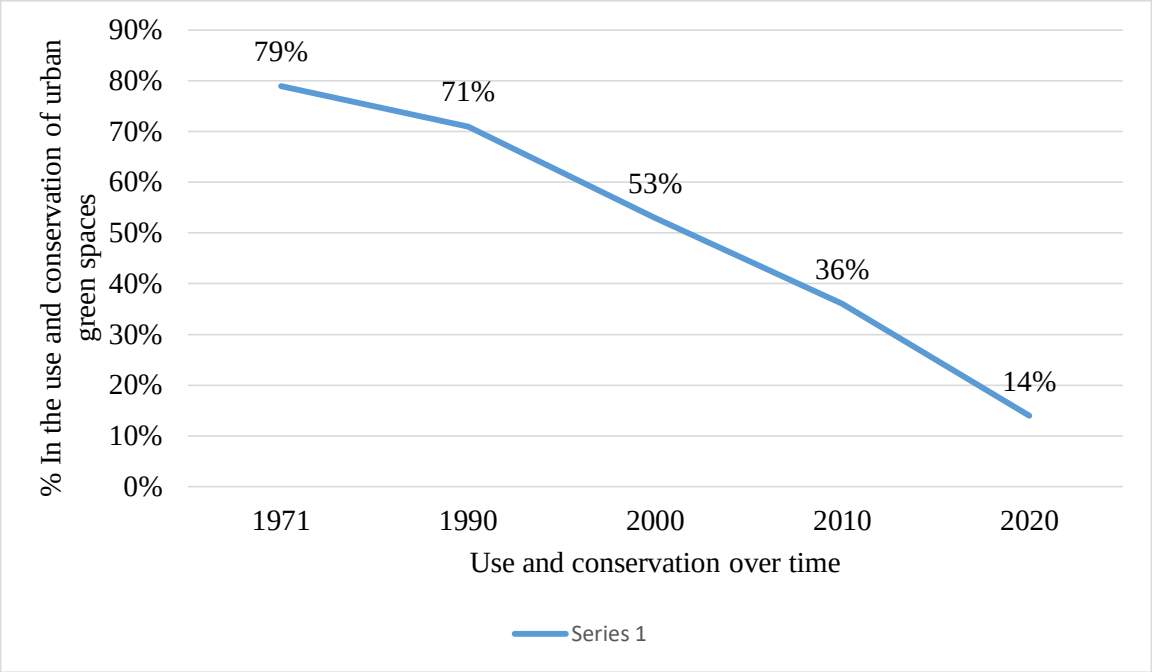
Despite these requirements, the study observed that, most residences were developed on more than 90% of the total land mass. Further, it was noted that, most structures which were done on green spaces could be easily identified since most of them were having challenges of access and poorly located within the main residences. Moreover, it was revealed from research that, the real situation on the status of those green spaces on ground was different as reflected on the approved development plans at the physical planning office. Thus, it was established that the developers did this in order to earn more money from the residentials and other economic activities. This results were affirmed by the head of physical planning directorate that, most developers took advantage of the former municipality exit on 2013 and developed haphazardly.

Figure 33: Showing developments on green space area in Mwembe

Source: *Field Survey, 2021.*

Equally, it was established that, the residence were having kitchen gardens, parking lots, fire assembly points, washing and cleaning areas but as time went by, the developers themselves used the space for other urban land use activities. However, through the satellite images the inquiry noted that, massive destruction of urban green spaces were within 2000 to 2020. Figure 35 illustrates how green spaces were being converted to other urban land use activities over time.

Figure 34: The trend in the use and conservation of urban green space over time



Source: *Field Survey, 2021.*

From the graph figure 35, the study found out that, in the year 1971 when the municipality was planned, the green spaces were not interrupted. Although, in the years from 1990, the study through the satellite images indicated decline of the green spaces at different years as indicated. For instance, the study established that, there were high conversion of green space areas in the years between 2010 and 2020 to other urban land use activities. These changes were noted by the inquiry especially at Mwembe and Nyanchwa residential areas. Summarized on the table 6.

Table 6: Summary of the trend in the use and conservation of urban green spaces in the study area

Type of urban green space	**Trends**			
	1971	**2000**	**2010**	**2020**
Riparian land **a) Rivers** **b) Roads**	Recommended riparian land size observed. (6-30m) Road reserves observed	Slightly less than 6m size Slightly encroached by commercial activities, car wash, shoe shinning activities	Less than 3m size Almost all road reserve converted to other urban land use activities.	Below 1m riparian size All road reserve spaces utilized.
Cemetery	Well demarcated and protected	Slowly being encroached by other urban land uses	Most of the cemetery space taken up by other urban land use activities	All cemetery space completely taken up by other urban land use activities.
Public Park	Well demarcated and protected	Encroached slowly by car wash activities	More urban land use activities take up the public park space; dumping of waste, commercial activities.	Very small space left for the park
Green spaces within residences	Well used and conserved	slowly being encroached by other urban land use demand	Rarely seen urban green spaces especially at high and medium residences	Completely green space areas converted to other land use activities
Wetland	Well conserved and protected	Introduction of other urban land use activities within the wetland space	Most urban land use activities appear on the wetland space	Most wetland space converted to other urban land use activities.
Stadium	Not protected and conserved	Developments were present	Developments increased and other urban land use activities	All urban land use activities removed, the stadium protected and conserved.

Source: *Field Survey, 2021.*

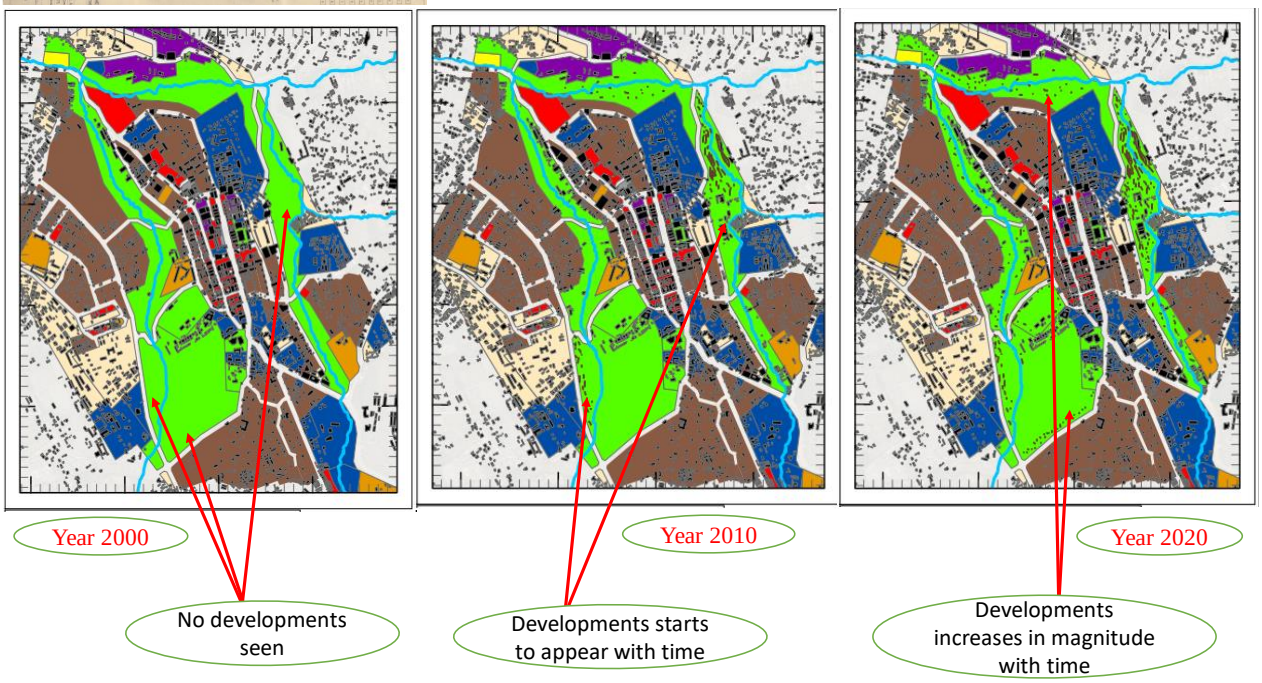
Figure 35: Trend in the magnitude of urban green spaces in the study area

Guiding Notes

a; Cemetery space (Nyambera)
b; Public Park (Peoples' park Kisii)
c; Sporting facility (Kisii Sports club and Golf course area)
d; Stadium (Gusii Stadium)
e; River Nyakomisaro
f; River Nyanchwa
g; Open space
h; Wetland (Daraja Mbili area)
i; Mashauri road section
j; Daraja Mbili to Daraja Moja road section
k; Daraja Mbili bypass to Daraja Moja junction

For the purposes of this study, the inquiry highlighted on the trend of a, b, c and h (Code 03) for the purposes of illustration.

The physical development plan shown indicated how Code 03 was used and conserved. It equally shows how the recreational land use was not interfered with but with time especially on the years 2000 to 2020 there are many changes as shown.



Source: *Field Survey, 2021.*

5.3 Factors explaining the changing trend of urban green spaces

This study sought to address the second research question which was;

What factors explain the changing trend on green spaces in Kisii Municipality?

Table 7: Summary of the factors in the use and conservation of urban green spaces

No.	Type of urban green space	Factors explaining the changing trend of urban green spaces	No. of respondents on factors	Percentage(%) of respondents
1.	Road reserve	-High levels of poverty and ignorance	19	23.75
		-Ineffective policy and legal framework	4	5
		-Conflicting institutional roles	2	2.5
2.	River riparian	-Ownership challenges	6	7.5
3.	Cemetery	-Political interference	7	8.75
		-Lack of coordination between urban community and Municipal planning	2	2.5
4.	Public Park	-Polluted urban green space	1	1.25
5.	Wetlands	-High competition from urban land use activities	9	11.25
6.	Sporting areas	-Low priority by planning authorities towards urban green space development	4	5
7.	Recreational spaces within residential areas	-Low levels of awareness and public participation	7	8.75
		-Laxity in enforcement of development controls	11	13.75
		-Lack of finances/budget	8	10
			80	**100**

Source: *Field Survey, 2021.*

Therefore, the study revealed from the responses in table 7 that, the factors which explain the changing trend of urban green spaces were specific to different types of urban green spaces. The leading factors in the use and conservation of urban green spaces were; 19(23.75%) high levels of poverty and ignorance, 11(13.75%) laxity in enforcement of development controls and 9(11.25%) high competition from other urban land use activities. On the other hand; 1(1.25%) polluted urban green spaces, 2(2.5%) conflicting institutional roles, 2(2.5%) lack of planning coordination between urban community and the planning municipal authorities, 4(5%) low priority by planning authority, Ineffective policy and legal framework respectively were the least factors in the use and conservation of urban green spaces in Kisii municipality.

Similarly, other factors which were noted to be significant to the study were; 6(7.5%) ownership challenges, 7(8.75%) political interference, 7(8.75%) low levels of awareness and public participation and 8(10%) lack of finance/budget in that order. These findings concur with other studies elsewhere (Kabisch and Haase, 2013; April et al, 2014; Cilliers et al, 2013; Makworo and Mireri 2011; Mensah, 2014; Fuwape and Onyekwelu, 2011; Tibaijuka, 2007; Ayonga, 2019; Kitur, 2019; Muketha, 2020; Kioo and Achola, 2015; Omollo et al 2017).

5.3.1 Riparian land

'High levels of poverty and ignorance 19(23.75%)' was the major factor revealed by the study. Along the main highways and access roads the respondent indicated that, they preferred to conduct their business activities on the road reserves purposely to access customers easily. The inquiry noted that, this act enabled them to make high sales thus earning their daily livelihoods. Through the field observations, the study noted that, the majority of the occupants of the green spaces were poor, ignorant and most economically vulnerable. On further interrogations with the respondents, it was revealed that, most of them were school drop outs, street families, from humble family background, internally displaced individuals and political sympathizers for the study political class.

However, it was also noted that, another group of individuals who were found on those spaces were due to nepotism, favoritism, bribery and others who were well connected with the senior county government officers. The research recognized that, these categories of individuals did not care for the environment and they were not aware of the consequences as a result of their economic living. Figure 36 shows plate 1 a map and locational context of the selected road reserves for study highlighted with thick red points A to B Daraja Mbili to Daraja Moja junction, X to Y Daraja Mbili to Daraja Moja lower road (Bypass) and D to E Mashauri to Mwembe road reserve.

Figure 36: Shows selected road reserves misused by other urban land use activities

Source: *Field Survey, 2021.*

'Ineffective policy and legal framework 4(5%)' was a significant factor listed for the decline of urban green spaces. in regard to the physical planning handbook (2008) and the physical and land use planning Act (2019) it is stipulated that, Planning of urban places is guided by planning standards which are often made by the county and national government. As much as planning policies and laws were found to be in place, the operationalization of such guidelines were difficult. These were; the nature of dysfunctional of urban planning regulations and inflexible processes in the issuance of developmental permits. The study established that, in the issuance of developmental approvals, the processes had delays which fueled negative results towards the use and conservation of green spaces in urban areas of Kisii municipality. Further it was ascertained that, it takes a longer time to approve development plans by planning authorities which exacerbated the destruction of urban green spaces.

Through the study observations, it was revealed that, from Daraja Mbili lower to Daraja Moja (Bypass), there were lined up commercial kiosks, roadside garages for both motorbikes and vehicles, car wash and shoe shinning activities.

However, during a focused group discussion with the Boda Boda riders, it was established that, the Boda Boda shades were allocated by the area member of county assembly and the office of the governor.

On the same note, the inquiry noted from the planning official that, members of county assembly and other senior government officers allocated road reserve spaces to their relatives, political sympathizers, bribery, nepotism and other fraudulent means. However on interrogating the head of the physical planning it was established that, the county had not put in place the enabling legislations to protect and conserve urban green spaces. Though, the spaces were misused by commercial activities, the research noted that it was a source of living to most youths and women who had been struck had by the Covid-19 pandemic. Following the ongoing discussion, it was clear that, legal and policy framework was ineffective and thus it lead to massive decline of urban green areas.

Figure 37: Misused road reserves

Source: *Field Survey, 2021.*

On the same breath, the study inquired the river riparian areas. According to the physical and land use planning Act (2019) and the Environmental management and coordination Act (2015) it was noted that, the riparian land should be protected and conserved with minimum 6-30metres from the highest ever flooded water mark. Despite these requirements, the study measurements indicated that, the riparian areas within the study area contravened the guidelines.

Table 8: Encroachment by land use activities into riparian of Nyanchwa and Nyakomisaro rivers

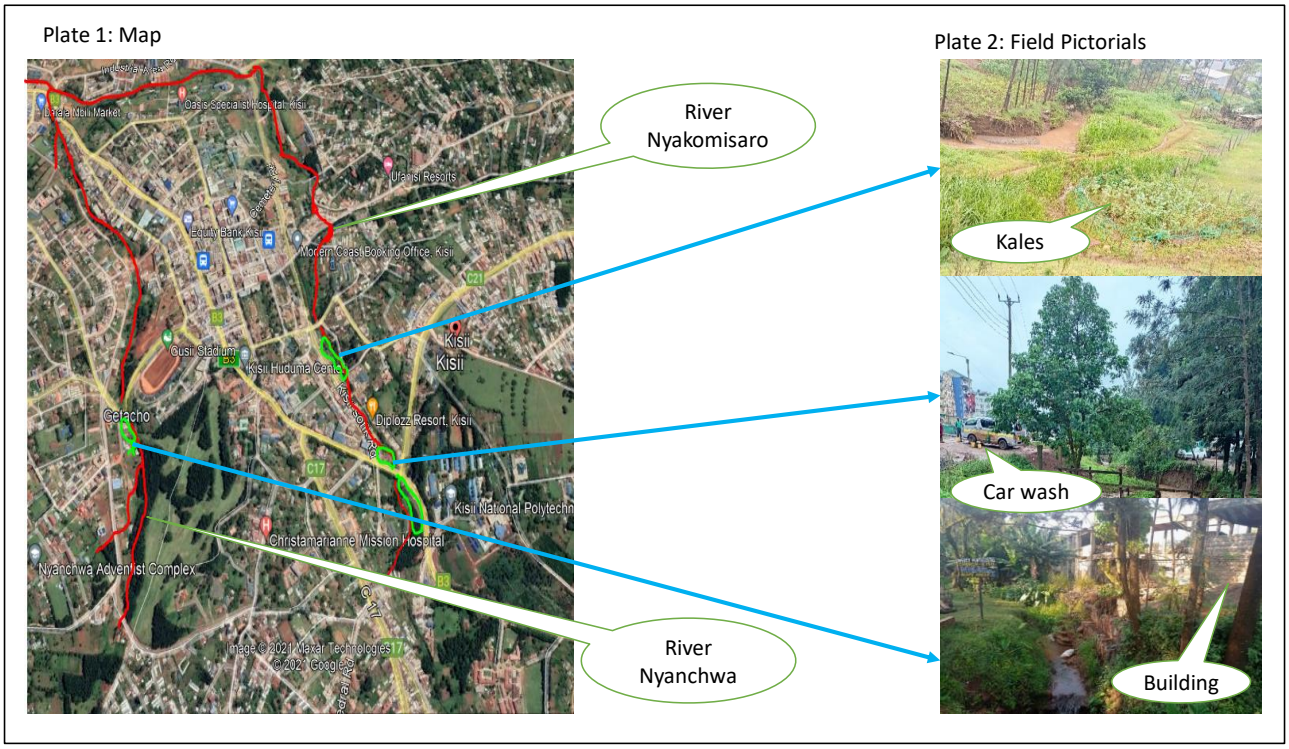
No.	Activity	Current study measurements (Nyanchwa river) in Metres.	Current study measurements (Nyakomisaro river) in Metres.	Recommended size by law
1.	Agricultural activity (Kales, Napier grass, maize and tree nurseries)	1.2, 0.7, 1 and 2 Average = 1.225 metres	1.7, 1, 1.5 and 1.5 Average = 1.425 metres	30 metres from highest water mark ever recorded (EMCA, 2015) Physical and land use planning Act (2019)
2.	Solid waste dumping	0, 1, 1.2 and 1 Average = 0.8 metres	1, 0, 2 and 1 Average = 0.75 metres	(EMCA, 2015; County Government Act, 2012; Land Act, 2012)
3.	Residential Building	1, 1.7, 3 and 2.7 Average = 2.1 metres	1.9, 1.3, 2.7and 3.8 Average = 2.425 metres	(EMCA, 2015; County Government Act, 2012; Land Act, 2012)
4.	Car wash	2, 5, 4, and 7 Average = 4.5 metres	1.8, 4.6, 3.1 and 4.7 Average = 3.55 metres	(EMCA, 2015; County Government Act, 2012; Land Act, 2012)
5.	Invasive tree species (Eucalyptus)	0.5, 0, 1, and 3 Average = 1.125 metres	0.7, 0.5, 1.1 and 3.1 Average = 1.35 metres	(EMCA, 2015; County Government Act, 2012; Land Act, 2012)

Source: *Field Survey, 2021.*

From table 8 it was clear that, riparian area of both rivers were below the recommended standards by law. Although, there were institutions responsible with the management of riparian areas, these institutions were found to have outdated laws and policies which cannot address current challenges facing the urban green spaces. Also the study revealed that, these regulations were addressing the challenges in a piecemeal way and they were not independent in addressing the challenges.

Furthermore, figure 36 showed plate 1 map and locational context of the misused riparian land of both Nyanchwa and Nyakomisaro rivers. Plate 2 indicated the field pictorials of the encroached riparian by urban land use activities.

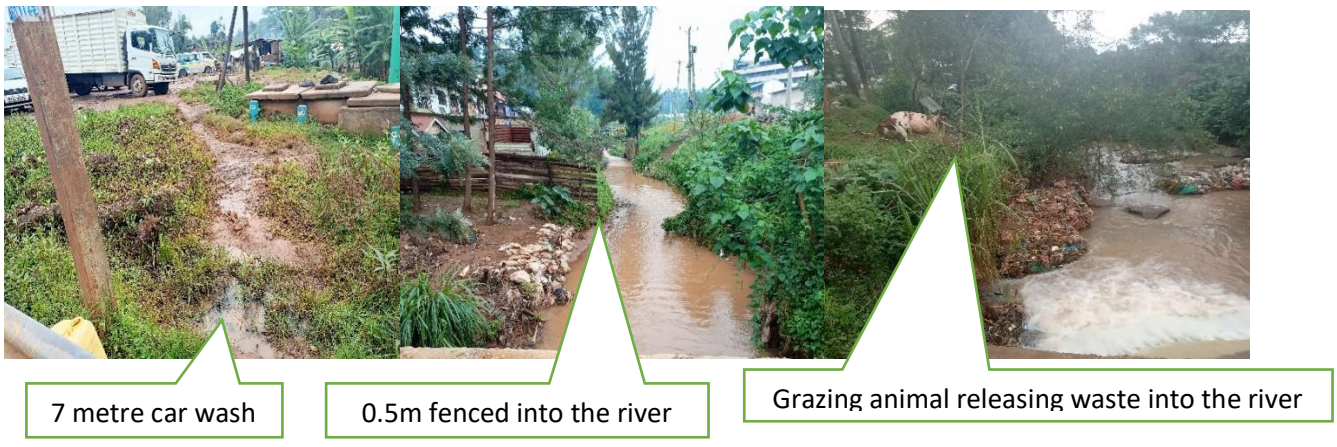
Figure 36: Photos showing the use of riparian land of Nyanchwa and Nyakomisaro rivers



Source: *Field Survey, 2021.*

Moreover, through the study measurements, figure 37 showed the extent of the level of encroachment to the riparian area of both Nyanchwa and Nyakomisaro rivers.

Figure 37: Showing level of encroachment on riparian land



Source: *Field Survey, 2021.*

'Ownership challenges 6(7.5%)' was also listed as other significant factor facing the use and conservation of green spaces in urban areas. In respect to the physical and land use planning Act (2019) all green spaces belong to the public and managed by the county government and national government. Irrespective of these guidelines on ownership of these green spaces, the study noted that, there were ownership wrangles on these area in the study area. During the field survey, the research observed that, there were areas along the Nyakomisaro river which were indicated 'No trespass'. This observation was noted opposite Ram hospital, but the space was not protected. On further inquiries with the respondents, it was established that, the space was fraudulently taken by private developer and the court halted all development plans which were planned to take off until the matter was heard and determined.

Moreover, through the study respondents, it was recognized that, since the developers had no legal ownership of the space, they misused it by dumping solid waste, constructing temporal latrines, directing raw human waste and planting eucalyptus trees for economic gains. Thus, contravening the said planning regulations.

5.3.2 Cemetery

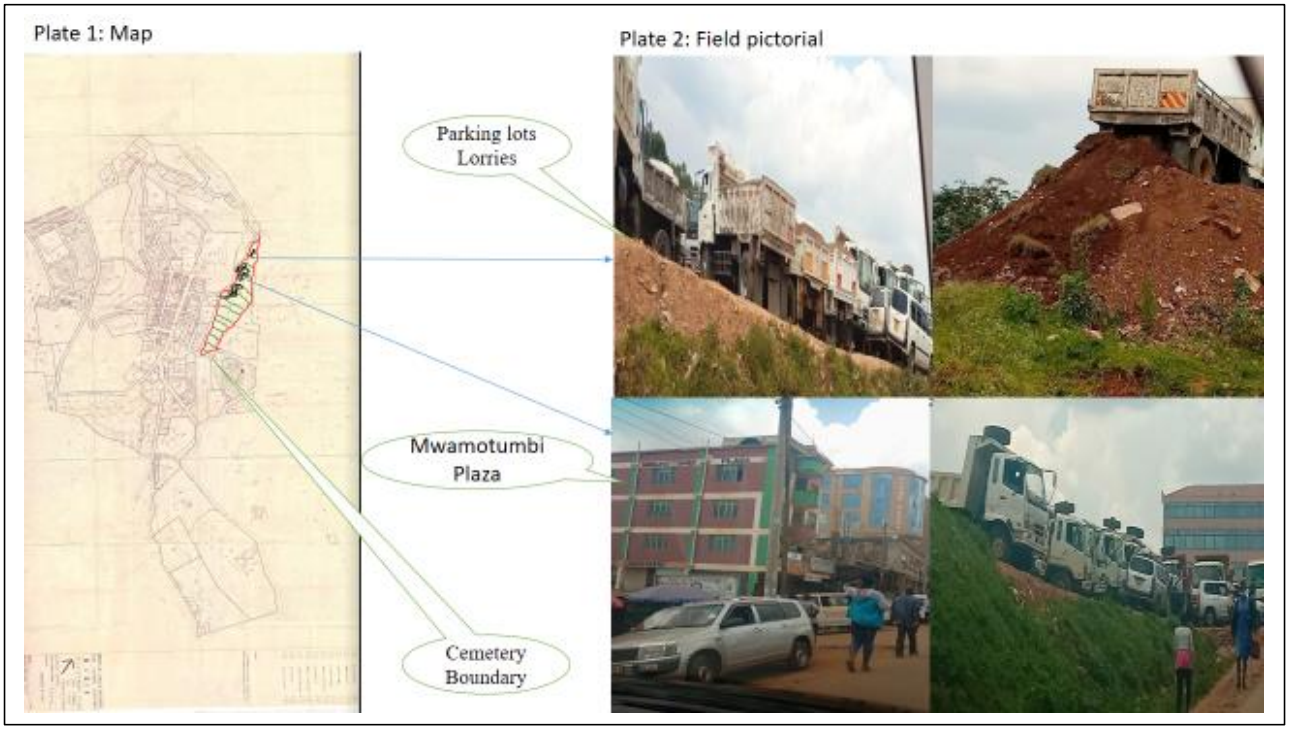
'Political interference 7(8.75%)' was listed as one of the factor facing the use and conservation of urban green spaces. Regarding the cemetery space area, the study revealed that, although these space was allocated to serve the purpose of accommodating the destitute to bury their dead, the former municipal authority officials made a decision to subdivide and allocate the land to former councilors and prominent businessmen.

For instance, the study noted more than three commercial buildings (Mwamotumbi plaza, Stage view plaza and Guardian Angel building) which belonged to the former member of Kisii county assembly, prominent businessman who was a political sympathizer of the current county government regime and the former councilor of the study area. Further, it was revealed that, on the parking lots which were done through red soil embankments, the inquiry revealed that, it belonged to the political class and they accommodated the tippers and Lorries which were selling construction materials.

Furthermore, the study observed installed kiosks and stall shifts along the cemetery space fronting the highway. Moreover, the study noted car wash activities which also belonged to the senior county government officials who were allocated the space due to political alignment.

Fundamentally, the study realized that, the cemetery land was subdivided by the people who were on power. Thus this finding agreed with the finding by Forester (1989) planning in the face of power. However on interrogating the planning official, it was noted that, the department was completely sidelined on issues to do with the cemetery.

Figure 38: Photo showing the cemetery being converted to other urban land use activities



Source: *Field Survey, 2021.*

'Uncooperative attitudes of urban dwellers towards the use and conservation of urban green spaces 2(2.5%)' also listed as another factor. The inquiry discovered that, most urban dwellers did not support urban green space conservation activities. For instance, the municipal planning team in the year 2016 engaged the public on conserving the cemetery land. The study revealed that, the dwellers who had already used up the space for other commercial activities they did not want to be engaged sine they felt that they will be relocated. Furthermore, even though the planning team protected the cemetery land by river bank stone bitching to control erosion, the urban community at the area did not support the initiative. It was noted from the key informant that, other sections were vandalized.

However, the study conducted an inquiry to disclose how they felt and understood whose responsibility was in the use and conservation of the urban green spaces.

Table 9: Responsibility in the use and conservation of urban green spaces

Type of urban green space		Responsibility in percentage (%)				
		Government	**Individual/Group**	**Both (Government and Individual)**	**None**	**Total**
1.	Road reserve	90	4	1	5	
2.	River riparian	47	39	14	-	
3.	Cemetery	98	-	2	-	
4.	Wetland	92	5	3	-	
5.	Public Park	90	-	10	-	
6.	Church grounds	3	95	2	-	
7.	Sporting areas	40	55	5	-	
8.	Stadium	100				
Total in %		**70**	**24.8**	**4.6**	**0.6**	**100**

Source: *Field Survey, 2021.*

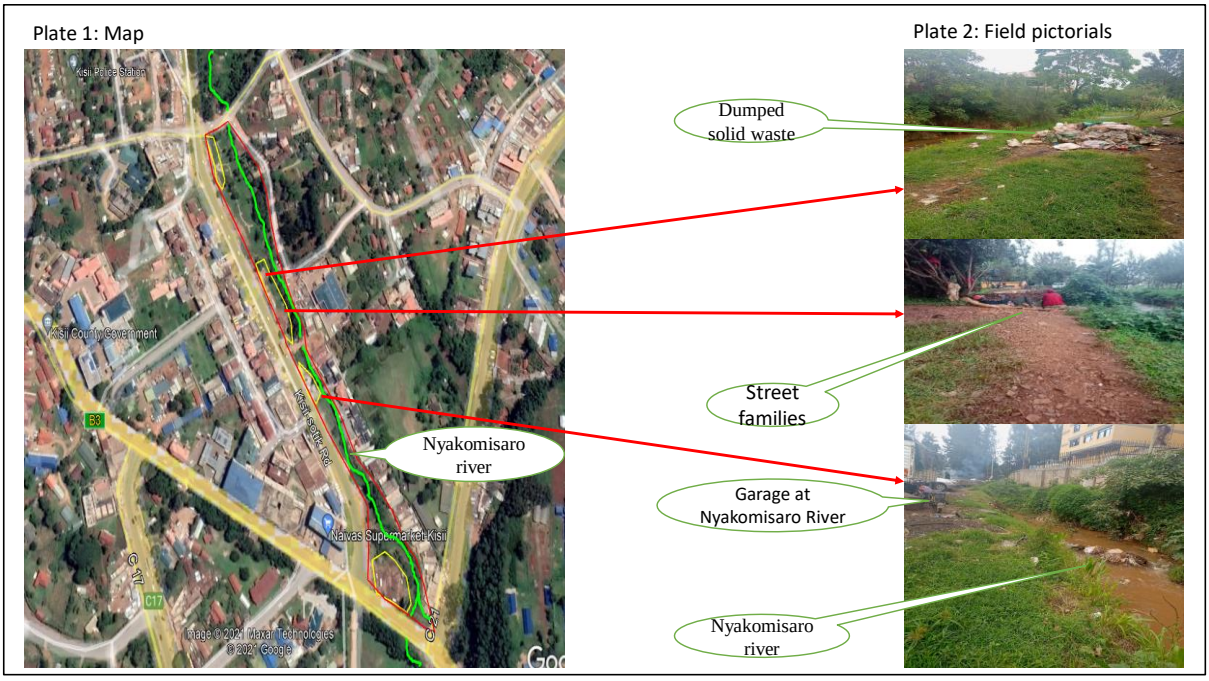
Table 9 revealed that, 70% of the respondents felt that, it was a government responsibility in the use and conservation of urban green spaces such as cemetery, wetlands, road reserves, Public Park, stadium and partly river riparian areas. On the other hand, 24.8% felt that the use and conservation of urban green spaces were the responsibility of individual or individual groups especially the church grounds, learning institution fields, partly river riparian and sporting facilities. However, 0.6% of respondents felt that, road reserves is not anyone responsibility thus, these category of respondents enjoyed encroaching into the road reserve without any worry.

5.3.3 Public park

'Polluted urban green spaces 1(1.25%)' was listed as the major factor in the use and conservation of urban green areas. According to the physical planning handbook (2008) guidelines, the public parks need to be areas of visual relief screened from the surrounding with quiet walking paths among other guidelines.

Regardless of these requirements, the study field observations revealed that, the public park was used by the street families as homes, dumped solid waste, car wash activities and drug peddlers thus no assured security by the users. These findings contravened the guidelines as stipulated by the planning handbook. Further, it was observed that, the area was not protected thus allowed misuse from any site. Equally, it was noted that, public facilities such as toilets were not provided for. Though, there were few resting benches, indigenous trees and a section fenced in the park, they were not maintained. Figure 40 plate 1 indicates the map and the exact locational points of the misused people's park at the study area while plate 2 shows field images of the real status of the use and conservation of the green spaces in urban areas.

Figure 39: Showing misused Public Park at the study area



Source: *Field Survey, 2021.*

5.3.4 Wetlands

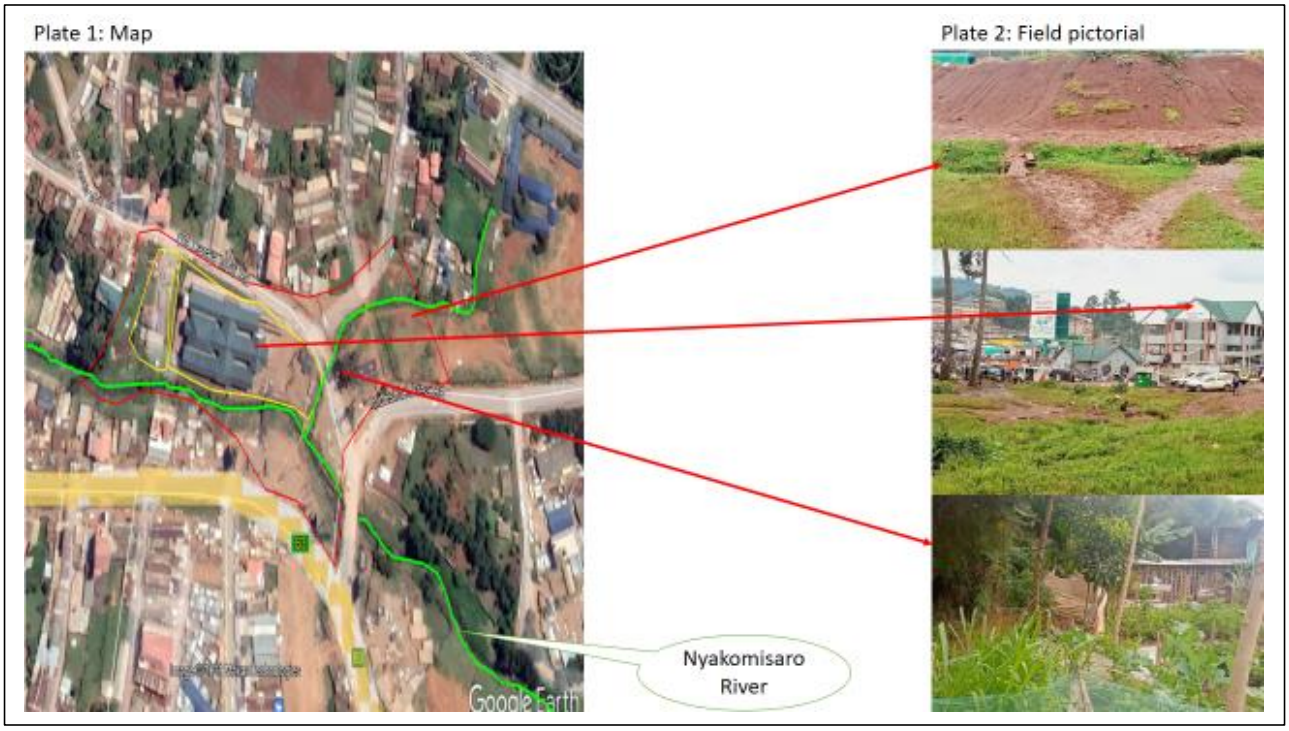
'High competition from other urban land use activities 9(11.25%)' was listed as one of the major factors in the use and conservation of urban green spaces. In regard to the environmental management and coordination Act (2015) a wetland is an ecological sensitive zone which acts as a water recharge and purification area as well as buffer zone. Regardless of these functions itemized in the EMCA (2015) Act, the study noted that, there was a new building which was located on the wetland space.

Further, through the study inquiries from the physical development plan (1971) Kisii municipality, it was established that, at the market was built on the wetland area. Moreover, through the study measurements, it was revealed that the market had converted 1.7 acres of land of the wetland including the fenced area.

Field observations indicated that, the upper part of the wetland was still active and the residents were taking water from it. Moreover, it was noted that, there were dumping of red soils on the lower end to create more space for open air market. On the same note, the investigation observed that, the location of the market building consumed also part of the Nyakomisaro riparian land and most of the solid waste was emptied into the river. Further, behind the market building, the space between the fence and the building of approximate four metres was floated with water which was draining into the river.

Through the study interviews with the planning official, it was found out that, the area was holding all the run off from the upper part of the study area reducing the flood impacts. Further, the planning official informed the study that, the building was a joint venture between the county and national government. Consequently, the executive due to high pressure by the market leadership and subsequent reports on accidents to the market operators who usually lined up along the road reserve of Daraja Mbili, it justified the conversion of the wetland space into a commercial activity. Nevertheless, the study noted that, not only the county government converted the space into a commercial land use activity, but also there were private activities which encroached the wetland. For instance, there were agricultural land use activities and temporal storage facilities for the market products.

Figure 40: Showing an encroached wetland at Daraja Mbili area



Source: *Field Survey, 2021.*

Similarly, the study established from the surveying official that, the market building project site location was unquestionable since the office of the governor directed for portioning the wetland for commercial activity to secure the national donor funds. However, even though the wetland was encroached with other urban land use activities, the study noted that, it was neither protected nor gazetted. Therefore, it faced the challenge of the tragedy of commons scenario.

5.3.5 Sporting areas

'Low priority by planning authorities towards urban green space conservation 4(5%)' was another significant factor that emerged from the study. Despite the physical planning handbook recognizing the conservation and protection of sporting facilities, the inquiry observed that, the sporting facility was lacking the necessary sporting equipments. Similarly, the study noted that at the golf course field there were animals grazing and some sections were not protected well. These contravened the planning requirements of the planning handbook concerning the guidelines on sporting facilities. Further, through the interrogations with the sports official on site, it was indicated that, there were very few personnel to conserve and maintain the golf course to the required planning standards.

The inquiry noted that, this was due to lack of resources to hire qualified personnel. Moreover, the inquiry noted from the official that, the sporting facility was under threat from encroachment by individual developers.

5.3.6 Recreational spaces within residential areas

'Low levels of awareness and public participation 7(8.75%)' was listed among the leading significant factors. In regard to the physical and land use planning Act (2019) and the county government Act (2012) requires that, before implementing any community project, there must be carried out public participation and awareness creation exercise. Although, the physical and land use planning Act (2019) emphasizes on conducting the said requirements, the study established that, there were low levels of awareness and public participation. During a focus group discussion with the Kisii Environmental green group at high residential neighborhood at Mwembe, the study revealed that, the team had never been involved in the planning of urban green spaces in the study area. Further, it was recognized that, awareness creation exercises were not well coordinated and sometimes they were selective in the participation. Furthermore, it was noted that, the planning authorities rarely gave timely information on awareness activities and participation. Also, the study revealed that, most participation centres were far away located. However, on interviews with the planning official, the study noted that, the planning personnel were few and inadequate resources were allocated for public participation and awareness exercises. As a result of low awareness, the study observed that, recreational facilities within the residences were converted to other urban land uses such as residential activities, urban agriculture and structures to accommodate domestic animals and birds.

Figure 41: Showing misuse of green spaces within residences

Source: *Field Survey, 2021.*

However, the study noted that, in low residential areas, the green spaces were well used and conserved. For instance, most respondents informed the study that, it was their responsibility in the use and conservation of green spaces within their area of residence. In addition, most of these residences were aware of intrinsic benefits of the urban green spaces.

'Laxity in enforcement of development controls 11(13.75%)' was listed as a factor for diminishing green space in urban areas. In reference to physical planning handbook and the physical and land use planning Act (2019) it is stipulated that, development controls are instruments used to guide the development in an urban area. Further, the same planning guidelines provide for the planning of green spaces in urban areas to enhance the quality of urban environment. In spite of these guidelines, the study observed that, there were illegal developments within the main development in most of the residences. It was revealed that, illegal developments on demarcated green space areas were as a result of laxity in enforcement of development controls by the planning authority. It was noted that, the developers altered the development plans to include temporal residences to earn more income. Further, the study noted from the planning official that, the planning team was not well facilitated with field operational resources such as transport and logistical field funds. Consequently, this made the supervision of development plans to be ineffective.

Figure 42: Photo showing new development and completely taken up green space area

Source *Field Survey, 2021.*

On the other side of the coin, the investigation established that, there were challenges of development approvals which took long time to be approved. These left the developers to go on with their developments with no regard to urban green space development. For example, in Mwembe area, the inquiry found out that, most developers had started developing without development approvals.

However, it was exposed by the study that, they had submitted the development plans to the planning authority long time enough but they had not been given any response concerning the plan approvals. Still, it was noted that, there were a lot of bureaucracies which demanded a lot of money from the developers.

'Lack of finances/budget 8(10%)' was another factor which the study listed. Through the study inquiries, it was revealed from the planning official that, due to lack of finances, the department was unable to hire more qualified personnel to handle planning matters especially on urban green space development. At the same note, the study revealed that, whenever the planning officials wanted to carry out supervision to ensure compliance of developments to required planning standards, they had no transport means. Equally, amounting to these challenges, even though they struggled to do supervisions at the field, they were rarely reimbursed to cater what they had spent to the field. Further, the inquiry found out that, awareness and sensitization activities on the conservation of recreational facilities had never been done for long time due to the challenges of finances. Moreover, the research investigated the budget copy which was shared by the planning official, it was realized that, though there was allocations on paper for recreational development, getting the real cash was a great challenge.

Though, the study discovered that, as much as the budget team were not involving the planning team in the budget making process, the planning authority did little to sensitize them on the intrinsic benefits and values of urban green spaces.

5.4 Effects of reduced green spaces on the aesthetics and environmental quality

This study sought to address the second research question which was;

'How does the changing trend of urban green spaces affect the aesthetics and environmental quality of Kisii Municipality?

Table 10: Effects in the use and conservation of urban green spaces

No.	Type of urban green space	Effects of reduced urban green spaces on the aesthetics and environmental quality	No. of respondents	Percentage(%) of respondents
1.	Cemetery	-Reduced burial space -Increased urban land use conflicts	12 3	15 3.75
2.	Road reserve	-Misused NMTs -Urban flooding -Reduced property value -Low business attraction	14 4 2 3	17.5 5 2.5 3.75
3.	River riparian	-Soil degradation	5	6.25
5.	Wetlands	-Biodiversity loss -unpredictable weather patterns	5 3	6.25 3.75
6.	Public Park	-Reduced social life	10	12.5
7.	Sporting areas	-Loss of Job opportunities -Loss of government revenue	2 2	2.5 2.5
8.	Recreational spaces within residential areas	-Health challenges -Misused urban green spaces	9 6	11.25 7.5
		Total Respondents	**80**	**100**

Source: *Field Survey, 2021.*

According to table 10 the study revealed that; 14(17.5%) misused Non-motorable transport (NMTs), 12(15%) reduced burial space, 10(12.5%) reduced social life, 9(11.25%) health challenges were listed as the leading significant effects on the reduced urban green spaces in the area of study. on the other hand, 2(2.5%) reduced property value along main highways, loss of job opportunities and loss of government revenue respectively, 3(3.75%) unpredictable weather patterns, low business attraction and increased urban land use conflicts respectively were enumerated as the least significant effects in the use and conservation of urban green spaces. Similarly, 4(5%) urban flooding, 5(6.25%) biodiversity loss, 5(6.25%) soil degradation and 6(7.5%) misused urban green spaces in that order were revealed as the other significant effects on the reduced urban green spaces.

5.4.1 Riparian land

'Soil degradation 5(6.25%)*'* was listed as the significant effect in the use and conservation of urban green spaces in the study area. Despite the guidelines from the Environmental management and coordination Act (2015) on riparian zone, the study observed that, along the riparian land of Nyakomisaro and Nyanchwa areas, there were agricultural activities, solid waste dumping and raw sewage directed to the riparian land. Thus these urban land use activities degraded soil.

Figure 44 indicates plate 1 a map and locational context of the affected areas in the study area while plate 2 shows field pictorial status of the effects of the use and conservation of green spaces along Nyanchwa and Nyakomisaro rivers in the study area.

Figure 43: Soil degradation

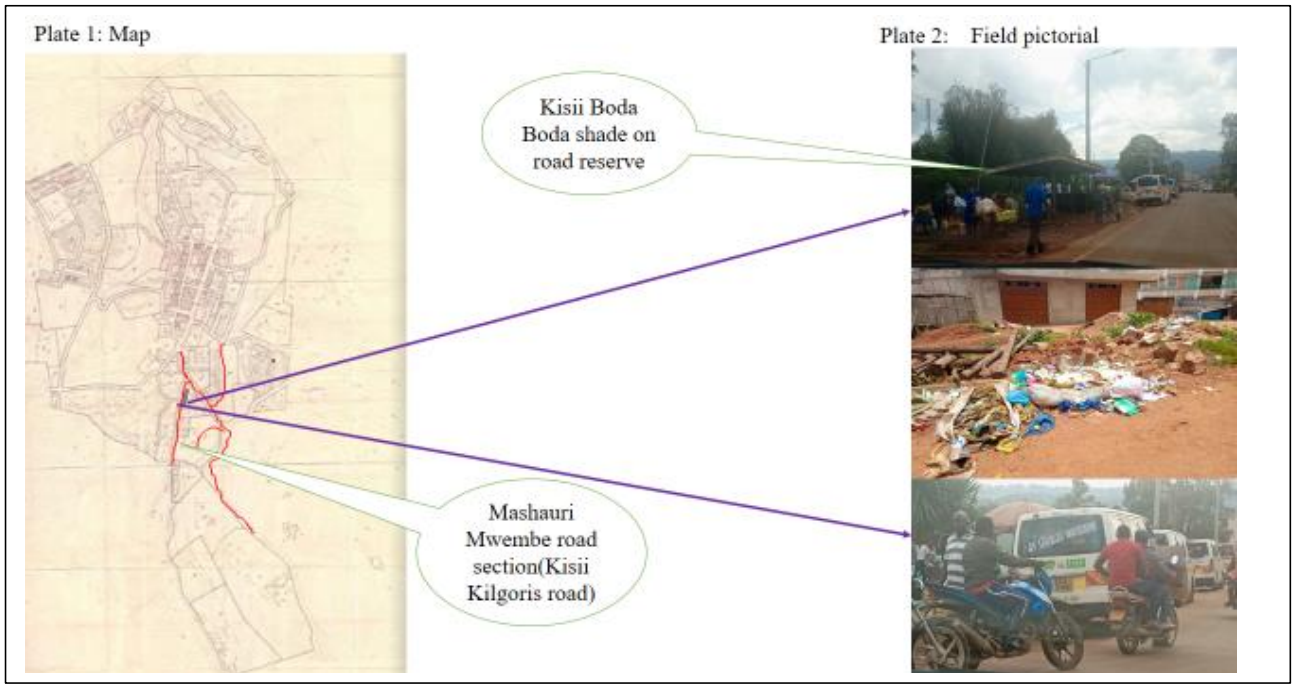
Source: *Field Survey, 2021.*

Misused Non-motorable transport systems 14(17.5%) was highlighted as one of the most significant effect in the use and conservation of urban green spaces in Kisii municipality.

Despite the physical and land use planning Act 2019 giving guidelines on the use and conservation of the road reserve, as a transport and service corridor, the study established that, the reserve was misused and blocked inhabiting the original use.

For instance, along Mashauri Mwembe road section of the study area, it was observed that, the county government had lined up Boda Boda shades, hawking activities, dumped solid waste, Kiosks, shoe shining and picking and dropping of Matatus operators.

Figure 44: Showing misused NMTs on the study area



Source: *Field Survey, 2021.*

'Reduced property value along main highways 2(2.5%)' was highlighted as one of the least effects on the reduced urban green areas in the study area. Along the selected study main highways, it was noted that, there were lined up kiosks, dumped solid waste, roadside garages, Boda boda stage sites, hawking activities, picking and dropping of passengers by Matatu operators, car wash activities, shoe repair and shinning activities among others. Most of these activities blocked the entry to most commercial buildings which fronted the road, thus reducing the urge of renting the property for urban land use activities.

The study noted from the developer that, nevertheless the developers had complained to the county government over illegal activities in front of their buildings, like kiosks which were conducting commercial activities similar to what the developers were doing, there were no action taken since most of these activities were licenced by the county government.

Besides these findings, the study investigated the business operator in one of the nearby dumped solid waste, 15 metres away from the premises, the study noted that, the business person was planning to relocate the business because of the filthy and bad smell which was coming from dumped rotten waste. Further the study noted that, it was very difficult for the customers to access the shop premises which were blocked by motorbike riders. Thus, it was established by the study that, most businessmen were avoiding to rent business premises at some points along Daraja Mbili to Mashauri for example at Harsh emporium building.

'Urban flooding 4(5%)' was enumerated as one of the effects in the use and conservation of urban green spaces. The study observed that, along the selected road reserve sections, there were illegal structures which were located on the drainage channels. This made it difficult for the municipal cleaning team to unblock the said channels to ease the run off flow. Thus, as a result of this, they blocked the run off causing urban flooding. Figure 46 indicates the situation during raining time along Daraja Moja to Mashauri at Uhuru power building. The area is flooded due to blocked water channels with kiosks making it difficult to unblock the drainage system.

Figure 45: Urban flooding in the study area

Source: *Field Survey, 2021.*

Equally, these structures were posing a challenge of unblocking the channels, by the county cleaning team.

However, the study argued that, nevertheless the road reserves had been clogged with illegal developments they contributed to economic livelihoods of the urban dwellers. The research therefore noted that, though there were a lot of misuse of the road reserves, they created job opportunities and earned a living for most of unemployed urban residents.

Further, the study recognised that, not all road reserve sections were misused but other areas were well used and conserved figure 46 shown.

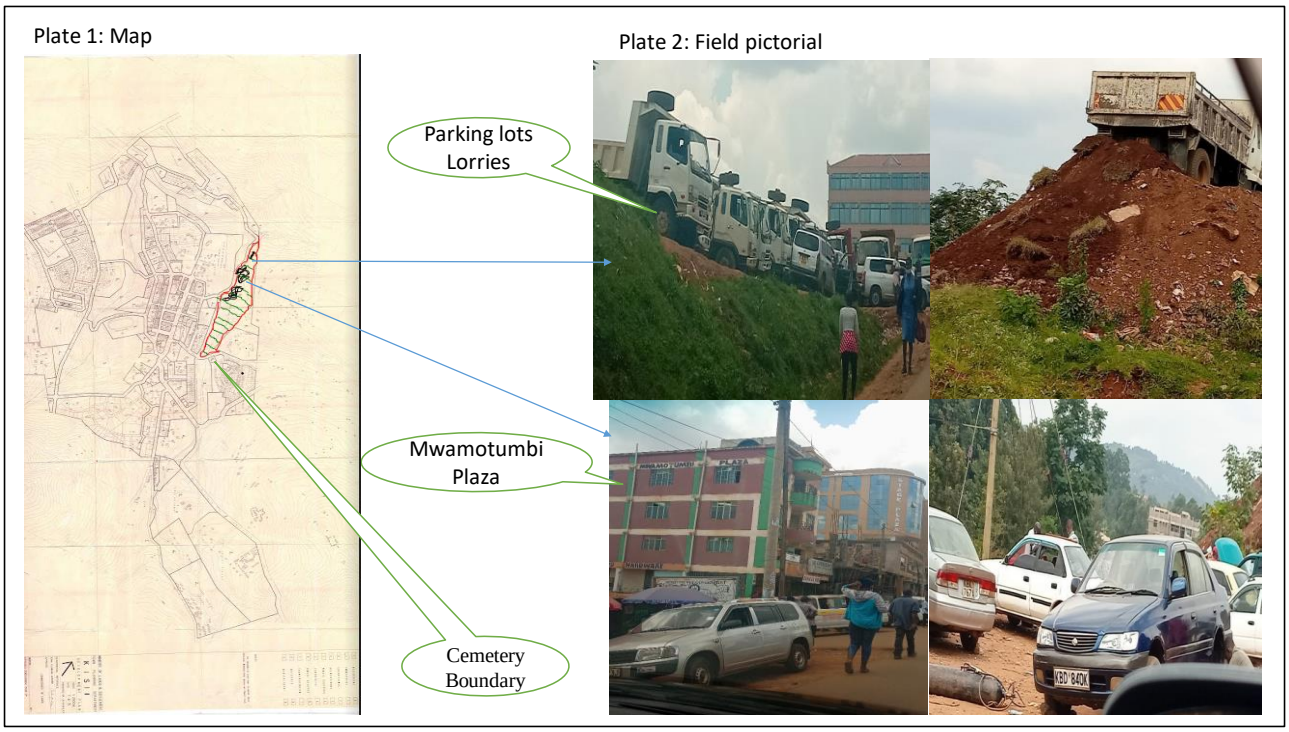
Figure 46: Showing areas along road reserves well used and conserved in the study area

Source: *Field Survey, 2021.*

5.4.2 Cemetery

'Increased urban land use conflicts 3(3.75%)' was registered as one of the least significant effects in the use and conservation of urban green spaces. Despite the cemetery land held very crucial uses in the urban set up, the study recognised that, the cemetery land was being converted to accommodate other urban land use activities which were seen as economically viable for private developers. Through the field inquiries, the study was informed by the key informant that, there were conflicts between the garage operators and the owner of Mwamotumbi plaza who argued that, the garage were carelessly disposing waste oils and grease from their garage which lowered the environmental quality of the place. Further, the study was informed of another conflict of car wash owner and the kiosk over the drainage of car wash waste water. Moreover, there were conflicts between the first encroachers of the cemetery by the parking lots and the new individuals who were expanding the parking lot to accommodate new lorries next to them. Equally, there were conflict between the Guardian angel building and the garage operators over the entry point which seemed to block the guardian angel entry seen on figure 48. Thus, the study noted that, these urban activities were not in harmony as a result of this, the conflicts were high.

Figure 47: A cemetery green space taken up by other competitive urban land use activities.



Source: *Field Survey, 2021.*

Moreover, the study established from the lands official that, there were active court cases which were going on concerning the encroachment into the cemetery land. Besides that, through the study interviews it was revealed that, there were intimidations and frustrations whenever an issue of protecting the cemetery land arose from the planning authority by the political wing which had already fraudulently acquired some sections of the cemetery land. Further, the official revealed that, it was very difficult to set aside funds for the protection of the cemetery, they were actually declined in the budget approval process in the assembly. However, the research noted that, the conversion of the cemetery land were purely done with impunity and power centered.

'Reduced burial space 12(15%)' unveiled as the second most significant effect in the use and conservation of urban green spaces in Kisii municipality. Despite the fact that, the cemetery land provided a burial space for the destitutes and other dead animals in the study area, it was established that, most of the cemetery land had been fraudulently acquired. A larger portion of the cemetery land had been converted to other urban land use activities.

5.4.3 Wetland

'*Biodiversity Loss 5(6.25%)'* was another effect uncovered by the study. The investigation learned from the traders that, before the new market building was done, they used to trade under the trees which shielded them from the scorching sun rays during the dry spell. Further, the study established that, they used to fetch clean water from nearby water spring for drinking and washing vegetables before selling. However, after sometime when the construction of the new market building was done on part of the wetland most indigenous trees and clean water were unavailable. Also, the wetland space was converted through dumping red soil to create more space for open air market this further caused loss of biodiversity.

Even though, the new market was built to relocate the traders along the road reserve, the study revealed that, it was not fully utilized. The inquiry realized that, most traders were not able to access it for their commercial activities.

Figure 48: Loss of biodiversity

Source: *Field Survey, 2021.*

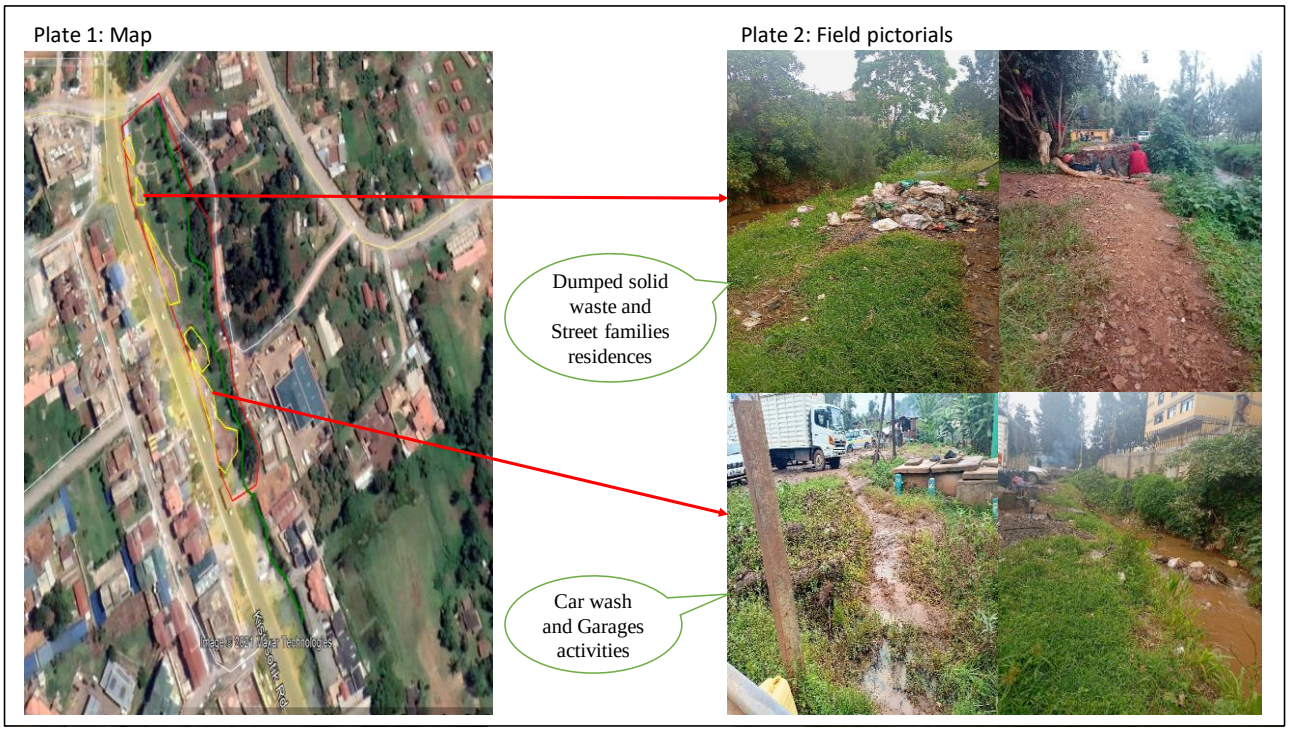
'Unpredictable weather patterns 3(3.75%)' was recorded as the other significant effect in the use of green space in urban areas of Kisii municipality. The study noted from the NEMA official that, due to the destruction of green places such as the wetland in the study area, the weather conditions were not determined well.

Further, the official added that, the wetland acted as a buffer and a water recharge zone for area. Furthermore, the study observed that, the remaining part of the wetland was dumped with the market waste which according to the NEMA official, the waste was releasing a lot of greenhouse gases (GHGs) to the atmosphere, thus climate change. On further investigation with the metrological office, the study noted from the records that, the study area was receiving heavy rains at different times of the year causing floods and other catastrophes like landslides.

5.4.4 Public park

'Reduced social life 10(12.5%)' was named by the study as one of the most significant effect in the use and conservation of green spaces in urban areas. The research established that, misuse and encroachment into the public park, reduced the number of the individuals who accessed the public park at the study area. This was because of misuse and encroachment by illegal urban land uses activities. Through the field observations which were made by the study, it was established that, the space was highly polluted and encroached forcing the users to avoid it. Although, the park was being reclaimed by the planning authorities as indicated by the planning official, a huge portion was not in use due to unsafe conditions which the study noted.

Figure 49: Public Park at the study area



Source: *Field Survey, 2021.*

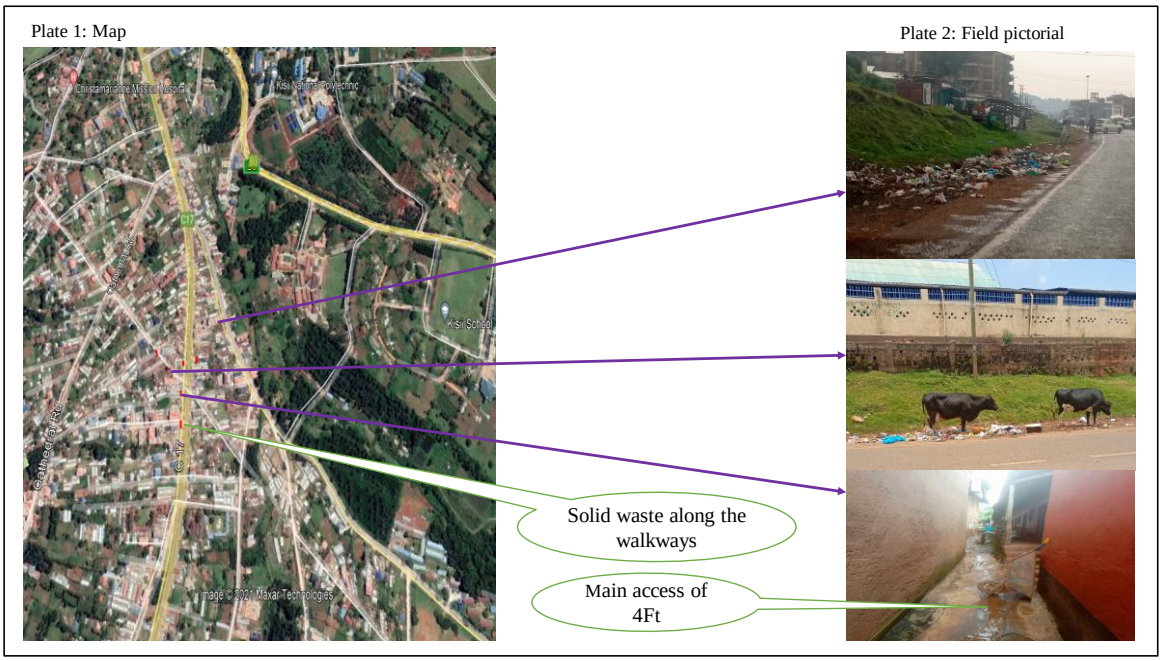
Moreover, the research pointed out that, '*loss of government revenue 2(2.5%)'* was another effect caused by decline of green spaces in urban areas. Equally, it was acknowledged from the revenue department that, the people's park earned revenue to the county for functions like weddings and church functions at the protected section.

5.4.5 Recreational spaces within residential areas

'*Health challenges 9(11.25%)'* was revealed as one of the most significant effect in the use and conservation of urban green spaces. During the field observations, the study noted that, there were limited space for recreational activities which according to the inquiry it was viewed as a health challenge. Also, due to these limited space, the study established that, most residences lacked space for holding solid waste thereby forcing them to throw them along the roadside which again was seen as a breeding ground for the diseases. For example, along Mwembe neighbourhoods the study noted several points of scattered solid waste. Similarly, this finding was noted at Nyanchwa neighbourhood. Further, through field observations, it was revealed that, most children were playing along the road where the study revealed that, the area was not conducive since there were waste water draining where the children played posing a health challenge.

Moreover, the study disclosed that, most residences were squeezed to an extent in case of emergence the rescue team cannot penetrate to help. Figure 51 indicated the real situation at the field.

Figure 50: Showing incidences posing health challenge in the study area



Source: *Field Survey, 2021.*

Contrary to this finding, on low residential area at Milimani, it revealed different results. This observation raised the question on the health conditions of the residents at high and medium neighbourhoods. On further inquiry with the community health worker at Mwembe and Nyanchwa, the study established from the statistics that, most patients with health related complications as a result of polluted air and water were from Mwembe and Nyanchwa where the study revealed they resided at filthy environment. Further, the health official reported that, most patients diagnosed with obesity, high blood pressure and diabetes were as a result of inadequate space for recreational use. Moreover, it was noted that, whenever these patients were advised to carry out daily exercises to meet their health standards, it forced them to go to the main highway or the public stadium which was far.

'Misused urban green spaces 6(7.5%)' was unveiled as the other significant effect in the use and conservation of green space in Kisii municipality. Observations made by the study indicated that, within the residences there were areas which were designated for playing ground for children, washing and cleaning area, kitchen and fruit tree gardens were converted to other urban land use activities by the developers. This finding reflected the misuse nature of the developers on already designated green space areas in urban residences.

The study enquired from the developer, what would be the motive behind the changing of the land use activity as earlier on designated, the study established that, they were doing so for economic gains latter than the benefits which were unseen and not accounted for. Similarly, the other respondent notified the study that, these spaces were well maintained but the population pressure coupled with tough economic times led to converting the whole area for economic gains. However, on inquiring from the director of planning, the investigation revealed that, there were no direct control over the misuse since most of them were under freehold tenure system.

Table 11: Summary of the effects of the reduced urban green spaces in the study area

S/No.	Type of urban green space	Effects of reduced green spaces on the aesthetics and environmental quality
1.	Riparian land Road reserve; a) Misused/blocked NMTs b) Urban flooding c) Reduced property value d) Low business attraction River riparian areas; a) Soil degradation	
3.	Cemetery	a) Reduced burial space b) Increased urban land use conflicts
4.	Wetlands	a) Biodiversity loss b) Unpredictable weather patterns
5.	Public Park	a) Reduced social life
6.	Sporting areas	a) Loss of Job opportunities
7.	Recreational spaces within residential areas	a) Loss of government revenue b) Health challenges c) Misused urban green spaces

Source: *Field Survey, 2021.*

5.5 Planning options to mitigate the effects of reduced green spaces in urban areas

This study sought to address the fourth research question which was;

What planning options exist to mitigate the effects of reduced green spaces in urban areas of Kisii Municipality?

Even though the inquiry had deliberated into possible green space planning interventions in urban areas, the study interrogated various institutions to establish the extent to which these institutions were mitigating the concern of the phenomenon. Similarly, the respondents were requested to give their opinions concerning the research.

This was done to establish the level of understanding of the urban residents on the effects of reduced green spaces in urban areas. This was achieved through the use of the household questionnaire where they shared their thoughts and views on the subject matter of study.

Further, the study requested key informants from both the national and county government to highlight possible planning interventions to discourse the consequences of diminishing green spaces in urban areas.

Table 12: Summary of the planning strategies in the use and conservation of urban green spaces

Type of urban green space	Site	Challenges	Effects	Planning strategy
Road reserves	-Along main highways in the study area	-High levels of poverty and ignorance	-Misused/blocked NMTs	-Demarcate and protect the road reserves -Strengthen public participation and awareness exercises
River riparian areas	Along selected rivers of Nyakomisaro and Nyanchwa	-Misused riparian reserves, -Ownership challenges	-Soil degradation	-Develop a comprehensive spatial plan for urban green space development -Promote policies and regulations which enhances riparian areas use and conservation
Cemetery	At Nyambera cemetery	-Political interference	-Reduced burial space -Increased urban land use conflicts	-Demarcate and protect the cemetery land -Designate and gazette the cemetery land -Prohibit rezoning of the cemetery land
Public Park	Opposite Ram Hospital	-Polluted park -Encroached park with other urban land use activities	-Reduced social spaces -Health challenges	- Demarcate and gazette the Public Park spaces -Designate and protect the park
Wetland	At Daraja Mbili area	-High completion from other urban land use activities -Fragmented wetland space	-Loss of biodiversity -unpredictable weather patterns	- Demarcate and gazette the wetland space -Promote policies and regulations which enhances wetland areas use and conservation
Recreational spaces within residential areas	a) High residences (Mwembe) b) Medium residences(Nyanchwa) c) Low residences (Milimani)	-Laxity in enforcement of development controls -Low levels of awareness and public participation	-Health effects -Misused residential urban green spaces	-Strengthen enforcement of development controls -Develop policies and regulations which enhances urban green space development in residential areas

Source: *Field Survey, 2021.*

5.5.1 Perception of respondents

In regard to the field survey, the respondents were of the opinion that; high levels of poverty and ignorance was the leading factor with 37% in the use and conservation of green spaces in urban areas. Equally, 29% was perceived to be laxity in the enforcement of development controls and 21% high competition from other urban land use activities and 13% low levels of awareness and public participation on the intrinsic benefits of the green spaces in urban areas of Kisii municipality. However, the study noted strongly that, reducing poverty and ignorance amongst the urban general public was considered to be the main strategy in controlling the encroachment and misuse of green spaces in urban areas. Thus, achieving resilient urban green spaces.

5.5.2 Findings from Kisii municipality

Kisii municipality was planned in 1971. Before extensions by Kisii county government to cover larger municipality, the study area was covering 29km^2.

The proposed coverage of the new municipality boundaries covers a land mass of 72km^2 which according to the county government it has not been gazetted. Since then, no any planning had been done to examine the changes on green spaces that have occurred. Although the new boundary has not been gazetted since the study area attaining municipal status in the year 2019 it lies between latitude 0°36’58.7’’S and 0°43’58.4’’S and longitude 34°40’58.8’’E and 34°49’48.2’’E respectively.

It also covered; Ekioga welcome road, Nyakoe Nyatieko road, Bobaracho, Kiogoro, Otamba and Menyinkwa. The study noted that, since the area was planned no any other planning had been considered, it was an indication that, green space areas had been interfered with especially in urban areas of Kisii municipality. Hence, there was need to recommend possible planning options to mitigate the effects of reduced green spaces in urban areas.

5.6 Summary of the research findings

Table 13: Summary of the study findings in Kisii municipality

Trend and magnitude in changes on urban green spaces	**Factors explaining the changing trend of urban green spaces**	**Effects of reduced green spaces on the aesthetics and environmental quality**
Environmental trends 1). Gradual increase of environmental hazards 2). Reduced urban green spaces with time 3). Steady decline of urban environmental quality Social trends 1). Unrelenting reduction of social life 2).Intensified urban land use conflicts with time 3) Continued exacerbation of health changes Economic trends 1). Ongoing decline of urban economy	Legal and Institutional factors **1.** Ineffective policy and legal framework **2.** Laxity in enforcement of development controls **3.** Conflicting institutional roles **4.** Low priority by planning authorities towards green space conservation **5.** Existing Development plans Environmental and demographic factors. 1. Polluted green spaces **2.** Green space fragmentation 3. Population growth Political and social factors High levels of poverty and ignorance **2.** Political interference **3.** Ownership challenges **4.** Lack of awareness and public participation **5.** Lack of finance/budget **6.** Lack of coordination between community and municipality Economic factors 1. High competition from other urban land use activities	Environmental Effects 1. Biodiversity loss 2. Unpredictable weather patterns 3. Urban flooding 4. Soil degradation Social effects 1. Reduced burial space 2. Reduced social life 2. Health challenges 3. Increased urban land conflicts Economic effects 1. Reduced property value 2. Increased grey development 3. Loss of job opportunities 4. Low business attraction 5. Reduced government revenue 6. Misused/blocked NMTs

Source: *Author's construct, 2021.*

CHAPTER SIX: SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

6.1 Introduction

The main drive of this study was to establish the factors and the effects of the changing trend of urban green spaces on aesthetics and environmental quality in Kisii municipality. Consequently, the study proposed planning strategies for the effects of the reduced urban green spaces in the study area.

6.2 Summary of the main findings

To examine the trend and changes on urban green spaces overtime, the study looked at the Kisii town physical development plan of 1971. Then it examined the trend and changes that have occurred in the years 2000, 2010 and 2020. The findings of the study were, there was a high land conversion rate to build up spaces for commercial and residential use. Further, the study established that, the decline of green spaces were gradual with time. This was examined using satellite images of different years. The revealed that, there were economic, residential and agricultural activities on green areas in the urban area of Kisii municipality. Consequently, the investigation noted irregular decline of green areas in urban places.

In regard to table 14 the study identified the trends, factors, effects and the key planning options in the use and conservation of urban green spaces in Kisii municipality.

Table 14: Summary of main findings on urban green spaces in the study area

Urban green space	Trend	Factors	Effects	Strategies
Riparian reserves	**Road reserves** -Gradual decline of road reserve size. -Increased structures along the road reserve with time	-High levels of poverty and ignorance -Ineffective policy and legal framework	-Misused NMTs -Urban flooding -Reduced property value	-Demarcate and protect the road reserves -Strengthen public participation and awareness exercises
	River riparian areas -On going encroachment into the riparian area	-Ownership challenges	-Soil degradation	-Promote policies and regulations which enhances riparian areas use and conservation -Develop a comprehensive spatial plan for urban green space development
Cemetery	-Increased cemetery land fragmentation (Years 2010 to 2020)	-Political interference -Lack of coordination between urban community and Municipal planning	-Reduced burial space -Increased urban land use conflicts	-Demarcate and protect the cemetery land -Designate and gazette the cemetery land
Public Park	Encroached (Years 2014 to 2020)	-Polluted urban green space	-Reduced social life	-Designate and protect the park
	of the wetland 2010 to 2020 period -Unrelenting environmental hazards	urban land use activities	-Unpredictable weather patterns	wetland spaces -Promote policies and regulations which enhances wetland areas use and conservation
Recreational spaces within residential areas	-Unending misuse of residential urban green spaces -Everlasting health challenges	-Low levels of awareness and public participation -Laxity in enforcement of development controls -Lack of finances/budget	-Health challenges -Misused residential urban green spaces	-Strengthen enforcement of development controls -Develop policies and regulations which enhances urban green space development in residential areas

Source: *Field Survey, 2021.*

6.3 Conclusions

The study established that the phenomena of the decline of urban green spaces is escalating over time. The study investigated; high levels of poverty and ignorance, obsolete physical development plans, laxity in enforcement of development controls, ineffective public sensitization and awareness creation, low priority by planning authorities towards urban green space conservation, weak legal and policy framework and political interference were the factors the study was investigating. Similarly; loss of biodiversity, misused/blocked NMTs, reduced burial space, unpredictable weather, urban flooding, overflowing of sewerage networks, soil degradation, health changes, fragmented green spaces and declined urban environmental quality were significant effects of the study. However, the inquiry concluded that, high levels poverty and ignorance on urban dwellers and obsolete physical development plans could be the main factors on the reduction of urban green spaces in Kisii municipality. Thus, making this inquiry necessary.

6.4 Recommendations

The study recommended as follows;

1. The Kisii county planning authority to strengthen enforcement of development control in the area of study.
2. The County and national governments to formulate legal and policy framework necessary for development of urban green spaces in the study area.
3. In line with the Physical and Land Use Planning Act, lead agencies in land matters should designate, demarcate and gazette all urban green spaces.

6.5 Areas of Further Study

1. A scientific study to be conducted to find out how urban green spaces can be successfully developed in Kenyan urban areas.
2. A research to be done to find out the applicable planning standards on the development of green spaces in urban areas of Kenya.

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Appendix 1: Data Needs Matrix

Study Objective	Data Needs	Indicators	Method of data collection	Sources of data	Data collection Instruments	Analysis of Data	Data presentation
Trend and Changes on green spaces overtime	1).Demographic data	-Increased municipality population	-Interview	-Land developers	-Key informant guide	Qualitative analysis	Report
		-Migration trends	-Literature review	-Kisii County Government	-Observation guide	Photographic analysis	
		-Settlement patterns	-Observations	-Land owners	-Camera	Descriptive analysis	
		-Living spaces	-Photography		-Household questionnaire	Bar graphs	
	2). Economic data	-Reduced economic gains	-Interview	-Land developers	-Key informant guide	Descriptive analysis	Report
		-urban property value	-Literature review	-Kisii County Government	-Observation guide	Photographic analysis	
		-poor living standards	-Observations	-Land owners	-Camera	Bar graphs	
		-reduced individual income	-Photography		-Household questionnaire	Pie charts	
		-destroyed properties				Qualitative analysis	
	3). Environmental data	-reduced environmental quality	-Interview	-Land developers	-Key informant guide	Descriptive analysis	Report
		-poor microclimate	-Literature review	-Kisii County Government	-Observation guide	Photographic analysis	
		-Overflow of sewerage	-Observations	-Land owners	-Camera	Bar graphs	
		-Urban flooding	-Photography		-Household questionnaire	Pie charts	
		-Soil degradation				Qualitative analysis	
		-Unpredictable weather					
		-Soil erosion					
	4). Health data	-Reduced social life	-Interview	-Land developers	-Key informant guide	Descriptive analysis	Report
		-Loss of life	-Literature review	-Kisii County Government	-Observation guide	Photographic analysis	
		-Health challenges	-Observations	-Land owners	-Camera	Bar graphs	
			-Photography		-Household questionnaire	Pie charts	
						Qualitative analysis	

Study Objective	Data Needs	Indicators	Method of data collection	Sources of data	Data collection Instruments	Analysis of Data	Data presentation
Challenges Explaining the Decline of green space	1). Demographic	-High demand for living space -Zoning standards collapse	-Interview -Literature review	-Land developers -Kisii County Government	-Key informant guide -Observation guide	- Descriptive analysis -Photographic analysis	Report
		-Migration into the municipality	-Observations	-Land owners	-Camera	Bar graphs	
		-Loss of land holding sizes	-Photography		-Household questionnaire	Pie charts	
		-Irregular green space subdivision/fragmentation				Qualitative analysis	
	2). Environmental	-Polluted green spaces	-Interview	-Land developers	-Key informant guide	- Descriptive analysis	Report
		-Poor urban microclimate	-Literature review	-Kisii County Government	-Observation guide	Photographic analysis	
		-Environmental hazards	-Observations	-Land owners	-Camera	Bar graphs	
		(soil erosion and urban flooding)	-Photography		-Household questionnaire	Pie charts	
		-Air and water pollution -Degraded soils				Qualitative analysis	
		-Decline of indigenous plant and animal species					
		-Overexploitation of natural resources (overdependence)					
	3). Economic	-Overstretched infrastructural facilities -Reduced property value	-Interview -Literature review	-Land developers -Kisii County Government	-Key informant guide -Observation guide	- Descriptive analysis Photographic analysis	Report
		-High living standards	-Observations	-Land owners	-Camera	Bar graphs	
		-Low economic gains	-Photography		-Household questionnaire	Pie charts	
		-High cost of residential places				Qualitative analysis	
		-High cost of food					
	4). Social	-Declined social life	-Interview	-Land developers	-Key informant guide	- Descriptive analysis	
		-Increased epidemics	-Literature review	-Kisii County Government	-Observation guide	Photographic analysis	Report
		-Social segregation	-Observations	-Land owners	-Camera	Bar graphs	
		-Emergence of social classes	-Photography		-Household questionnaire	Pie charts	
		-Formation of informal networks				Qualitative analysis	
		-Loss of community values					

Study Objective	Data Needs	Indicators	Method of data collection	Sources of data	Data collection Instruments	Analysis of Data	Data Presentation
	5). Planning policies and institutional management.	-Ineffective enforcement of planning standards -Ineffective institutional management	-Interview -Literature review	-Land developers -Kisii County Government	-Key informant guide -Observation guide	- Descriptive analysis Photographic analysis	Report
		-Weak policies	-Observations	-Land owners	-Camera	Bar graphs	
		-Ineffective land use and development plans	-Photography		-Household questionnaire	Pie charts Qualitative analysis	
Effects of reduced urban green space	1). Environmental	-Degraded soils	-Interview	-Land developers	-Key informant guide	- Descriptive analysis	Report
		-Climate change	-Literature review	-Kisii County Government	-Observation guide	Photographic analysis	
		-Poor urban environmental standards	-Observations	-Land owners	-Camera	Bar graphs	
		-Environmental disasters	-Photography		-Household questionnaire	Pie charts	
		-Decline of plant and animal species				Qualitative analysis	
		-Increased exploitation of natural resources -Soil erosion					
	2). Economic	-Decline of property value -Decline of economic gains	-Interview -Literature review	Land developers -Kisii County Government	-Key informant guide -Observation guide	- Descriptive analysis Photographic analysis	Report
		-Destroyed urban infrastructure	-Observations	-Land owners	-Camera	Bar graphs	
		-Reduced income sources	-Photography		-Household questionnaire	Pie charts Qualitative analysis	
	3). Social	-Loss of social life	-Interview	-Existing -Land developers	-Key informant guide	- Descriptive analysis	Report
		-Declined community values	-Literature review	-Kisii County Government	-Observation guide	Photographic analysis	
		-Loss of life	-Observations	-Land owners	-Camera	Bar graphs	
		-Epidemic diseases	-Photography		-Household questionnaire	Pie charts	
		-Social segregation/classes				Qualitative analysis	
		-Formation of new social networks					

Study Objective	Data Needs	Indicators	Method of data collection	Sources of data	Data collection Instruments	Analysis of Data	Data presentation
	4). Planning policies and institutions framework	-Poorly coordinated institutions	-Interview -Literature review	-Land developers -Kisii County Government	-Key informant guide -Observation guide	- Descriptive analysis Photographic analysis	Report
		-Ineffective governance	-Observations	-Land owners	-Camera	Bar graphs	
			-Photography		-Household questionnaire	Pie charts	
		-Weak institutional framework				Qualitative analysis	
Planning options to mitigate the effects of reduced urban green spaces	1. Designate and gazette green spaces	a). Urban planning policies b). Legal framework c) Planning standards	-Interview -Review of planning policies - Review of planning standards	-Land developers -Kisii County Government -Land owners adjacent to green spaces	-Key informant guide -House hold questionnaire	-Qualitative analysis	Report
	2. Develop a comprehensive spatial plan for urban green space development	a) Policies and legal Framework	-Interview	-Land developers/owners	-Key informant guide	-Qualitative analysis	Report
		b). Planning Standards c). Participation and partnership	-Review of planning policies - Review of planning standards	-Kisii County Government -National government	-House hold questionnaire		
	3. Curb high levels of Poverty and Ignorance on urban dwellers	a). Urban planning policies	-Interview	-Land developers/owners	-Key informant guide	-Qualitative analysis	Report
		b). Legal framework	-Review of planning policies	-Kisii County Government	-House hold questionnaire		
		c) Planning standards	-Barazas	-National government			
	4. Strengthen enforcement of development controls	a). Urban planning policies	-Interview	-Kisii County and National Government	-Key informant guide	-Qualitative analysis	Report
		b). Legal framework	-Review of planning		-House hold questionnaire		
		c) Planning standards					

Source: *Field Survey, 2021.*

Appendix 2: Former Kisii municipality physical development plan of 1971

Appendix 3: Household Questionnaire

UNIVERSITY OF NAIROBI

DEPARTMENT OF URBAN AND REGIONAL PLANNING

PLANNING RESEARCH STUDY ON CHALLENGES ON THE USE AND CONSERVATION OF ON GREEN SPACES IN URBAN AREAS. A CASE OF KISII MUNICIPALITY.

Preamble:

This questionnaire is in aid of a research thesis conducted by Nyamache Mogire Cyrus, a master's candidate (in Planning) in the Department of Urban and Regional Planning, School of Built Environment, University of Nairobi. The research is on 'Implications of urban developments on green spaces.' The researcher is using a case study of urban areas of Kisii Municipality.

Declaration:

The information generated through this questionnaire will be used for academic purposes only and will be held professionally.

Section I: Survey instrument identification and tracking

Q1. Name of interviewer……

Q2. Instrument Id No. …….

Q3. Date of Interview……

Q4. Ward name …….

Section II. Information on respondent

Q/No.	Questions	Responses (Please mark appropriately)	
Q5	Name of respondent (optional)		
Q6	Age (Years)		
Q7	Gender	1. Male 2. Female	
Q8	Category of respondent	1. Land developer/owners 2. Tenants **3.** Business men 4. Government officers	

Section III: Trend and magnitude in changes on urban green spaces (Tick appropriately)

Q9. Are you a resident of the study area?

YES ☐ **NO** ☐

Q10. If yes in the question 9, indicate how long you have stayed in the study area?

a) 1 – 10 Years ☐
b) 11 – 20 Years ☐
c) 21 – 30 Years ☐
d) 31 – 40 Years ☐
e) 41 and over years ☐

Q11. Kindly indicate the trend in the use and conservation of urban green spaces over the last 20 years in the study area? (Tick appropriately)

Name of urban green space	**Increased change**		**Decreased change**	**No change**
1. Cemetery				
2. Wetland				
3. Sporting areas				
4. River riparian land				
5. Road reserve				
6. Stadium				
7. Public Park				
8. Recreational space within residential places	**a).** Low			
	b). Medium			
	c). High			

SECTION IV: Factors explaining the decline of urban green spaces

Q/N	Question	Responses (Please tick appropriately)	Remarks
Q12.	Are you aware of urban green space facilities in Kisii municipality?	Yes No	
Q13.	If your response to Q12 is yes, do you use these facilities?	Yes No	
Q14.	If your response to Q13 is No, what are the reasons for your answer? (Tick appropriately)	a) Not accessible b) Polluted c) Encroached d) Fragmented e) Degraded f) Costly g) Others (specify)	

Q15	Questions	Factors for declined urban green spaces		Tick (where applicable)
	Identify the factors facing the use and conservation of urban green spaces in Kisii Municipality?	**Legal and Institutional factors**		
		1.	Laxity in enforcement of development controls	
		2.	Ineffective legal and policy framework	
		3.	Low priority by planning authorities towards urban green space conservation	
		4.	Conflicting institutional roles	
		5.	Obsolete **e**xisting development plans	
		Environmental and demographic factors		
		1.	Pollution of urban green spaces	
		2.	Green space fragmentation	
		3.	Population growth	

Q15	Questions	Factors for declined urban green spaces		Tick (where applicable)
		Political and social challenges		
		1.	High levels of poverty and ignorance	
		2.	Political interference	
		3.	Ownership challenges	
		4.	Lack of awareness and public participation	
		5.	Lack of finance/budget	
		6.	Lack of coordination between community and municipality	
		Economic challenges		
		1.	High competition from other urban land uses	
		2.	Selfish interests	
		3.	Inadequate resources	

Q16.	Do you participate in the use and conservation of urban green spaces? (Tick Appropriately)	Yes	
		No	
Q17.	If No in question Q16, what are the reasons?	a) Lack of awareness	
		b) Lack of involvement by planning authorities	
		c) Inadequate accessibility to information	
		d) Poor timing for participation	
		e) Language barrier	
		f) High population densities	
		g) Any other (specify)	

Q18.	How do you use the available urban green spaces within the area of study?	a) Worship b) Playing	
		c) Courtship	
		d) Resting	
		e) For leisure	
		f) .Meeting area	
		g) Agricultural activity	
		h) Housing purposes	
		i) Environmental purposes	

Section V: Effects of reduced urban green spaces

Q19.	What are the effects of reduced green spaces in Kisii municipality?	**a) Environmental effects**		(**Tick appropriately**)
		1.	Biodiversity loss	
		2.	Overflowing of urban sewer networks	
		3.	Destruction of urban green spaces	
		4.	Unpredictable weather patterns	
		5.	Urban flooding	
		6.	Soil degradation	
		7.	High urban noise level	
		b) Economic effects		
		a)	Reduced property value	
		b)	Increased grey development	
		c)	Loss of job opportunities	
		d)	Low business attraction	
		e)	Reduced government revenue	
		f)	Misused/blocked NMTs	

		c) Socio-cultural effects		
		1.	Reduced social life	
		2.	Reduced burial space	
		3.	Deterioration of human health	
		4.	Increased urban land use conflicts	
		5.	Low life expectancy	

Section V: Strategies to mitigate the effects of declined urban green spaces

Q20. What measures can you propose to ensure sustainable urban green spaces in Kisii Municipality?

No.	Strategy	Tick appropriately
1.	Strengthen enforcement of development controls	
2.	Promote public participation and awareness	
3.	Promote good governance and political good will	
4.	Proper coordination of planning institutions	
5.	Promotion of political good will	
6.	Introduction of the concept of green spaces in learning institutions	
7.	Establishment of GIS and remote sensing departments	
8.	Designate and gazette all green spaces in urban areas	
9.	Decentralization of economic activities	
10.	Policy formulation to protect green spaces in urban areas	

Q.21 What is your general comment on the use and conservation of urban green spaces in Kisii Municipality?

……

……

.....

Thank You

Appendix 3: A typology of urban green spaces

Main types of green spaces in urban areas			
			Parks and gardens
			Informal recreational areas
			Outdoor sports areas
			Play areas
			Housing green space
			Other incidental green space
		Private green space	Domestic gardens
			Remnant farmlands
			City farms
			Allotments
			Cemeteries
			Churchyards
			School grounds (including school farms and growing areas
			Other institutional grounds
			Open/running water
			Marsh fens
			Deciduous woodland
			Coniferous woodland
			Mixed woodland
			Moor/health
			Grassland
			Disturbed ground