GREEN SPACE DEPLETION IN URBAN AFRICA: A COMPARATIVE STUDY BETWEEN KUMASI AND ACCRA, GHANA.

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Abstract

Urban green spaces are important natural assets that support city growth in a variety of ways. However, statistics show that these regions are gravely threatened as a result of the dire situation in Africa. In order to design solutions to address the issue, this study set out to evaluate the forms and trends of the loss of green space. Accra and Kumasi, Ghana's two major cities, served as the focus of a comparative analysis of the issue using the multiple case study method. Approaches utilizing a mix of methods were employed. Representatives of the stakeholders and local people made up the study population, and various qualitative approaches (document review and interview guides) were used. Questionnaires and an examination of land use and land cover made up the quantitative methodology.

The study found that urbanization, weak implementation of planning laws and controls, a lack of cooperation among stakeholders, and other factors have all contributed to the rapid loss of green space in Accra and Kumasi during the past ten years. The study selected specific green spots in the study locations, two from Kumasi (Adehyeman Parks, Fante new town Park), and one from Accra (Achimota forest), in order to gain a thorough understanding of the pattern of the loss of green space. As the hub of commerce in Ghana, Kumasi has seen the loss of the Adehyeman Gardens and Fante New Town Park to primarily commercial activity while the Achimota forest has been lost to mostly settlement.

Although both Kumasi and Accra lost green space between 2000 and 2022, the comparison analysis showed that Kumasi continued to lose green space while Accra experienced a slight rise in 2022. However, over time, the quantity of green space lost in both locations doubled. Some sustainable approaches to solving the problem include the use of bulldozers, education, stakeholder cooperation, and allocating funds to manage green places.

Key words: **Depletion, Accra metropolitan area, Kumasi metropolitan area, green space**

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CHAPTER ONE

INTRODUCTION

1.1 Background

Many cities around the globe are challenged by growing urban populations. Cities are anticipated to absorb most of the future growth in the global population over the next forty years because more than half of the world's population now lives in urban areas (United Nations, 2010). Due to this, urban planners are placing more emphasis on the urban infill plan to boost population density and bring people together nearer to public transportation, places of work, and urban amenities (Zhou et al., 2013). However, there are also rising worries about how to incorporate and maintain urban green space in development of future cities (Eigenbrod et al 2011). Due to the health and recreational advantages associated with green spaces, such as parks and gardens, Howard, who developed the garden city concept in 1902, emphasized their importance in town planning. Parks, urban forests, wetlands, meadows, and street trees are examples of urban greenery that are essential to the metropolitan ecosystem (World Health Organization, 2012). The originator of American landscape design, Frederick Olmsted, called green areas "the lungs of the city" (Scheer, 2001).

Now, the Sustainable Development Goal (SDG) 11 of the United Nations on sustainable cities and communities highlights the significance of urban green space (United Nations, 2016). This is because the pursuit of sustainable urban development has taken center stage in this era of accelerating urbanization and climate change, along with the challenges these phenomena pose to socioeconomic and human health. In many urban agglomerations, urban green space serves as a critical ecological and health function, such as regulating climate conditions, enhancing air quality, fostering biodiversity, and improving flood control, according to the World Health Organization in 2016.

The blue-green infrastructure framework, a strategy for building resilience to urban flooding that makes use of urban green spaces and naturalized water flows, has expanded the discourse on urban green spaces in urban ecosystems, according to emerging global literature, such as a research study by Lamond and Everett published in 2019.

Urban green spaces have many advantages for cities, but statistics indicate that they are disappearing in many cities around the globe. For instance, a study of land-use changes in 25 European cities showed that between 7.3 and 41% of green spaces were lost to various land uses. Similar findings were found in the United States of America, where a survey on land-use transformation in 274 metropolitan regions found that 1.4 million hectares of green space had been converted to various land use developments (Wolch et al., 2014). Numerous towns, including Paris, London, Berlin, and Vienna, have worked to include urban vegetation in their city plans (Hall, 1997).

Studies reveal that most urban green places in developing nations have been extensively destroyed to make way for various human activities, making the situation there even more dire. Studies in various African nations, such as Mpofu (2013) in Ethiopia; Oduwaye (2013) and Fuwape & Onyekwelu (2011) in Nigeria; Adjei Mensah (2015) in Ghana, found that there has been a significant loss of urban green space, with the result that many African cities have very little green space on their landmass. Similar findings from other studies that concentrated on developing nations showed that urban green areas were disappearing at an alarming rate (Yusof, 2012; Gomes & Moretto, 2011). Cities in developed nations generally have more green area than cities in developing nations. In contrast to Africa, developed nations have given much attention and respect to landscape planning.

1.2 Research context

The economy of Ghana has grown extraordinarily. There is only one catch: care must be taken to safeguard and manage the natural resources that underlie this accomplishment. Due to increases in the price and production of cocoa, gold, and oil over the past 30 years, Ghana has advanced: real GDP growth has quadrupled, extreme poverty has decreased by half, and Ghana was upgraded to a Lower Middle-Income Country classification in 2011. (Srivastava and Pawlowska, 2020). A significant environmental expense has been incurred by Ghana's elusive economic success. The Sustainable Development Goals (SDGs), specifically SDG 15, which aims to "sustainably manage forests, fight desertification, and stop and reverse land degradation and biodiversity loss," are in jeopardy due to the structural and functional changes brought about by economic development in Ghana.

The expansion of the nation's economy has had a sizable effect on green areas. According to a few studies conducted in Ghana (Addo-Fordwuor, 2014; Appiah, 2012; Adarkwa, 2011), the main causes of the loss of green space are infrastructure improvements like roads and residential and commercial structures. In the Ashanti Region's Kwabre East Municipality, the percentage of green space decreased over a 15-year span from 71% in 2000 to 60% in 2010 to 42% in 2015, according to a study by Takyi et al. (2022). The two largest towns in Ghana, Accra and Kumasi, are where this is worse. Kumasi has drawn a lot of interest from academics. Statistics reveal that many of the city's green spaces have been depleted, with only a small portion left, which together with other open spaces make up about 10.7% of Kumasi's total land area (Adjei-Mensah, 2014). According to research by Nero (2017), Kumasi had 33% of its urban areas covered by green space in 2017. The decline in this number was four times faster in recent years (2009-2014) than it had been in years prior (1986–2014). Kumasi, the "second-largest city in Ghana," which earned the title "Garden City of West Africa" as a result of the 1945 city plan, experienced a swift paradigm shift in the post-independence period, claims Amoako and Korboe (2011). In addition, he claims that Kumasi's "green spaces" have declined more rapidly in the post-independence period, gradually losing their distinction. This, he claims, is due to the city's rapid urbanization. Amasa (2015) claims that some of the areas marked on the Kumasi layout have been encroached upon, and most of the ones that remained are in disrepair. According to preliminary studies, many of Kumasi's wetland regions are being developed, and where there are no buildings, the nature reserve that provided shade for the river and streams has been eliminated. It also suggests that greywater runoff from homes has contaminated the majority of the city's rivers and streams, converting them into urban wastewater.

In Accra, research by Stow et al. (2013) revealed a 5.9% decline in vegetation cover between 2002 and 2010. Hosek (2019), using an I-Tree Canopy model, once more demonstrated the disparities related to the distribution of trees in Accra and its communities. According to the research, the average crown cover in low-poverty areas like Achimota was 23.1%, while it steadily declined to 3.5% in areas with the highest levels of poverty like Chorkor (Hosek, 2019). The distribution of vegetation cover is depicted by the i-Tree canopy model, which also assesses the value of vegetation cover by valuing ecosystem services like carbon sequestration, reduction of air pollution, and hydrological advantages (NRS, 2018). According to a Land Use Land Cover Analysis published by Puplampu & Boafo in 2021, the Accra metropolitan area experienced

unprecedentedly quick and rapid shifts in land cover between 1991 and 2018. Built-up areas continuously grew in comparison to other land use and land cover types, at the expense of grassland, dense vegetation, and water bodies, according to the supervised classification of Landsat data for the time under assessment.

1.3 Problem statement

Studies on sustainability have paid a lot of attention to urban green spaces, especially in developed nations. More study on urban green spaces is concentrated in Europe, North America, and Asia than in Africa as a result of the high priority given to green spaces in those regions' development objectives. This has made reading material about Africa's urban green space challenging to come by. For instance, Haas et al. (2021) studied urban green areas and evaluated their contribution to inclusion promotion in the Netherlands. In Australia, participation and societal inclusion are the two main goals of urban green areas (Bush & Doyon, 2017). Studies and policies on the purposes and advantages of urban green space have frequently received little to no consideration in many developing economies.

In Sub-Saharan Africa, where cities are urbanizing quickly and in an era of shocks and stresses related to climate change, such as floods, heatwaves, and drought, this gap presents numerous challenges for urban planners and managers. Again, there has not generally been research on how to make metropolitan green spaces sustainable. Works that address issues like accessibility, benefits, contributions, and usage of these locations continue to dominate the literature on green space.

According to Ahmadi and Toghyani in 2011, planning mechanisms are crucial for developing a framework for sustainable urban development. Urban green space and rapid urban development can coexist, as evidenced by places like Singapore (Tan et al. 2013). Unfortunately, many African cities do not have effective planning and management frameworks (Cobbinah & Darkwah, 2016), and even in those that do, as in the master plans of Abuja and Zaria in Nigeria (Zakka et al. 2017), urban development in Africa still proceeds without taking urban green spaces into account and evidence on the ground suggests a more general dearth of attention to urban green spaces. As the demand for urban land increases, urban green space is ignored, rezoned, or encroached upon by urban planners and residents to provide space for land uses with greater economic benefits, such as commercial, residential and industrial uses (Amoako & Adom-Asamoah, 2018)

The impact of planning mechanisms on urban green spaces was not considered in the few studies conducted on urban green spaces. Adjei Mensah (2015) PhD thesis and a research work by Cobbinah & Nyame (2021) in Africa attempted to close this gap but was unable to do so because it was limited to a case study of Kumasi and did not give a comprehensive account of sustainable methods and the role of planning mechanism for preserving urban green areas. To close the gap and contribute to knowledge, this study employed a multiple case study approach and analyzed the nature of three green spaces in order to propose interventions.

1.4 Relevance of the study

The study of urban green space in developing nations will benefit academically from the addition of planning and spatial perspective. This study adds weight to the pressing issue of sustainability, particularly for planners trying to resolve environmental sustainability complexities. This research uses a multiple case study methodology to provide a thorough and comparative analysis of the state of urban green space in Accra and Kumasi, Ghana's two largest cities facing the rapid depletion of the green space. This will paint a clear image of the condition and character of green spaces, offer strong support for generalizations, and serve as a source of scientific knowledge and thorough reference for all parties involved. Additionally, it will serve as a foundation for additional study on the loss of green space.

The societally relevance of this study is that it will provide information on the reasons for the loss of natural space in Ghana's urban areas and how those reasons might be lessened. This will lead to the development of a conceptual framework of workable solutions that will act as a guide for the government and other relevant stakeholders in managing and developing urban green spaces in Ghana. If these suggestions are followed by these decision-makers, it will encourage the preservation of green areas in metropolitan areas.

1.5 Research Objectives

The overall objective of the study is to assess the pattern and drivers of the depletion of green spaces in Ghana’s urban areas with Kumasi and Accra as a case.

Specifically, the study seeks to achieve the following objectives.

1.To analyze the green space depletion in Accra and Kumasi

2.To examine the drivers of the green space depletion

3. To identify barriers and enablers of green spaces

4. To offer policy recommendation

1.6 Research Questions

The research seeks to find an answer to the question: what is the pattern and drivers of the depletion of green spaces in Ghana?

In this, the following set of questions would help in providing answers to the overall question. The questions are;

- What is the nature and existing condition of green spaces in the City of Accra and Kumasi?
- What are the drivers of the green space depletion in Accra and Kumasi?
- What are the barriers and enablers of green space depletion?

1.7 Organization of the study

There will be five different chapters throughout the work. The introduction to this research is given in the first chapter. It suggests the dense arrangement this subject naturally entails. As a result, it offers enough background information for the reader to comprehend the motivation for the study as well as the goals the researcher has for carrying it out. The chapter will provide a summary of the entire investigation. The second chapter of the paper evaluates prior research on the research issue with a focus on the study's goals. It provides excerpts from books, journals, and compiled works that are essential for carrying out this research and supporting important conclusions and suggestions.

The collection, organization, and analysis of data are also covered in length in chapter three. It covers the various methods and equipment needed to gather and analyze data in order to produce reliable results. The study findings and analyses presented in chapter four were obtained using the technique described in chapter three. The summary of findings, study conclusions, and suggestions for research users are all included in chapter five.

CHAPTER TWO
THEORETICAL FRAMEWORK

The theoretical framework starts by defining green space. This is followed by the importance of green space to urban planning. As a particular kind of urban development model, this section also addresses the main theories on planning around green space.

2.1 Defining green space.

The term “green space” is a recent term and its origin can be traced from the urban nature conservation movement and the European thinking about green space planning which started in the UK (Swanwick et al., 2003; Dunnett et al., 2002). The meaning of green space is often confused with other terminologies in urban planning, especially open space and public open space. In most cases these terms are used loosely or interchangeably. For clarity between these terms and better understanding of the meaning of green spaces in the urban planning practice, some authors have come up with the following definitions in both developed and developing countries.

With the context of developed nations, Fratini & Marone (2011) refer to all places that are naturally or intentionally coated in greenery as urban green spaces. Urban green spaces are all vegetated areas, including those with trees, bushes, and grasses, according to Fam et al. (2008). Urban green spaces, according to Dunnett et al. (2002), are territories that are mostly composed of open, porous, "soft" coverings including dirt, trees and bushes, shrubs, woods, parks, gardens and swamps. These lands can be individually or openly accessible or regulated. Jim & Chen in 2003 added that urban green spaces are external spaces with some greenery and are found mainly in semi-natural settings. Urban green spaces, according to Kit Campbell Associates (2001), are any covered land or building, water feature, or geological feature that can be found in urban environments. Urban green spaces, as defined by Baycan-Levent et al. (2002), are either public or privately owned urban areas that are largely covered with vegetation and that are accessible to users directly or indirectly. Cilliers, however, used the term "urban green spaces" in the context of developing nations in 2013, to refer to the whole urban green facilities, which includes a connectivity of all organic, quasi, and man-made ecological systems found at all spatial and temporal scales within, around, and between urban areas. According to Yusof (2012), an urban green space would be any space or land parcel that is coated in plants or waters in an urban area.

The term "green space" is a relatively recent concept that defines the greenery in metropolitan areas, as opposed to the term "open space," which has several dubious connotations, including reference to the natural environment outside of cities (Swanwick et al., 2003). According to Swanwick et al. (2003), the Sheffield research initiative tried to give clearer definitions for these important terms. They argued that the external environment and buildings are the two different types of components that make up an urban area (see figure 2.1).

Grey and green spaces make up the entire urban environment. The term "grey space" simply refers to terrain that has more sealed, impermeable, and "hard" surfaces like concrete, asphalt, or pavement. The two different types of grey spaces are civic grey spaces, which are publicly accessible areas created primarily for public enjoyment, such as town squares, plazas, and esplanades, and functional grey spaces, which serve a specific purpose like highways, pavements, car parks, and many more.

On the other hand, a green space is a place where many of the surfaces are unsealed, permeable, and "soft," such trees, bushes, grass, and soil (Swanwick et al.,2003). As a result, the term "urban green space" refers to all areas of land that fall under this definition of "green space" (Swanwick et al., 2003). Sports fields, vacant property, public parks, natural or semi-natural areas, greenways, roadside edging, waterways, railroads, and backyard gardens are all included in this (Smith et al., 2005; Caula et al., 2009).

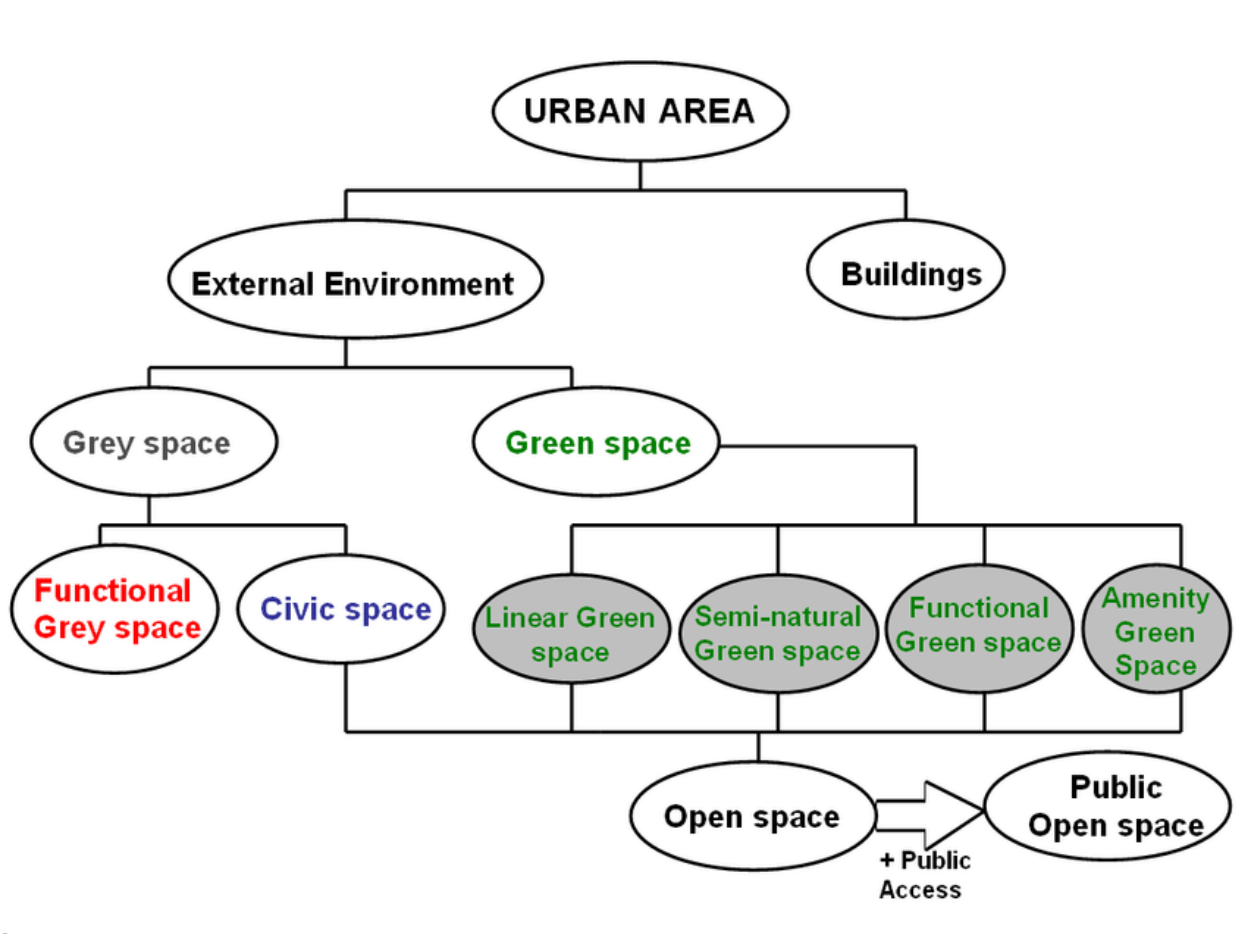


Figure 2.1: Description of green spaces in urban landscape

Source: Swanwick et al. (2003)

Typology of green space

Taking all of the aforementioned concepts into consideration, the term "urban green spaces" is used in the context of this study to refer to all natural and semi-natural spaces in urban areas that are primarily covered by vegetation, whether they be publicly or privately owned and are readily available for human use. However, according to usage patterns, ecological purpose and outdoor recreation function, green spaces can be categorized in a variety of ways. The following typology, which was created by Dunnett et al. (2002) is used for this study. These include recreational green spaces, functional green spaces, semi-natural green space and linear green spaces respectively.

1.Amenity green space green spaces are primarily intended to provide access to both aesthetic pleasure and recreational comfort. They specifically encompass both private lands and public spaces.

2. Functional green spaces are those that are mostly used for their intended function. They may be designated for recreation and used by city residents for this purpose. The functions they possess are the reason city inhabitants employ them. Their primary uses are in horticulture, cemeteries, education, and other institutions, as well as in agriculture.

3. Semi Natural living areas make up semi-natural green space. These living spaces are produced by their transformation into new living areas, the improvement of rural areas that were not previously included in urban green spaces, and the abandonment or degradation of areas. Although some of these habitats may or may not be open to the public, they all significantly enhance the metropolitan landscape.

4. Linear features, such as rivers and streams and transportation corridors, define linear green spaces (roads, railways). Although many linear green spaces are designed for enjoyment and nature preservation, some of them are also meant to have both features. Albeit they are classified by various types, urban green spaces provide similar functions.

Furthermore, using a combination of variables such as available facilities, the size and nature of green spaces as criteria, the Institute for Leisure and Amenity Green Space categorized green spaces into four hierarchical types (Swanwick et al., 2003)

- Principal/City/Metropolitan Park: It has a catchment area that spans the entire town or city, more than 8.0 hectares of land, and a variety of physical resources and amenities.

- District Park has a catchment area of between 1500 and 2000 meters, and its land covering can reach 8.0 hectares. There are a number of facilities, including play spaces and sports fields, as well as a variety of landscape characteristics.

- Neighbourhood Park: With a size of up to 4.0 hectares, it serves a catchment area of between 1000 and 1500 meters and offers both a variety of facilities and landscape characteristics.

- Local Park: It can cover up to 1.2 hectares and has a 500–1000-meter catchment area. It typically consists of a playground, an unofficial green space, and landscape elements but lacks other amenities.

These green spaces described above give users access to physical comforts like fresh air and resting spots, as well as possibilities for official or casual social connections with a variety of social groupings, customs, and cultural experiences in metropolitan settings (Lawton, 2007). The heart of urban life is found in its green spaces. Celebrations occur there, kids learn new skills, people acknowledge the seasons, and cultures mix. In these locations, friends interact, and social and business transactions take place (Project for Public Space, 2000). These functions that urban green spaces fulfill bring about a variety of advantages for city residents as well as for the sustainability of cities.

2.2 Importance of green space to urban planning

SDG 11: Make cities and human settlements inclusive, safe, resilient, and sustainable is the most pertinent to urban planning. Natural, man-made, and climate change effects pose significant threats to cities. Many of these problems could be addressed through urban planning with environmental concerns. Urban planning is a relatively new profession that arose from worries about health and wellbeing, specifically the prevention of diseases and illnesses caused by overcrowding, poor sanitation, and exposure to environmental pollution. An increasing body of research indicates a link between human health and wellbeing and the design and structure of towns, cities, and regions. Urban studies and planning research are now conducting research in these emerging areas. As a result, Kamenetz referred to urban planning as a "green collar" profession in 2009. A green-collar worker is one who works in the economy's environmental area. Green-collar workers or green jobs meet the demand for environmentally friendly growth. In general, they use environmentally

friendly design, policy, and technology to enhance conservation and sustainability (Sulich, Rutkowska, & Poplawski, 2020).

By 2030, planners should provide universal access to safe, inclusive, and accessible green and public spaces, particularly for women and children, the elderly, and people with disabilities, according to SDG 11 goal 11.7. To accomplish this goal, planners have implemented green infrastructure to improve the climate and environment (Woolley, 2003), provide habitat opportunities (Woolley, 2003), increase aesthetic appeal (McCormack et al., 2010; Sugiyama et al, 2010), and improve the urban landscape and livability. Historically, access to green space benefited wealthier and more privileged communities; thus, recent attention in urban greening has shifted to environmental justice concerns and community participation in the greening process (Nature of cities, n.d). In particular, urban greening has wide community revitalization effects in cities experiencing economic decline, such as the Rust Belt in the United States (Urban Greening with Sandra Albro, n.d.)

Green infrastructure contributes to a reduction in noise levels, an improvement in urban climate, and an improvement in air quality (Gidlöf- Gunnarsson & hrström, 2007). Urban green space reduces the urban heat island effect and makes cities feel cooler (Lawton, 2007). The plants that make up urban green spaces minimize air pollution by trapping particles, absorbing heavy metals and harmful gasses, and performing the function of an air filter (Dunnett et al., 2002; Lawton, 2007). By ensuring that rainwater is absorbed and retained, they minimize the detrimental effects of urban areas on natural water sources and manage the water cycle (Chiesura, 2004; Niemelä, 2014). This makes people of all works of life have access and right to the city.

Planners also help the local economy by providing job opportunities in order to reduce unemployment in their respective countries. Urban green area, which is being promoted by urban planners, has helped to create jobs.It is predicted that various activities on urban green areas in Australia will create employment chances for 80,000 individuals (Aldous, 2005). According to research by Blue Sky Green Space (2011), over 50,000 people are directly employed in public

parks and gardens in the United Kingdom, and many more work in fields related to green spaces, such as those that produce equipment and goods for parks.

2.3 Urban Development Model on Green space

Various urban development models or theories also consider the value of green spaces in urban development, in addition to the practical contributions that they provide to assist sustainable urban growth. The importance that these models place on green spaces is shown in the section that follows.

Garden city model

The garden city model is one of the key historic urban idealistic models which emphasized the importance of preserving the natural environment (Stahle, 2010; Baycan-Levent & Nijkamp, 2009). It was developed by Ebenezer Howard (1850-1929) to address societal and health issues caused by the industrial revolution at the end of the 18th century, such as overcrowding and pollution. He expanded on this concept in his book "Tomorrow: A Peaceful Path to Real Reform," first published in 1898 and subsequently revised in 1902 as "Garden Cities of Tomorrow" (Hall, 2002).

In formulating the garden city model, Howard (1902) observed that in order to solve the unhealthy habits in cities, towns, and the countryside (village), they must be integrated and that from this combination will emerge the garden city which will provide renewed hope and vitality.

According to the garden city concept, both cities and the countryside have distinct characteristics that draw people in. The beauty of nature, fresh air, sunshine, and the fruits of the earth attract people to the countryside, whereas cities attract people due to prospects such as employment, aspirations of progression, social enrichment, better wages, and cultural events (Clark, 2003). The proposed third magnet (garden city) combines "energetic and active urban life with all the beauty and delight of the countryside" without the drawbacks of either (Howard, 1902). In theory, the garden city concept was intended to bridge the gap between society and the natural environment (Sandstrom, 2009). It was to be a hybrid of city and country benefits, and it was envisioned as encompassing three magnets (Figure 2.2)

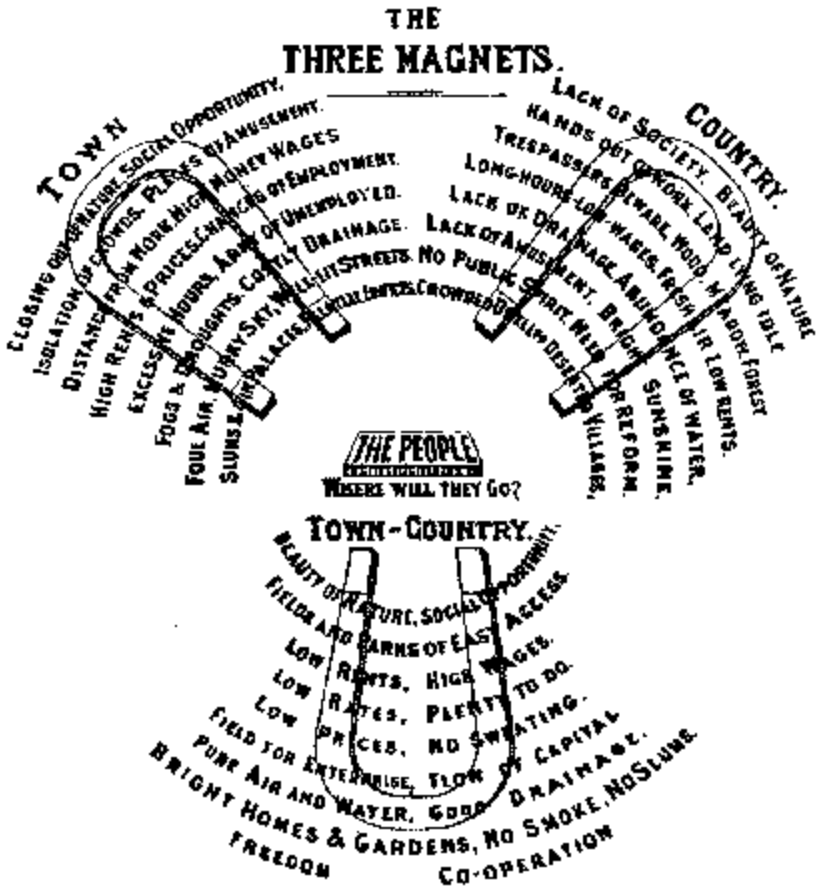


Figure 2.2: Ebenezer Howard's three magnets
Source: Howard (1902)

The garden city was to be constructed on 6000 acres of undeveloped agricultural land, with the city occupying 1000 acres near the center of the landmass and the remaining 5000 acres acting as a green belt. It was designed to house a community of approximately 32,000 people (Clark, 2003; Ward, 1992). Green areas were prominent in this model, accounting for more than half of the city's landmass. They were also placed at strategic vantage spots to allow city dwellers to appreciate the natural environment. Howard (1902), for example, designated the center of the garden city for the establishment of a public park.

Following the public garden, which was surrounded by big public buildings, there was a large space dedicated to a public park intended to provide city dwellers with a recreational avenue. Furthermore, the garden city's different road networks were lined with trees, and the housing

blocks had abundant garden space to integrate the roads and homes into the natural setting of the garden city.

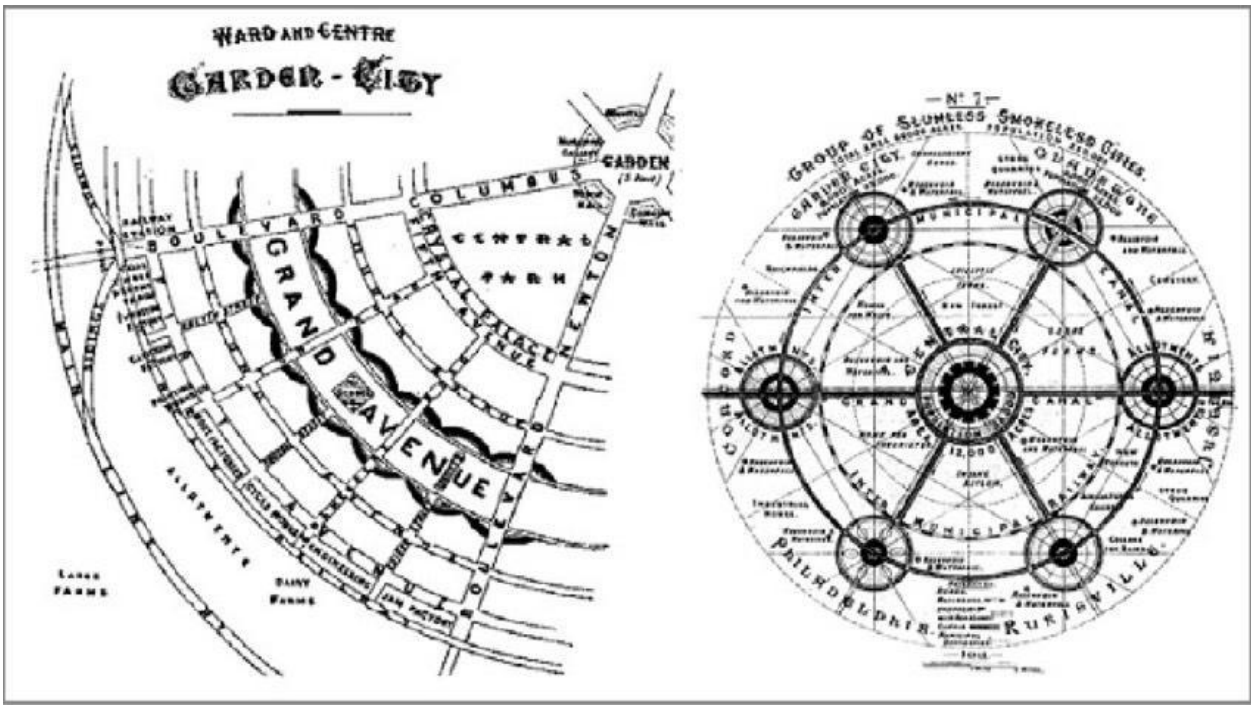


Figure 2.3: Structure of the garden city
Source: Howard (1902)

Letchworth and Welwyn Garden City were the first and second cities in the United Kingdom to effectively implement the garden city model. Following that, the model spread to other parts of the world through colonization, commerce, and the adoption of the United Kingdom's town planning policies by other countries. The garden city model has been implemented in several cities in developing nations, including Pinelands (South Africa), Kumasi (Ghana), and Putrajaya (Malaysia). Despite the enormous effect that the garden city model has had on preserving the urban natural environment, Bookchin (1974) believes that it fails to take into account social conflicts in productive relationships, income issues, and social interactions with nature. Aalen (1992) observed that Howard's belief that societal change could emerge from a new physical environment appears

to be a pipe dream. However, the model has received widespread acceptance in urban planning and is frequently cited when discussing new towns and green area development.

2.3.1 Green planning

The most recent methods of urban planning support creative ideas on how cities throughout the world may develop in the future. These ideas are referred to as "green planning" and are based on the idea that cities have complex metabolisms and operate like living organisms (Kennedy et al., 2007; Wolman, 1965). The urban themes promoted in the green planning literature are new urbanism, green urbanism, green cities and green infrastructure.

The idea of new urbanism was developed in response to the growing demand for sustainable practices in the field of urban planning (Bohl, 2000; Knaap & Talen, 2005). Beatley (2000) asserts that green urbanism should be used to distinguish new urbanism, particularly when it comes to urban planning and sustainable thinking. By reducing the amount of material and energy used, this is a way to develop urban areas that are healthy for both the environment and the people who live in them. By its content, uniqueness, level of implementation, and range of components used, green urbanism associates itself with the European nations (Beatley, 2000) However, a number of internationally renowned writers endorse and advocate for the ecological ideas put out by American cities (Birch & Wachter, 2008). Green urbanism did indeed originate and grow in Europe, but the Americans quickly picked up on its advantages and adopted it as a model. They also had the benefit of more room.

The term "green city" refers to a strategy for improving metropolitan regions' sustainability. It's a way of thinking about urban design that depends on the ecological services that green infrastructure may provide. In essence, this idea combines the elements of all the urban ideas previously discussed (the city interacting with nature, restoring the ecological values of the urban ecosystem, reducing resource and energy consumption, and utilizing the ecosystem services provided by the blue-green natural components).

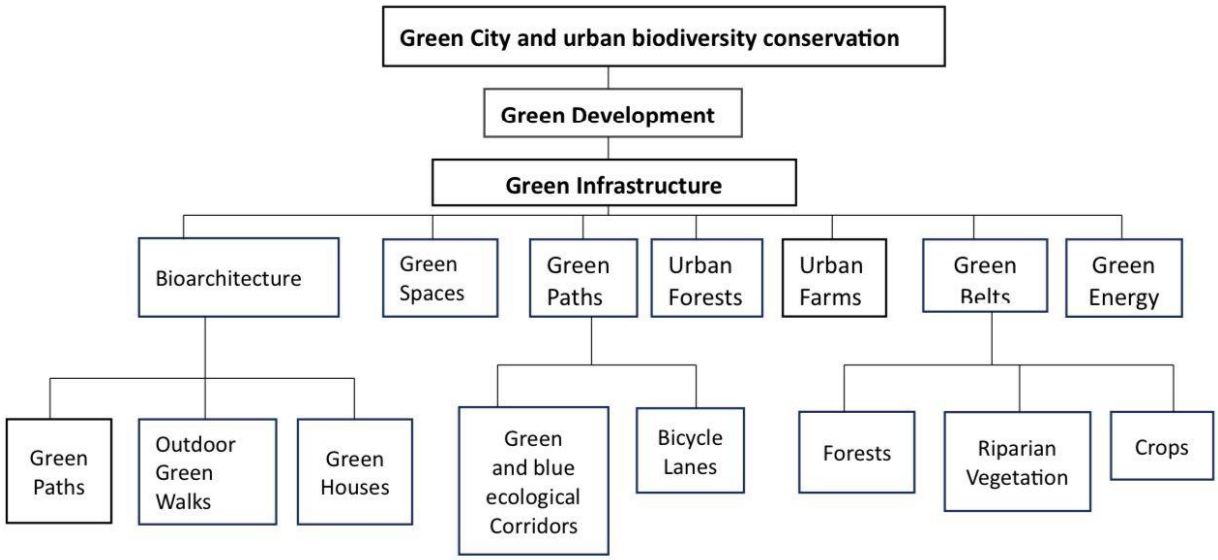


Figure 2.4: Hierarchical Diagram of a Green City Structure

Source: Manea et al., 2014

A network of connected green spaces and hydrographic features known as "green infrastructure" helps keep biotic processes in urban contexts close to their natural state while preserving and enhancing biodiversity. Thus, it encourages improving sustainability and quality of life (Benedict & McMahon, 2006). Urban greenness receives the same ranking as communication infrastructure, water supply systems, waste disposal systems, etc. due to its inclusion into the category of infrastructure elements. As a result, it becomes a necessary component for urban ecosystems, one whose presence, functionality, and diversity must be maintained (Pauleit et al., 2011). However, green infrastructure also needs support mechanisms in terms of planning, just like all the other comparable urban components (Deal et al., 2013).

2.4 Green infrastructures

Green spaces are one of the essential elements of urban infrastructures in general and of green cities in particular. These areas include all areas that have been planted with flowers, shrubs, or trees, however the urban green area system also includes any green areas that are located outside the city limits. Three types of distribution of green areas can be identified in the structure of such a system: in patches, in strips, and composite (Manea & Mihai, 2007)

A more contemporary management strategy for urban greening is the Greenways approach. It is also known as green wedges. Its use in urban planning circles gained popularity in the 20th century (Fabos & Ryan, 2006; Walmsley, 2006). It is a network of linear areas designed, organized, and maintained for a variety of uses, including recreation and biodiversity preservation. It is essentially a green area built along linear characteristics like hills, rivers, railroads, and highways. It provides a lot of green plants into urban areas and aids in the preservation of green spaces along these linear characteristics. They also play a cultural and aesthetic role, as well as any other role that is appropriate for the sustainable usage of the area (Ahern, 2010).

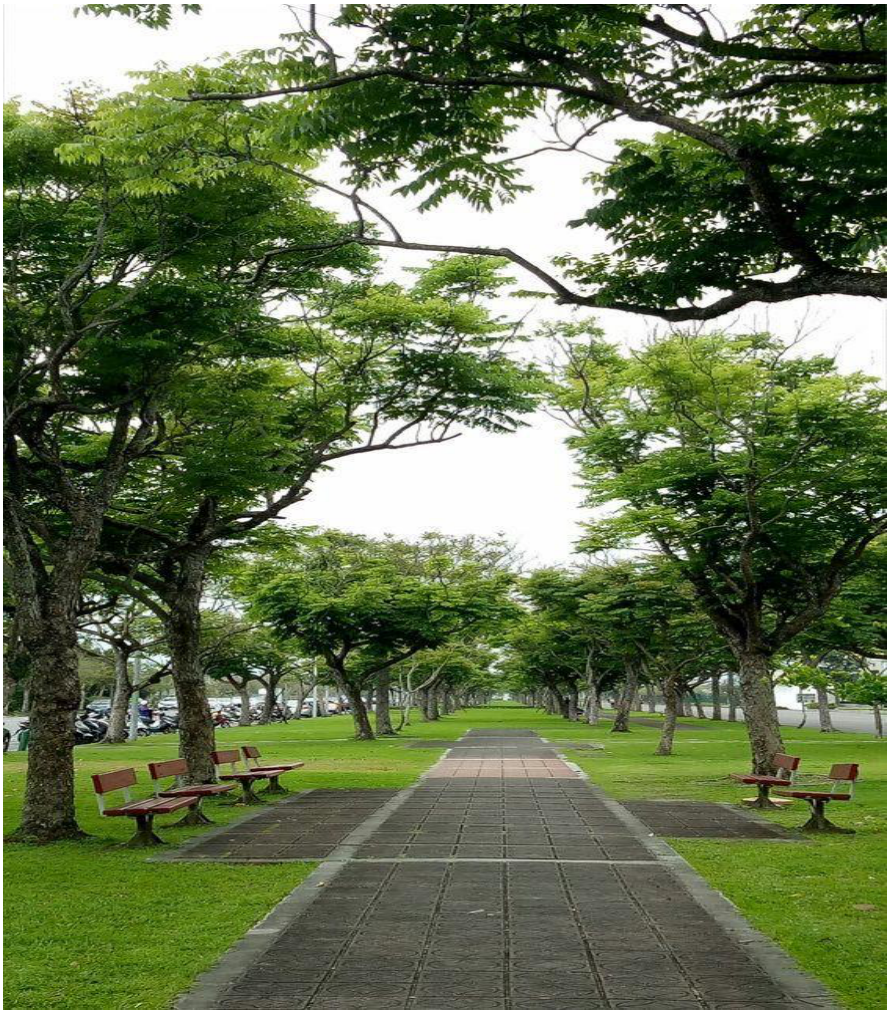


Figure 2.5: Greenways

source: https://www.pinterest.ca/

In order to safeguard the natural environment, many cities have green belts erected around them. They are also intended to limit their unchecked growth, protect the priceless traditional landscapes, and provide more spaces for leisure and recreation (Manea et al., 2010; Osborn, 1969). The green belts of London, Paris, Vienna, Berlin, Frankfurt, and Barcelona are examples of where such improvements may be seen in the metropolitan districts of large cities. The yellow-green belts, which combine agricultural crops and woodland vegetation, are an alternative to the green belts (Tang, Wong, & Lee, 2007). The garden city concept gave rise to the notion of a greenbelt as a safeguard against metropolitan areas' outer expansion. From the start of the 20th century, it gained popularity and was mostly used in the UK. To stop urban sprawl, greenbelts are built around the edges of cities in the shape of a ring. They serve as physical boundaries that divide one city from another, preventing urban sprawl into the countryside or peripheral, and protecting land in the periphery for recreation, agriculture, and forestry (Amati, 2008; Prior & Raemaekers, 2007).

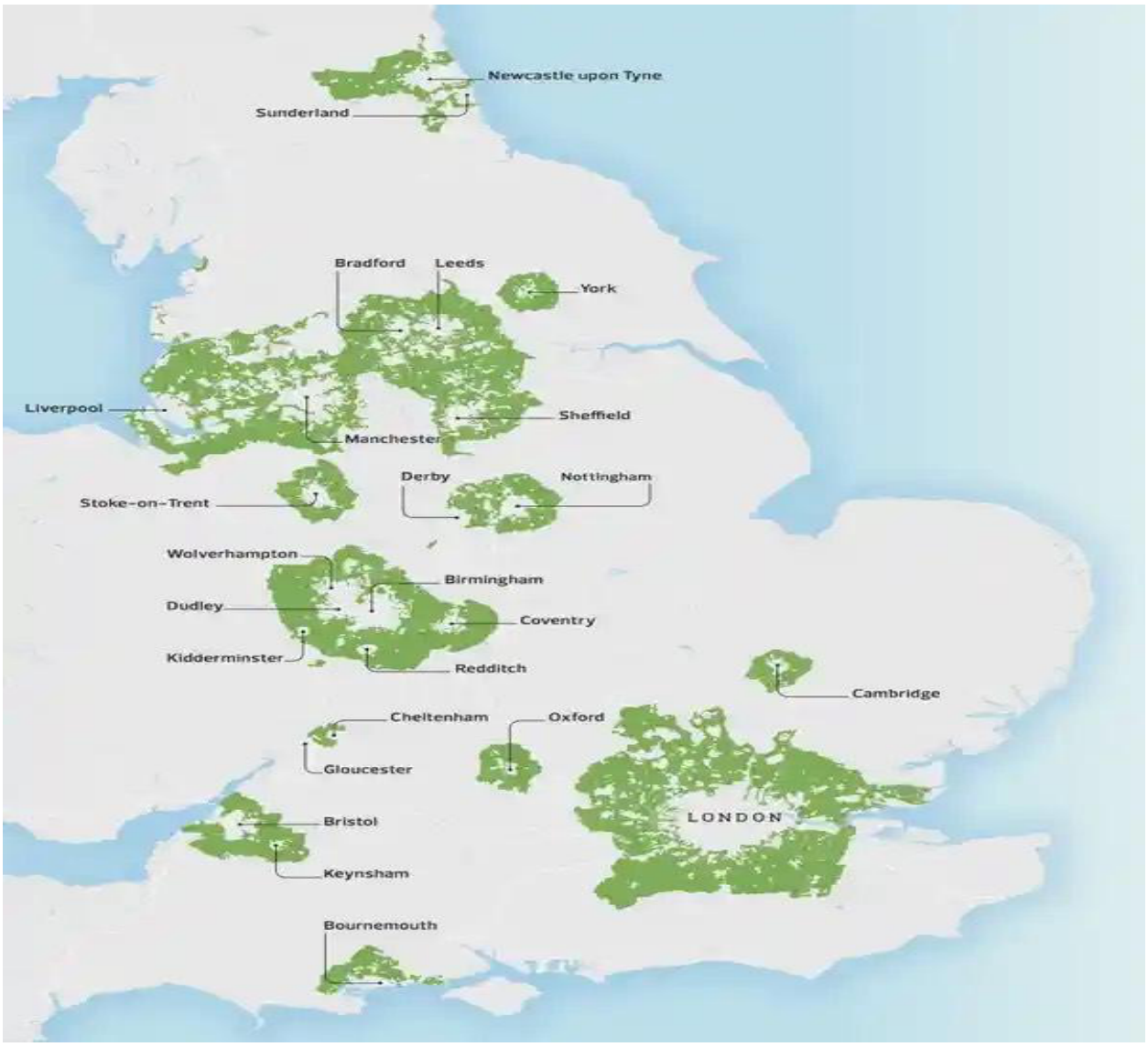


Figure 2.6 Greenbelts in the United Kingdom

Source: The Guardian (2014)

The urban forest is a crucial element of the green city. In general, it depicts the numerous types of tree vegetation that can be found in or around cities, from lonely trees in private gardens to street-lining trees, from tiny groups of trees around homes to parklands and the last remaining natural forests (Miller, 1997; Wu, 2010). The green roof is an example of an urban forest. Green roofs are currently being used as another strategy to improve the greening of various cities, like Toronto (Banting et al., 2005). The production of green plants on building rooftops is covered by the green

roof model. Its advantages include reducing smog in cities, providing home for wildlife, and improving aesthetics.

Figure 2.7 Urban Forest in New York
Source: Hurley (2019)

Blue corridors and blue-green corridors are examples of additional green infrastructure. The blue corridors contain any naturally occurring and/or man-made watercourses that pass through urban areas and may develop into urban stems or branches, constituting true urban hydrological systems (Ruhnke, 2011). As part of the strategic spatial planning of urban environments, the blue-green corridors may be utilized as tools for integrating water surfaces and green spaces with the goal of managing flood risk and maintaining the richness of fauna and flora. This idea especially applies to cities like Amsterdam or St. Petersburg that are bordered by rivers or are located near waterways or canals. Beyond the benefits to the ecosystem, these corridors revitalize urban aesthetics and balance human and natural requirements.

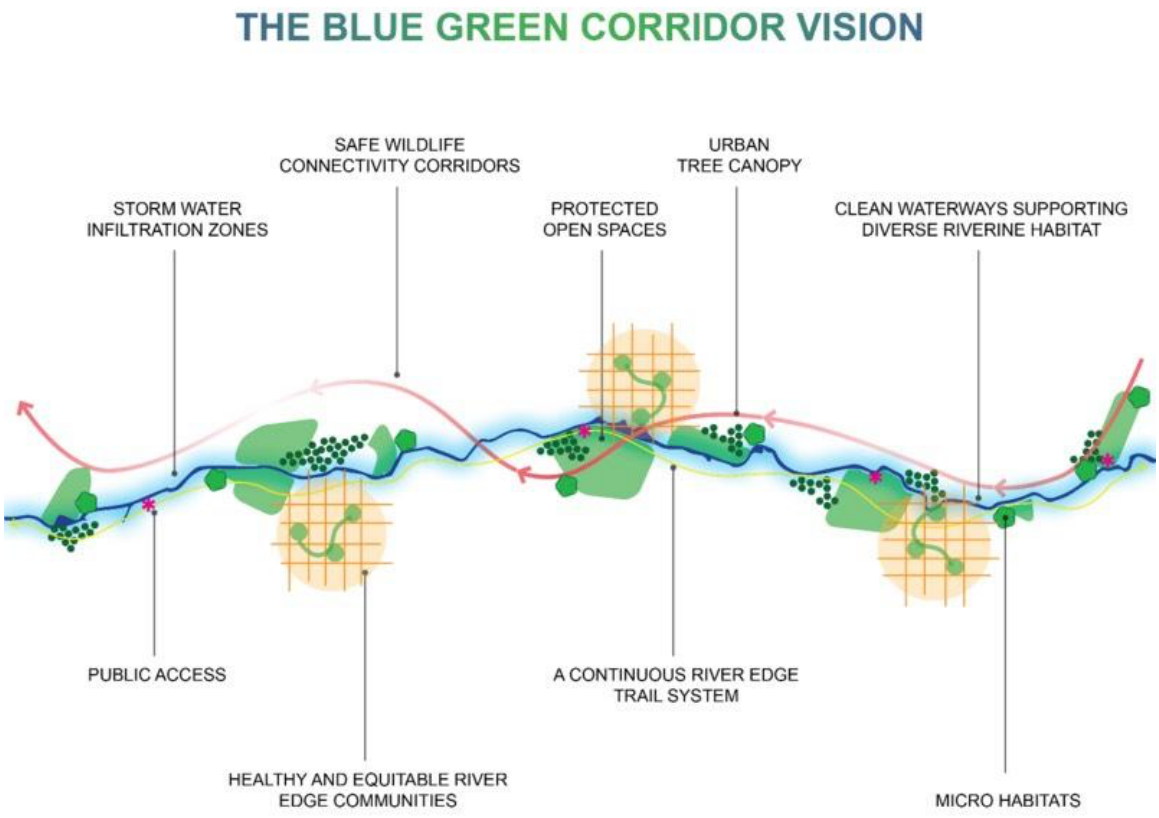


Figure 2.8 Blue-corridor Vision for Chicago River system

Source: Friends of the chicago river (n.d)

2.5 Factors giving rise to green space depletion in Africa.

According to a survey of the literature, there are various types of urban green spaces in the African sub-region. According to Fuwape and Onyekwelu (2011), the following are the principal types of urban green spaces in the majority of African nations:

- Semi-private areas including parks, street trees, and plantations along the sides of roadways, as well as green spaces in residential, institutional, and industrial sectors.
- Public green spaces like playgrounds outside, botanical gardens, leisure gardens, etc.
- Peri urban farming, green belts, forests, and public and private tree plantations.
- Forests, rangeland, and forests adjacent to cities.

- natural forests influenced by cities, such as ecotourism forests, national parks, and nature reserves; and
- trees planted for aesthetic and ecological purposes.

It was discovered that a number of issues have a detrimental impact on the creation and administration of green areas in Africa. These difficulties have often been divided into three categories for the sake of clarity and simplicity. These include the strain of urbanization, the inadequate implementation of urban planning laws, and economical and political difficulties.

Rapid Urbanization

It was discovered that the excessive loss of urban natural habitats, such as green spaces, was a consequence of Africa's fast urbanization (Fuwape & Onyekwelu, 2011; Dubbale et al., 2010). The high urban population was contained by the presence of numerous informal settlements (slums) and urban sprawl on lands designated for green spaces (such as urban forests, parks, gardens, and outdoor recreation places). With 200 million slum inhabitants, Sub-Saharan Africa has the biggest slum population worldwide (UN Habitat, 2011).

Additionally, due to urban sprawl and infrastructure improvements, many cities in West Africa, including Lagos, Ibadan, Kano, Kaduna, Sokoto (Nigeria), Dakar (Senegal), Freetown (Sierra Leone), Abidjan (Côte d'Ivoire), Accra, Kumasi, and Tema (Ghana), have lost a significant amount of their urban green spaces (Fuwape & Onyekwelu, 2011). In a related trend, a study on urban sprawl and its impact on the natural vegetation cover in Abuja (Nigeria's capital city) revealed a sizable loss of the natural vegetation due to the spread of human settlements (Fanan et al., 2011).

Insufficient operation of urban planning regulations

In Africa, urban planning is emphasized by established regulations, which are frequently imposed by the central government. Various African countries were found to have a number of land planning legislation that address green areas, but their implementation was difficult. The ineffectiveness of urban planning regulations, the bureaucratic procedures involved in issuing development permits, and the frailty of the planning institutions or organizations as a result of

having insufficient resources to work with were all found to be obstacles to the effective operation of urban planning regulations on green spaces in Africa (Muderere, 2011; Awuah et al., 2010).

The ineffectiveness of various urban planning policies in poor Africa can be attributed to their inability to take into account the most recent urban development patterns. It was discovered that some of the urban planning laws currently in effect in several Sub-Saharan African nations were created some 60 years ago in imitation of those of their former colonial masters, the British, French, and Germans (Awuah et al., 2010). For instance, the 1945 Town and Country Planning Act of Ghana, the 1946 Town Planning Ordinance of Nigeria, the 1948 Town Planning Act of Malawi (Njoh, 2009), the 1956 Town Planning Ordinance of Tanzania (Kironde, 2006), and others are still in force. It is challenging for existing regulations to thoroughly address some of the current issues with urban development, such as rapid urbanization and the quick disappearance of green spaces, as little or no revisions have been made to them.

Socioeconomic and political challenges

The spread of green areas has been hampered by certain African cities' lack of importance for them in their development agendas. Many African nations were found not to include green areas among their top objectives. Many African nations place a high priority on reducing poverty and providing social services like homes, hospitals, schools, and piped water. Due to this, local and national governments have been less inclined to prioritize and allocate the necessary resources for the establishment and upkeep of green spaces. Bolnick et al. (2006) reiterated this by pointing out that in Africa, a brown agenda receives a lot of attention at the expense of a green agenda that focuses on protecting the environment. According to Lugoe's (2008) observations, urban land-use projects involving green spaces in Tanzania have been poorly implemented due to the low priority accorded to them.

The administration of urban green spaces was also hampered by urban residents' unwillingness to cooperate. This was determined to be the result of the local population's lack of participation in managing green spaces and their lack of knowledge of the advantages of doing so (Muhumuza & Balkwill, 2013; Djibril et al., 2012).

2.6 Urban Green Spaces in Ghanaian Context

Urban green spaces in Ghana are underutilized sections of cities or towns, such as parks, that have enough flora on them to lessen the adverse effects that nearby concrete buildings and constructions have on the local environment. Green spaces are defined in this study as greenery areas or infrastructure, water, and biological characteristics which function as either passive or active recreation or as a nature-based interference to improve the condition of inhabitants, ensure a sustainable way of life, while additionally improving both the health and welfare of locals. On the other hand, urban green spaces are the kinds of places that are located in urbanized areas. Open spaces, parks, recreation areas, cemeteries, paths, marshes, and other places are examples of "green spaces," and they are typically controlled by the government rather than by private individuals. The terms "urban green spaces," "green spaces," and "open spaces" are all treated equally in this study.

2.6.1 Planning laws in Ghana

The land use and spatial planning acts were approved in 2016 to modify and solidify the regulations on land use and spatial planning, provide for the long-term sustainability of both land and human communities by means of a decentralized planning structure, guarantee prudent use of land in order to enhance the standard of life, foster wellness and security in regards to the development of human settlements, and control nationwide, regional, district, and specific spatial planning, as well as to provide in general for geographic aspects of socio economic development and other relevant matters. There are offices in each of the 16 regions in along with the central office in Accra. At the national and regional levels, land use and spatial planning authorities are in operation. By creating planning standards and legislation, the Land Use and Spatial Planning Act at the district scale offers professional guidance for the physical planning department of the district, metropolitan, and municipal assemblies within the Ministry of Local Government and Rural Development.

Planning standards and laws

In Ghana, permitting and planning for space have long been governed by the Town and Country Planning Ordinance, Cap. 84 of 1945, and additional expert guidelines. Planning entities continue to strictly apply these rules and regulations despite the fact that they are now quite obsolete and insufficient, which can occasionally lead to aberrations and misunderstanding in the systems for permits and spatial planning. Revised Planning Regulations and Development Guidelines have been produced in a single publication as part of the Town and Country Planning Department's Land Use Planning and Management Project.

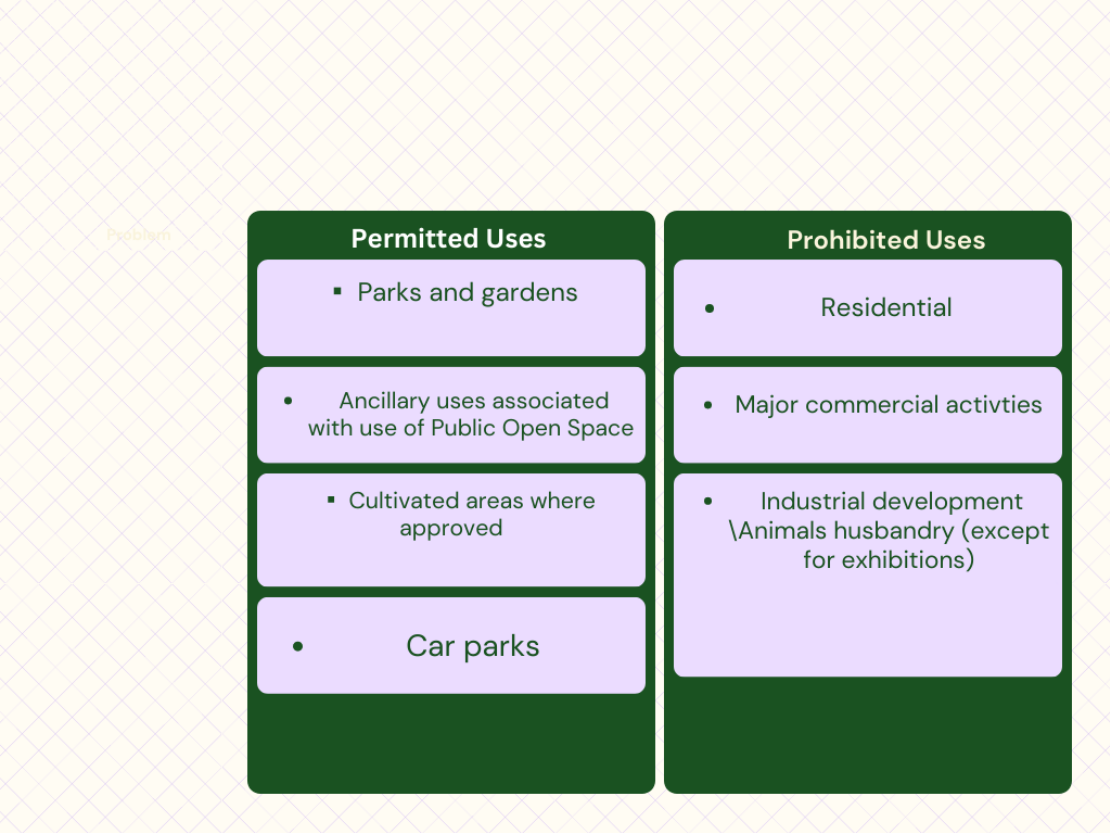
The purpose of the zoning regulations and planning standards is to support local planning authorities in sanctioning any development that falls under their purview. Additionally, it is anticipated that it will support the efforts of individual developers, specialists, property managers, academics, and the planning authority to advance peaceful human settlement development and administration. They do not propose particular design solutions; rather, they establish the standards for acceptable design. Instead, they serve as a checklist of the guidelines that should be adhered to when creating and evaluating development proposals as well as a benchmark for evaluating the quality of development from the perspective of building occupants and users as well as its effects on the neighborhood. All developers are urged to carefully review these principles and requirements, as are local planning authorities.

Zoning of public Open Space

Despite the fact that open green space was not specifically included in the planning standards of Ghana, they did discuss and include provisions for the zoning of public open spaces, which, according to published research, is composed of both public green space and grey spaces. For informal or casual recreational activities, public open space zones are primarily designed. Parks and gardens, children play areas, and open spaces utilized as barriers between industrial use and other land use activities all fall under the category of public open spaces. The majority of the sites next to major drains and streams are supposed to be designated as public open space and stay

undeveloped. Public open space or another suitable zone will be applied to all land suggested for urban development that is beneath the 1 in 20-year flood level. Some supplementary uses, such kiosks, eateries, and entertainment venues, might be allowed in the zone, but only under certain circumstances relating to the site, the soil's state, traffic, service, and disposal of waste.

Table 2.1: Development for Public Open Spaces



A systematic review of the planning standard and guidelines revealed that open green space is a permitted use in all the other zones like the Health zone, Industrial zone, residential zones as indicated above among others.

Planning Standards for Recreation and Open Spaces

Open and recreational space needs must be met, unless specifically stated differently, according to Ghana's planning standards. Parks, gardens, playgrounds, and “palava grounds or durbar grounds” were all considered forms of “passive recreational spaces”.

A minimum of 2,500 people must be served by public open space, which must be at least 10% of the total development area or 0.5 hectare per 1000 persons. Durbar grounds should be able to accommodate up to 35,000 people and should range in size from 0.2 ha to 1 ha, with an acceptable number of public seats dispersed evenly among settlement areas. Additionally, it ought to be situated near a hub of population with convenient access to public transportation.

Department of parks and gardens

The Department of Parks and Gardens is the specialized entity in charge of managing and expanding the nation's public areas. The Department of Parks and Gardens was established to support the rapid growth of Ghana's horticulture potential for the benefit of its citizens through public awareness campaigns, efficient landscape beautification initiatives, maintenance programs, and conservation efforts using qualified personnel and cutting-edge technology. The Local Government Act 54, which was passed in 1961, created the department. The Department became the Ministry of Parks and Gardens and Tourism in 1965 after receiving ministerial rank. It was changed back to a Department under the Department of Forestry in 1966. From 1970 to 2000, it was governed by three separate Ministries: Works and Housing, Local Government and Rural Development, and Environment and Science.

The Department currently reports to the Ministry of Local Government and Rural Development. The 1992 constitution and section 12 of PNDCL 327, which created the Department and lays out its functions, serve as the Department's primary sources of authority. The department's mission, which is to "improve rapid development of our gardening capacity in the urban and rural sectors of the country," was deemed to be acceptable and relevant. Urban planting is under the purview of the Department of Parks and Gardens, which also plays a vital role in the nation's landscape rehabilitation.

Town and Country planning department

The Town and Country Planning Department (TCPD) was founded in 1945 and given the duty of managing the expansion and development of the country's cities, towns, and villages. As a result, it aims to foster human settlement development that is founded on the ideals of effectiveness, discipline, security, and community expansion.

It is a special department within the Ministry of Environment, Science, and Technology that provides services. Prior to the administrative reforms of the 1980s, the TCPD was solely a civil service organization with its head office in Accra and regional and district branch offices. According to the Town and Country Planning Act of 1958 (Act 30), the Minister responsible for Town and Country Planning was in charge of planning prior to 1993.

In order to wrap up this section, it is important to note that the land use and spatial planning authority develops planning mechanisms through the planning process in consultation with pertinent stakeholders and documents them as zoning guidelines and planning standards that are supposed to be implemented by pertinent stakeholders at the regional and district level through the process of decentralization. The Department of Parks and Gardens and the Town and Country Planning Department are responsible for implementing the zoning regulations and planning requirements related to public space.

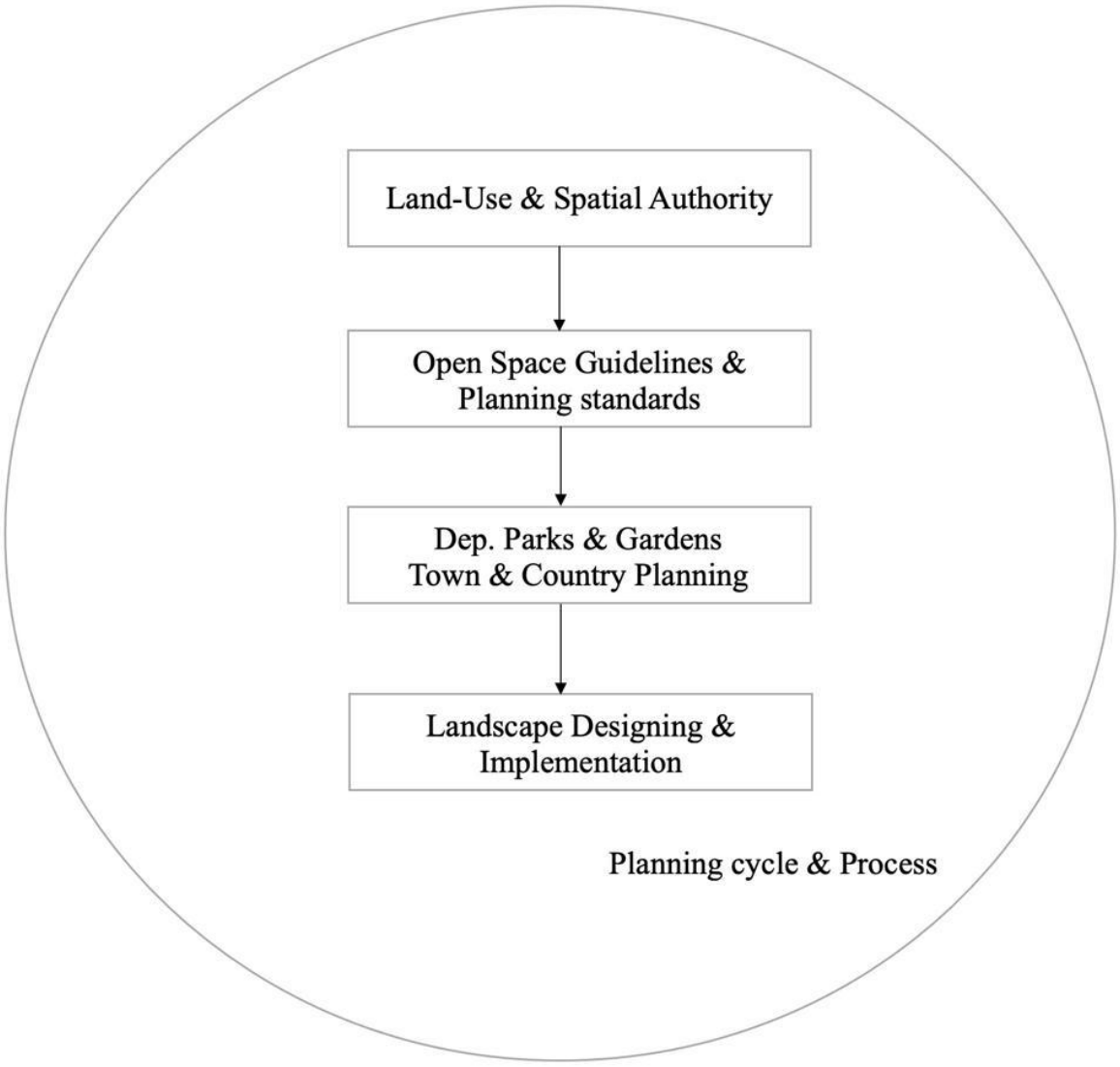


Figure 2.9 Planning laws procedure.

Source: Authors (2023)

Enablers to the implementation of planning standard

Despite being vague and varying depending on the researcher's perspective, the term "enablers" typically refers to the possibility and chances for facilitating a specific purpose. The adaptability of strategies is one of the characteristics that best defines the term "enablers," according to Azhoni et al. (2018). Success of an initiative is determined by the existing characteristics of the actors and organizations as well as their capacity and attributes. Visionary leaders, teams with prioritized

goals and objectives, appraisal capabilities, team expertise and abilities, interaction, learning versatility, collaborations, and the ability to monitor achievement toward goals are a few of the characteristics mentioned (Azhoni et al., 2018). The term "enablers" thus describes actors' and organizations' adaptive abilities and readiness to support the implementation of strategies or programs, which, in the context of this research, supports the results of the implementation of planning standards in terms of green spaces.

As stated by Azhoni et al. (2018), the existence of readiness, competence, or enablers does not, however, ensure that a policy will always be effective. As a result, policy outcomes are not always predictable, particularly in areas where there are limitations and obstacles. Therefore, the idea of adoption facilitators is outside the purview of the players and institutions. According to UNICEF (2013), enablers are components or situations that facilitate the achievement of a particular goal or outcome. In the context of implementing policies, enablers can refer to a number of methods, systems, and technologies that facilitate the efficient adoption and application of regulations (Santos, 2022). Enablers can be variables that are internal as well as external. Internal enablers (Rondinelli et al., 1991) refer to the resources and talents that an organization or community possesses which promote the implementation of regulations, such as the availability of funding, expertise in technology, and management. The larger financial, social, and political setting whereby strategies are carried out is referred to as an external facilitator, on the other hand. A few instances in this context are the level of public enthusiasm for the regulation, and the existence of supporting infrastructure as well as supportive regulatory structures (Bryson et al., 2015).

Barriers to the implementation of planning standards

According to UNICEF (2013), barriers are things or circumstances that obstruct or prohibit the achievement of a particular goal or outcome. Various challenges and obstructions to the effective implementation and adoption of policies can be referred to as barriers in the setting of implementing policies (Santos et al., 2018). In the study by Barnett et al. (2015), research has found that the expression "limit" ought to be used to describe obstacles caused by environmental variables, but the concept "barrier" is more frequently used to characterize challenges caused by social as well as institutional difficulties.

Barriers can be broken down into many categories based on their type and origin. According to Bryson et al. (2015), "structural barriers" are the underlying systems, practices, and structures that may make it difficult to implement an initiative, such as a lack of funding or the existence of rules that conflict with one another. Institutional barriers are the standards, mindsets, and procedures of communities and organizations that can block the implementation of policies (Jones & Hill, 2009). Examples of institutional barriers include opposition to alteration or a lack of accountability. According to Rondinelli et al. (1991), psychological obstacles are attitudes, verdicts, and impressions that can prevent them from accepting policies, such as a lack of understanding or faith in the policy.

Some academics contend that a shortage of resources frequently makes it difficult for policies to be implemented effectively, especially when those policies call for substantial financial or construction expenditures (Hill & Varone, 2021). Others contend that political factors, including elected officials' preferences and the sway of special interest groups, might occasionally take precedence over the requirements and interests of the broader public, resulting in insufficient execution (Peters & Pierre, 2006).

In addition, there are issues with lack of openness and public participation in decision-making (Hill & Varone, 2021) as well as the responsibility of policymakers and officials in the execution process (Knill & Tosun, 2020). According to others, the lack of these elements can make implementation less effective (Knill & Tosun, 2020), since it can result in policies that don't take the requirements and preferences of the people they are intended to help into account (Peters & Pierre, 2006).

2.7 Cases of Green Space loss in Ghana

This section discusses three urban green places that have been lost throughout time in the two cities. These examples are Accra's Achimota Forest Reserve, Kumasi's Adehyeman Garden, and Fante Newton Park. The Accra Metropolitan region chose the Achimota Park in Ghana as a case study because of the attention its quick depletion has garnered in Ghana's traditional and academic media. Due to Kumasi's reputation for having a large number of depleted green spaces throughout time, the two examples were chosen from the Kumasi metropolitan assembly. However, the two cases were chosen by the researcher at random using a sample random sampling method in which all the vacant areas in Kumasi were listed on a piece of paper.

2.7.1 Adehyeman Garden (Kejetia park) and Fante Newtown Park in Kumasi

According to Adjei Mensah (2014) and Quagraine (2011), there were five planned urban parks during the colonial era: "Kejetia" Park (Adehyeman Gardens), Suntreso Park (on the grounds of the Department of Parks and Gardens), park at "Amakom" (now Kumasi Children's Park), Fante Newtown Park, and Kumasi Zoological Gardens (Kumasi Zoo). By 1957, the city was as charming and vibrant with greenery as the 1945 plan had envisioned. As the cultural center gained national significance, it developed into a hub of tourism and cultural prominence (Amoako and Korboe 2011). This signaled the start of formally designated public open areas.

There are less options for leisure and social interaction as a result of the reduction of green spaces like playgrounds and gardens in the city. Parks like the Fanti New Town Park and the Adehyeman Gardens, which were originally used for recreation and relaxation, have been depleted and are now used for new purposes, claims Addo-Fordwuor (2015). There isn't another specially designed location in the metropolitan area that serves as a playground and recreational park for kids besides Amakom Park.

2.7.2 Achimota forest reserve in Accra

The Okaikwei North Municipality, which is part of the Greater Accra Region, has Achimota as well as a forest called Achimota Forest Reserve. Approximate distance from Accra is 7.6 kilometers (4.7 mi). It is protected from unauthorized use by people and organizations, including poaching, home construction, hunting, and the opening of shopping centers. It is one of Accra's environmentally friendly buildings that aids in reducing carbon emissions. Its entire area was 494.95 hectares (1,223.0 acres) when the forest was gazetted in 1930. According to Benyin (n.d.), the forest reserve currently covers 360 hectares.

To form a lush barrier between Accra City and the Achimota School, this forest reserve was created. When the Presidential Palace was constructed, the majority of the animals from the Accra Zoo were relocated to the forest reserve. It is currently run as a wildlife rescue facility and

arboretum. The forest reserve is home to a variety of animals, including pythons, a camel, ostriches, hyenas, monkeys, and others.

According to GhanaWeb blogger Philip Kyeremanteng cited by BORGEN Magazine (2022), the 495-acre Achimota Forest Reserve, established in 1930, has lost more than 150 hectares over time as a result of urban infrastructure expansion and unauthorized intrusion. The author continues by outlining potential advantages that the Achimota Forest Reserve can provide locals. Achimota, like other forests, reduces greenhouse gas emissions, according to Kyeremanteng. In addition to trapping a number of these gasses, the hundreds of acres of woodlands' continuing photosynthesis also contribute to the reduction of carbon dioxide and the production of oxygen. The columnist claims that the forest reserve can also aid in regulating the climate.

According to Kyeremanteng, the presence of trees can lessen the need for air conditioning in metropolitan areas like Achimota. In fact, trees are big, sturdy plants that can absorb carbon monoxide, a greenhouse gas that has contributed to global warming. According to figures from 2018, Ghana alone generated 44,500 metric kilotons of greenhouse gasses (BORGEN Magazine, 2022).

2.8 Stakeholders in Urban Green space governance in Ghana

According to the underlying ideology of both urban governance and collaborative governance theories as a means of achieving efficiency and democracy in the decision-making process (Kjaer, 2009; Ansell & Gash, 2008; Coaffee & Healey, 2003), the overall governance of Kumasi and Accra is supposed to be based on policy implementation networks. By providing forums for knowledge and information sharing, fostering trust in the planning apparatus, and legitimizing urban policy decisions, these networks are intended to connect state agencies, private organizations, and civil society organizations. This will improve governance (Booher, 2004; Healey, 1998; Healey et al., 1997). The urban green space in these two cities has changed as a result of these stakeholders, nevertheless.

2.8.1 Government's role in Urban green space depletion

Achimota Forest Reserve, one of Accra's greatest urban green infrastructures, and one of its nearly 100-year-old forest reserves, was declassified as a non-forest reserve on May 1, 2022, by an Executive Instrument (E.I 144) issued by the Ghanaian President. Worryingly, the E.I. harms Accra's Achimota Forest Reserve, a more than 100-year-old beloved, trusted, and environmentally secure forest area. The Achimota Forest Reserve will lose an additional 41 acres to EI144, for a total loss of 72% of the reserve's land. This will be the largest area loss in the reserve's history. Since 1927, the Forest Reserve's initial size has decreased from 495 hectares to 214 hectares. This posed an urgent threat when E.I. 144 came into force in 2022.

The decision to declassify portions of the Achimota Forest as a forest reserve was met with an outcry from many Ghanaians when President Nana Addo Dankwa Akufo-Addo signed the executive instrument. The political class was accused by many on social media of trying to resell the property to themselves and their allies. The government has refuted the charges, claiming that it was simply giving back a portion of the land to its original owners.

However, the will of Kwadwo Owusu Afriyie, a former general secretary of the ruling New Patriotic Party, had surfaced and contained certain parcels of land in the Achimota Forest while the dust around the Achimota Forest scandal was still settling. Up until his passing, Sir John, a.k.a. Kwadwo Owusu Afriyie, served as the Forestry Commission's chief executive officer. The deceased politician left four parcels of identified and unspecified acres of land in the Achimota Forest to certain people, according to the will, which The Fourth Estate has seen and confirmed.

Kwadwo Owusu Afriyie, whose office was located at the Achimota Forest till his death, states on page 4 of the will: "*I give my land situated at the Achimota Forest in the name of Jakaypro Limited and measuring 5.541 acres to the following persons forever.*

–Yaw Amoateng Afriyie *-One (1) acre*

— Eva Akua Afriyie *One (1) acre*

–Ivy Akua Afriyie *One (1) acre*

–Elizabeth Asare Boateng (aka Mother) *One (1) acre*

–Michael Owusu *1.541 acres"*

Page 5 of the will reads "*I give my land also situated at the Achimota Forest in the name of Fasoh Limited and measure 0.987acres to my nephews Michael Owusu, Yaw Boadu and Kwabena Amoateng forever. On the same page, the will again reads "I jointly own a piece of land at Achimota Forest with Charles Owusu. Upon my demise, my portion of the said land should be given to Ruth Korkor Odonkor."*

That's not all. On the same page 5 and still on the Achimota Forest, the will states: "*I give my portion of land that jointly own at the Achimota Forest in the name of DML Limited to Elizabeth Asare Boateng who at the time of making this will is domiciled in the USA forever.*"

It was also mentioned in the will of the previous administrator of the forestry commission that he had property in Sakumono, Accra's Ramsar neighborhood. *"I give my land situate at the Ramsar area at Sakumono in the Greater Accra Region and measuring 5.07 acres to my sisters Abena Saah and her children, Comfort Amoateng and her children, Abena Konadu and Juliet Akua Arko and her children on equal share basis forever,*" the will states.

Despite these developments, the Ministry of Lands and Natural Resources declared June 11th, 2021, to be "Green Ghana Day," with a goal of growing 5 million trees nationwide (IUCN, 2021, Mensah, 2022)

2.8.3 Business owner's and citizen's role in urban green space depletion

Oduro-Ofori et al. (2014) argue that approximately 90% of urban areas in the Kumasi and Accra have lost their greenery, and many have been rezoned for other purposes. Residential land use in

Kumasi has grown from 109.3km² (43.7 percent) in 1995 to 115km² (46 percent) in 2013 (Oduro-Ofori et al., 2014). Furthermore, while the share of built land rose by 17km² from 1995 and 2010, the percentage of undeveloped land, which includes parks, nature reserves, and open areas, declined by the same amount in Kumasi. This is because many individuals in the city have recently started cutting trees, filling swampy territories with sand, and impeding the course of river bodies with various things in order to begin residential and other types of physical development.

Similar to other cities of the global south, slums in most Ghanaian cities develop at city fringes or less valued urban lands, which were once green areas including watersides, steep hills, dumping grounds, idle plots, old and/or abandoned industrial areas, and unused state lands. The growth of slums and their population in Ghanaian cities have adverse implications on the destruction of UGS despite their numerous positive contributions. One of the major challenges with slum expansion is the difficulty to control the rapid destruction and conversion of urban green space to other uses, especially in major cities. In Accra, for example, low knowledge of the preservation of and poor attitudes toward urban green space are cited as major factors in the rapid decline of urban green space (Cobbinah, 2022)

2.8.4 Traditional authorities' role in green space depletion

The 1992 Constitution of Ghana provides legal protection for the immense power and authority Ghana's traditional leaders have over land management. Chiefs, tinamba (earth priests), and clan/family leaders are the most notable traditional authority with a variety of duties related to land in various corporate tenure categories. Traditional community leaders are the traditional authorities. The term "traditional" alludes to the historical foundations of leadership, which validate the exercise of authority. The leadership in modern cultures is typically chosen or appointed by elected officials, but traditional leadership is either inherited or appointed. This is where traditional forms of authority diverge from the modern state. While some are subject to accountability measures, traditional leaders are not elected (Linder and Lutz 2004). Similar to this, traditional authority is defined as a group of individuals who, by virtue of their ancestors, hold the throne or stool of a region and are chosen in line with its traditions and conventions. These individuals exercise traditional power over the local populace or tribe (Mthandeni, 2002). Traditional institutions or authorities, according to Crook (2005), are all those social and political

authorities that have their historical roots in pre-colonial governments and civilizations and that were assimilated by British colonial control into what is now Ghana. This is particularly true in the case of Ghana.

Since a sizable amount of Ghana's land is owned under customary tenurial arrangements, traditional authorities have a substantial impact on land management and spatial planning. National constitutional provisions that recognize chiefs as trustees of the land held under customary tenure give traditional authority's engagement in land management and spatial planning legal meaning. The indigenous structures that traditional rulers employed to safeguard public areas have been eroded by greed and economic pursuit (Adjei-Cudjoe, 2022).

2.9 Conceptual framework

The below conceptual model displays fundamental concepts and their relationships with each other. The feedback loop in this conceptual model can be seen from how the arrows move downward and upward in a linear ways and ends at the outcome (protection of green space) First, there exist planning laws specifically land use planning laws that mandates the development and maintenance of green infrastructure like parks, garden and recreational grounds in urban areas. The governance and maintenance of urban green space is done by multiple stakeholders (government, citizens, businesses and traditional authorities). However due to rapid urbanization, insufficient regulation as well as socioeconomic and political challenges, the available green spaces in urban areas are depleting at a faster rate. The conceptual framework proposes interventions that will lead to the protection of green space.

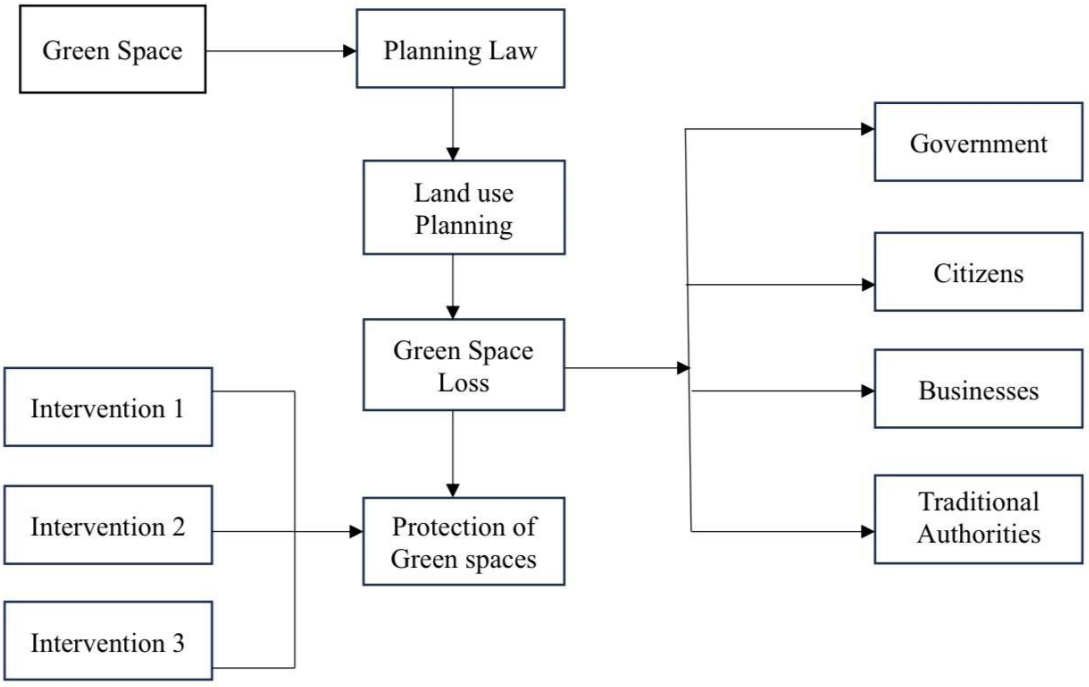


Figure 2.10 Conceptual framework

Source: Authors (2023)

CHAPTER THREE

METHODOLOGY

3.1 Research method

Collis and Hussey (2003) opine that there are two main research methods, which are quantitative and qualitative research methodologies. Leedy and Ormrod (2005) have defined quantitative research to mean any research that allows one to find answers to questions regarding relationships among the variables that are being measured in order to explain, predict and control a certain phenomenon. They also define qualitative research as a method that is used to answer questions which pertain to a complex nature of a phenomenon and usually to bring to bear what the participants think of the phenomenon. Positive theory typically underpins quantitative research, whereas interpretivism is more frequently the foundation of qualitative research (Wasti et al., 2022). The study used a mixed research approach (qualitative and quantitative methods) to better comprehend the complex phenomenon under investigation and learn what the research participants believed. In what is being referred to as pragmatism, mixed-methods research combines issues from two distinct philosophies (O'Cathain Murphy & Nicholl, 2007).The roles of mixed-methods are evident in an understanding of the situation (the what), meaning, norms, and values (the why or how) within a single research question that combines the strengths of two different methods and offers numerous perspectives on the research question (David, 2006).

By presenting a more complete picture that can improve description and comprehension of the phenomena, the mixed-methods research design seeks to provide a better and deeper understanding. Because it uses both quantitative and qualitative data in a single study, mixed-methods research has grown in popularity because it yields stronger inferences than either technique alone. In other regards, a mixed methods adds depth and breadth to the research by combining meanings gleaned from interviews or observation with the prevalence of characteristics in a community gleaned from surveys (Creswell, 2014).

3.2 Research approach

The case study research approach is the one that will be employed. Case studies, according to Yin (1981, 1984) are the most effective method for dealing with contemporary problems and real-world situations. A case study is an in-depth investigation into an individual, a group of people, or a unit with the intention of generalizing over various units. A case study centers on a particular element (Jacobsen, 2002). Another, related definition is that a case study is an examination of a system that is examined thoroughly using one or more techniques (Thomas, 2011). The case study method is a good way to identify cases and investigate a setting in order to understand it, rather than analyzing cases (Cousin, 2005).

This study utilized multiple case studies as opposed to the singular case study that has previously been used to study urban green spaces. A multiple case study differs from a single case study in that the researcher examines a number of cases in order to comprehend the similarities and variations between the cases, according to Baxter & Jack (2008) and Stake (1995). A multiple case study is required when research involves more than one single case, according to Baxter & Jack (2008) and Stake (1995). Baxter and Jack (2008) claim that the proof produced by a multiple case study is solid and trustworthy.

3.3 Study Areas

The Kumasi and Accra Metropolitan Assembly served as the study's focal points. The justification for this is that while Accra and Kumasi, Ghana's two largest cities, once had a lot of green spaces, many of them have since disappeared or are deteriorating quickly as a result of various issues. Almost all of the issues that many African cities share, including rapid urbanization, poor town planning, urban sprawl, and the loss of urban biodiversity, including green areas, are represented by these specific cities. This makes Kumasi and Accra a suitable choice for the study since it seeks to create strategies to preserve urban green spaces, which are rapidly disappearing in many African cities.

Accra Metropolitan Area

The Republic of Ghana's capital, Accra, was chosen for this research. Geographically, Accra is a coastal metropolitan area situated 37m above sea level between latitude 5°33′N and longitude 0°12′W. With a yearly rainfall of 809 mm and an average temperature of 26.6 °C, Accra's climate

is best described as hot and semi-arid. 60 km2 is the size of Accra. It is the most urbanized metropolitan territory in Ghana's Greater Accra Region and one of the regions that is urbanizing most quickly in West Africa. Ablekuma South, Ashiedu Keteke, and Okaikoi South are the three sub-metropolitan areas that make up the Accra Metropolitan Area (AMA). The expected population of Accra in 2019 was 2,052, 341 (GSS, 2019; UNDESA, 2018). Accra's population has grown significantly over time, from 177,147 in 1950 to 2,514,000 in 2020.

There are many surprises and stresses associated with Accra's rapid population growth. About 90% of the ground surface is owned by people with customary land rights (Addo-Fordwuor, 2014). Like other rapidly urbanizing cities in Ghana, Accra's land markets follow a trajectory of ownership, land use, land values, sources, and land acquisition; all of these processes contribute to the loss of green areas in the city (Addo-Fordwuor, 2014). Accra has some of the most expensive real estate in the nation (Korah et al., 2019). The ongoing development has also encouraged landowners to sell or contract their properties to organizations, people, or businesses that turn these areas into developed areas (Korah et al., 2019).

Many individuals or groups who buy lands do not consider the conservation of greens because of the cost and the planned use. Additionally, the high demand for land in Accra and landowners' greed drive them to sell plots of land marked on site plans for road building to interested parties (Offei et al., 2018). According to Addo-Fordwuor (2014), the majority of lands in Accra are either family or individual- or stool-owned, which provides the government little control over zoning and determining how to use these urban areas. Sustainable urban planning has been severely hampered by the Accra metropolitan area's current land tenure structure (Korah et al. 2020).

Figure 3.1: Map of Accra metropolitan assembly

Source: GSS

Kumasi Metropolitan Area

Osei Tutu I, the then-Ashanti King, established Kumasi as the seat of the Ashanti Kingdom in 1680. It is the center of Ghana's Ashanti Region. It has a total land size of 254km2 and is situated between latitude 6.350 and 6.400 and longitude 1.300 and 1.350. It is located about 270 kilometers north of Ghana's main city, Accra. It has a concentric physical structure and is located in Ghana's zone of transitional woodland. Its location in Ghana is advantageous because it acts as a hub for important road networks that connect to other regions of Ghana and beyond. Large-scale movement into the city is encouraged by Kumasi's geographic centrality. Kumasi is the most populous metropolitan area in Ghana, with 2,035, 064 people according to the 2010 Population and Housing Census of Ghana. The city's expected annual population growth rate is about 5.4%. (Cobbinah & Amoako, 2012).

Kumasi metropolitan area is located in Ghana's moist semi-deciduous vegetation zone, where the earth is ideal for farming and supporting a variety of greenery. The Kumasi Zoological Gardens

were created as a result of the city's abundant flora. However, Kumasi's greenery has suffered significantly from rapid development and urban sprawl. While most of the green spaces in other sections of the city have been encroached upon, patches of green vegetation along waterways have been cleared. Due to unchecked human activity along the water bodies, some waterways and streams in the city have decreased in number or are on the verge of extinction. The high density of houses frequently causes flooding in some areas of the city, destroying many properties. This is due to the encroachment of water bodies, green spaces like wetlands, and nature parks (KMA, 2006).

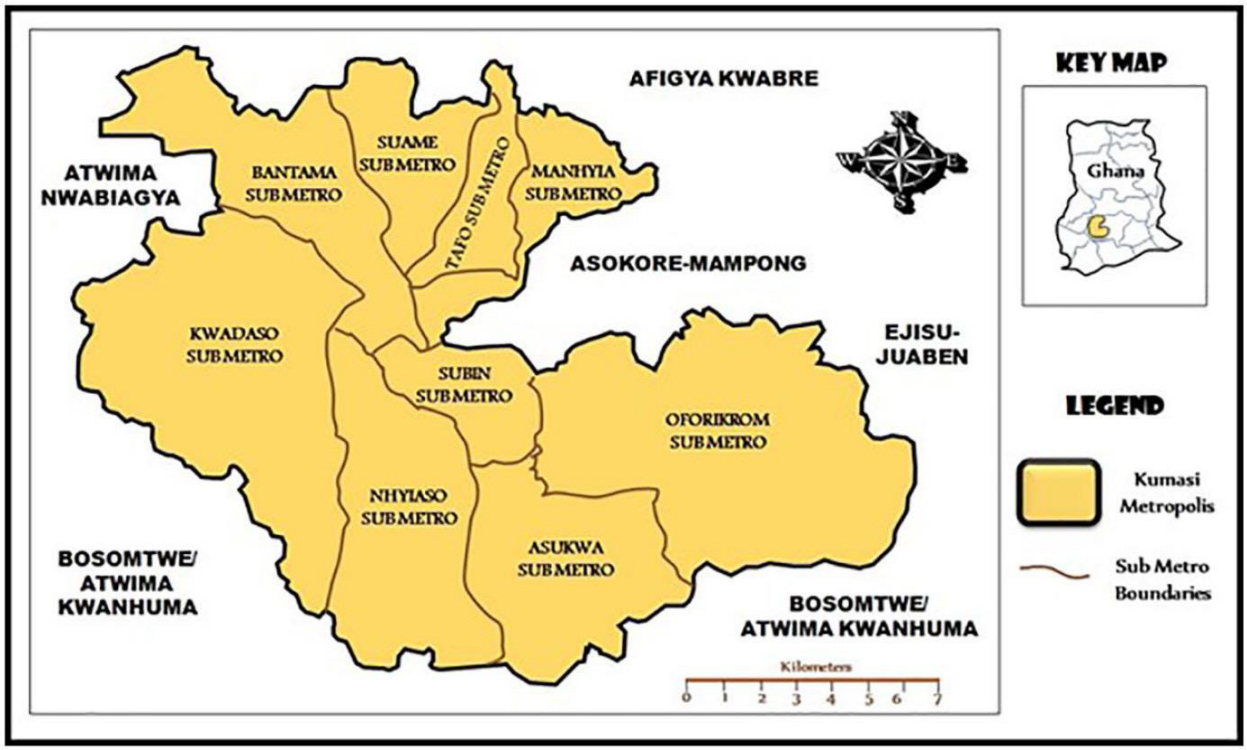


Figure 3.2 Map of Kumasi metropolitan area
Source: Cobbinah & Nyame (2021)

3.4 Sample and Sampling procedures

Purposive sampling was used to pick the study's subjects. Using a non-probability technique called "purposeful sampling," which aims to select respondents who fit into particular categories and are pertinent to the objectives of the research (Leedy and Ormrod, 2005). Also picked specifically

were 5 major organizations from each of the two cities. These include the departments of forestry, parks and gardens, environmental protection, and town and country planning and traditional leaders. The study also sampled citizens and businesses that have coached the three cases under investigation.

Data types

According to Clifford et al., research can be conducted using secondary data from sources like databases and policy papers (2010). Utilizing primary data also has the benefit of enabling researchers to gather data for the precise purposes of their study. Essentially, the knowledge discovered through primary data research is adapted to the research queries (Clifford et al., 2010). Using both main and secondary sources boost a study's credibility, claims Baarda (2010). Additionally, research using a variety of methods may present a more complete picture of the circumstance (Yin, 2014). As a consequence, this study makes use of both primary and secondary data. The main source of information was qualitative semi-structured interviews, and the secondary data was Accra and Kumasi metropolitan area short- and medium-term development plans.

3.5 Method of data collection

Interviews

Interviews are used to discover how study participants feel, think, and are aware of particular subjects, events, or individuals (Longhurst, 2010). According to Clifford et al., there is a distinction between organized, semi structured, and unstructured conversations (2010). In a semi-structured interview, the interviewer uses questions to attempt to elicit information from the subject of the interview. Semi-structured interviews were used in this research due to two factors. First, semi-structured interviews are done in a conversational manner while the interviewer prepares a list of predefined questions, allowing participants to explore issues that are important to them (Longhurst, 2010). Second, this method of interviewing has the benefit of enabling the researcher to gather data that is pertinent to his or her objectives, claim Clifford et al. (2010). On the other hand, this type of interviewing might surface in unexpected and intriguing conversations. In a semi-

structured interview, a list of questions based on the literature review and research questions is developed. There are inquiries to delve further into each research topic.

Land use and land cover change analysis (LULC)

Data Source and acquisition

The study employs a series of Landsat satellite images acquired in the years 2000, 2011 and 2022 for both Accra and Kumasi metropolitan area. The satellite images were downloaded from the Glovis website, satellite data with less cloud cover of 10% was of interest to facilitate the accuracy of the classification process. Districts shape files were obtained from Smart and Sustainable Environmental Technologies, Geospatial Lab. This was used to extract the area of interest (Accra metropolitan area and Kumasi Metropolitan) from the satellite images. Landsat images employed in acquired for this study have a resolution of 30m. All pre-process analysis was carried out using Envi, a remote sensing centered software, this process was carried out to correct all radiometric and geometric errors to make the data ready for post analysis.

No	Training Classes	Attributes
1	Dense Vegetation	Forest and trees within the metropolitan area.
2.	Mesic Vegetation	Areas with moderate or intermediate vegetation cover this includes Farmlands (urban agriculture), shrubs and bushes within the metropolitan area.
3.	Built Up	Temporary structures such as chalets and kiosks, permanent buildings and paved surfaces
4.	Breland	Identified by soil, exposed rocks, cleared farmlands, untarred roads and e-waste dumping sites.
5.	Water	All forms of flowing water surfaces within the study area, such as the Korle Lagoon, ponds, etc.

The next process after the image pre-processing was extracting the Areas of interests. The images of the Accra metropolitan area and Kumasi Metropolitan were obtained from the bigger Landsat images. The boundary shapefile of Accra and Kumasi Metropolitan obtained from the district dataset was used to subset the AOI from the satellite images. The new Accra metropolitan area layer was overlaid on the radiometrically calibrated Landsat images using a clipping method, this process extracted the Area of interest (AOI), from the Landsat images for further analysis, and this process was repeated for Kumasi Metropolitan. After the Area of interest was extracted, a pre-processing phase was initiated to classify the pixels into land cover classes (Greenspaces: Dense and Mesic vegetation, built up, bare land and water) using a supervised classification approach. In this process, a set of training samples representing each land cover class was selected from the region of interest, and the spectral signatures of each class were characterized based on their reflectance values in the Landsat imagery. The training samples were then used to train a classifier, which was applied to the entire Landsat image to classify each pixel into one of the predefined land cover classes.

Once the classification was completed, accuracy assessment was carried out to evaluate the accuracy of the classification results. This involved comparing a sample of the classified pixels to reference data from the ground, in this case high-resolution imagery (Google imagery for the studied years were used, to determine the overall accuracy and error matrix of the classification.

The assessment was performed to compare the supervised classification of the AOI and to the actual ground condition. This process is to evaluate how well the classification represents the actual ground conditions. Hence, this level of research tests the usability of the classification result that was performed on the data acquired. Since supervised classification was completed, the likelihood that the researcher could influence the mismatch of classes was probable. An overall accuracy and kappa coefficient was obtained as a step towards enhancing the study's reliability.

Kappa coefficient is used as a measure of agreement between the classified image and the real-world scenario. The formula is presented below.

$$k = \frac{N \sum^{r}_{i=1} Xii - \sum_{i=1}^{r} (x_{i+} * x_{+i})}{N^2 - \sum_{i=1}^{r} (x_{i+} * x_{+i})}$$

Where **N** is the total number of the reference points,

r is the number of rows in the matrix

xii is the number in row i and column i

x+i is the total for row i

Xi+ is the total for column i

Hence, **K=1** means there is perfect agreement between reality and classified image

K=0 means complete randomness

Characteristics of Landsat data (satellite imageries) used for the Accra metropolitan area.

Year	**Landsat Type**	**Date**
2000	Landsat 7 (ETM +)	20-04-2000
2011	Landsat 7 (ETM +)	01-01-2011
2022	Landsat 8	04-08-2020

Characteristics of Landsat data (satellite imageries) used for Kumasi metropolitan area

Year	**Landsat Type**	**Date**
2000	Landsat 7 (ETM +)	17-05-2000
2011	Landsat 7 (ETM +)	24-01-2011
2022	Landsat 8	03-03-2022

Simplified table of Accuracy assessment of Accra Metropolitan

Year	Total number of correct pixels	Total number of reference points	Overall Accuracy (%)	Kappa coefficient (%)
2000	65	100	65	32
2011	79	100	79	40
2022	85	100	85	50

Simplified table of Accuracy assessment for Kumasi Metropolitan

Year	Total number of correct pixels	Total number of reference points	Accuracy (%)	Kappa coefficient (%)
2000	71	100	71	44
2011	83	100	83	67
2022	84	100	84	66

Results for Landcover change analysis in Accra metropolitan area (2000-2022)

Land Cover Class	2000		2011		2022	
	Area (ha)	Percentage (%)	Area (ha)	Percentage (%)	Area (ha)	Percentage (%)
Dense Vegetation	547.92	3.92	223.29	1.60	227.07	1.63
Mesic vegetation	4,573.53	32.69	2801.34	20.02	2,539.17	18.15
Built – Up	8,504.1	60.78	10914.3	78.04	11212.2	80.09
Bare Land	310.32	2.22	42.93	0.31	10.44	0.07
Water	55.35	0.40	9.36	0.07	2.34	0.02

Results for Landcover change analysis in Kumasi metropolitan area (2000-2022)

Land Cover Class	2000		2011		2022	
	Area (ha)	Percentage (%)	Area (ha)	Percentage (%)	Area (ha)	Percentage (%)
Dense Vegetation	1,160.64	5.42	593	2.77	221.22	1.03
Mesic vegetation	12,736.62	59.43	6,669	31.12	6121.89	28.57
Built – Up	7,517.97	35.08	14,169	66.11	14959.29	69.80
Bare Land	15.66	0.07	-	-	128.52	0.60

Document review

This approach will be used to address the third study question: What strategies have the city plans been adopting to enhance the development of green spaces in Accra and Kumasi? The city authorities' strategies for addressing and enhancing the growth of green spaces were identified through an analysis of the short, action and medium plans for the study areas. This sought to uncover the role of planning mechanisms in ensuring urban sustainability in terms of green space development. Specifically short, action and medium plans from 2011 to 2022 were reviewed for discussion.

3.6 Data analysis

Thematic analysis was used to analyze the data, which involved finding themes that naturally emerged from the data rather than beginning with preconceived categories (Bryman, 2008). A triangulation method was used to ensure that the data obtained from various sources was accurate and to maintain some degree of consistency (Bengtsson, 2016).

Validity and Reliability

Controllability and scholar autonomy have been cited as shortcomings of the case study methodology. Due to the researcher's extensive degree of freedom when conducting research, this is different from quantitative methods (Verschuren, 2003). The researcher, however, gets around these drawbacks in a variety of methods. The researcher started by conducting a study of the relevant literature, which aided in the phenomenon's theoretical formulation. The concepts were defined in terms of the context of the study (stipulative definitions), which successfully constrained

and focused the investigation. This lessened the likelihood of collecting information unrelated to the study question. The study's aim was internal validity. Several reliable sources were used to collect the data, and several complementary methods were used to do so. Data was gathered from a variety of trustworthy sources, using a variety of complementary methodologies. In order to provide consistency, validity, and comprehensive knowledge on the study topics, data from various sources was triangulated.

Table 3.1 below summarizes the research processes and the method of collecting data.

Research objectives	Instrument for parameters	Data types and sources	Parameters for analysis
To assess the nature and existing condition of green spaces in Accra and Kumasi	● Mapping ● GIS ● Comparative analysis (land use and land cover change over the years)	● Primary ● secondary (satellite images) EPA Forestry Commission, Department of Parks and Gardens, Town and Country Planning	● Change in vegetation cover over the years (Km square) ● Percentage of land cover change over the years
To identify the factors which have given rise to green space depletion	● Interviews ● Thematic analysis	● Primary data Forestry Commission, Department of Parks and Gardens, Environmental Protection Agency, Town and Country planning Traditional leaders Citizens	● Urbanization ● Insufficient regulation ● Socioeconomic and political challenges
To analyze some city plans of Accra and Kumasi in relation to green spaces	● Document review ● In Depth interview	● Primary and secondary data Town and Country Planning, Parks and Gardens, short and medium development plans, policy documents	Content analysis to discover theme

3.7 Ethical consideration

For the study, a variety of ethical concerns were taken into account. These include the rights to free consent, confidentiality, and privacy as well as informed consent. In order to prevent any sort of attack or mistaken impression, the researcher will reveal herself to the respondent with their informed agreement. In addition, the respondents will be made aware of the goal of the study and the labor-intensive process that would be needed given the complexity of the questions they will be asked. In order to avoid any kind of pressure from the researcher, the right to free consent means that the research subjects were given the option of participating or not. Additionally, since the study will only be used for academic purposes, the respondents will be told that any information they provide will be treated in confidence. Confidentiality will be attained using pseudo variables.

CHAPTER FOUR
RESULTS AND DISCUSSION

4.1 Introduction

Empirical results are elaborated below to support answering the research questions. Further explanation will be gathered from interview results, questionnaires and geographic information system particularly trends of land use land cover change. Here, a general interpretation of the semi structured interviews from the planning authorities will be included to better understand the relationship between relevant stakeholders and green space depletion. Moreover, the comparison between data and analysis will be elaborated on in the last section of this chapter.

4.2 Descriptive statistics

For the three cases, data were collected from traditional leaders, business owners, households and planning authorities. A total of 3 traditional authorities were interviewed thus one from each case. A total of 77 businesses were used for the study. Out of this number, 59 of the businesses were located on the Adehyeman park, 11 on the Achimota forest and 7 on the Fante Newtown Park. The reason for these numbers is that the entire Adehyeman park has been transformed into a commercial center hence the high number of the respondents (see figure 14) while the Fante new park has a few businesses (see figure 15). Again, questionnaires were again issued to 10 households from each case making a total of 30 while 3 planning authorities were interviewed from both metropolitan areas. To ensure confidentiality of those interviewed pseudo variables were used.

Table 4.1: A table showing research participant and Pseudo variables for confidentiality.

Research participant	Pseudo variables
Traditional leader in Achimota	TLA
Traditional leader in Fante new town	TLF
Traditional leader (Adehyeman gardens)	TLAd
Planning authorities in Kumasi metropolitan area	PAK1, PAK2, PAK3

Planning authorities in Accra metropolitan area	PAA1, PAA2, PAA3

4.3 Accra Metropolitan area (Land Cover Changes)

Landsat images of the three periods captured and produced by the ENVI software are presented in Figure 11 and 12 below. Five categories of land cover -dense vegetation, mesic vegetation, built up areas, bare lands and water are shown in the figures below. In 2000, the dense vegetation, mesic vegetation, built up, bare lands and water bodies in the Accra metropolitan area represented 3.92%, 32.69%, 60.78%, 2.22% and 0.40% of the total area respectively. By 2011, it was observed that the dense vegetation, mesic vegetation, built up, bare lands and water bodies in the Accra metropolitan area represented 1.60%, 20.02%, 78.04%, 0.31% and 0.07% of the total area respectively. Eleven years later in 2022, the area occupied by the dense vegetation, mesic vegetation, built up, bare lands and water bodies in the Accra metropolitan area represented 1.63%, 18.15%, 80.09%, 0.07% and 0.02% of the total area respectively. These trends represent changes in the areas occupied by the five classes of land. Similarly, there has been rapid developments with upward surge in the built up and bare areas as shown in the south-west wing of the metropolitan area as observed in Fig. 10. Dense vegetation, which represents the 'green' areas, have changed over the 20-year period (Fig. 10). This trend is not different for built-up and bare areas.

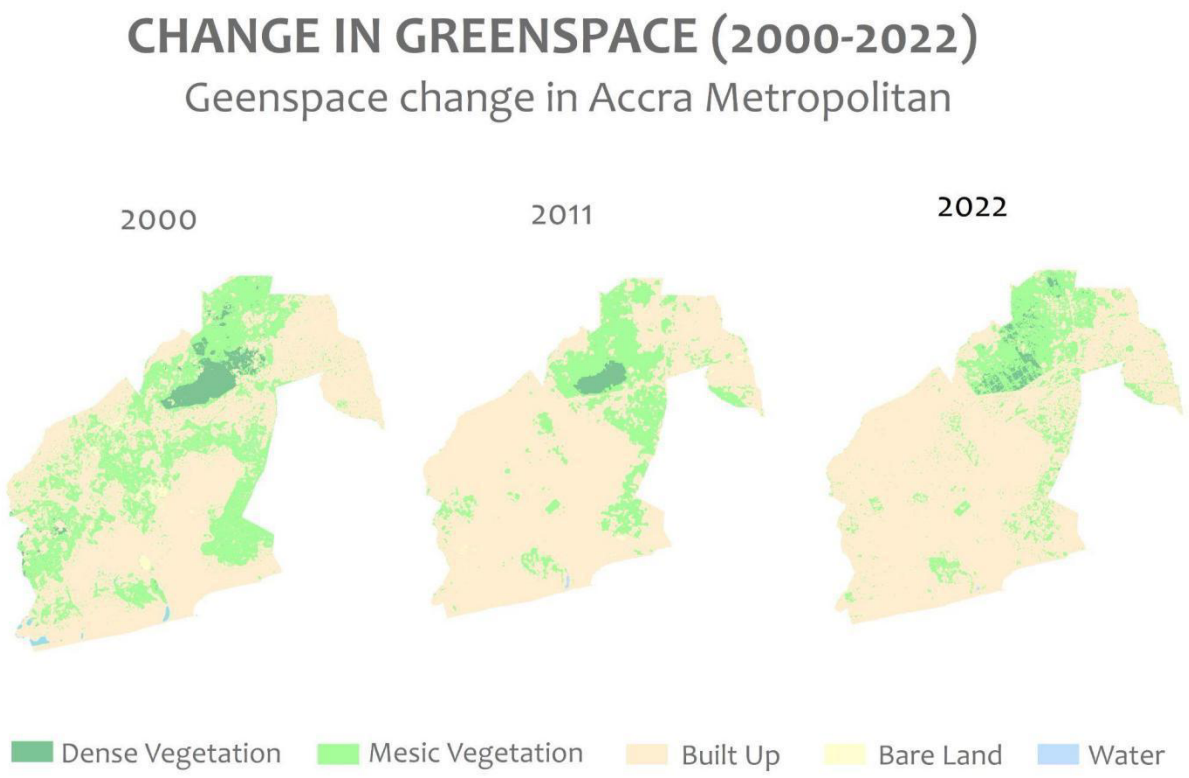


Figure 4.1 Land Use Land Cover Change in Accra Metropolitan Area from 2000 to 2022
Source: Authors (2023)

4.4 Kumasi Metropolitan area (Land Cover Changes)

In Kumasi, four categories of land cover are dense vegetation, mesic vegetation, built up areas, and bare lands are shown in the figures below. Kumasi, which was once described as a garden city, has witnessed decline over the years. In 2000, the dense vegetation, mesic vegetation, built up and bare lands in the Kumasi metropolitan area represented 5.42%, 59.43%, 35.08% and 0.07% of the total area respectively. By 2010, it was observed that the dense vegetation, mesic vegetation, built up, bare lands and water bodies in the Kumasi metropolitan area represented 2.77%, 31.12% and 66.01% of the total area respectively. Eleven years later in 2022, the area occupied by the dense vegetation, mesic vegetation, built up and bare lands the Kumasi metropolitan area represented 1.03%, 28.57%, 69.80%, and 0.60% of the total area respectively.

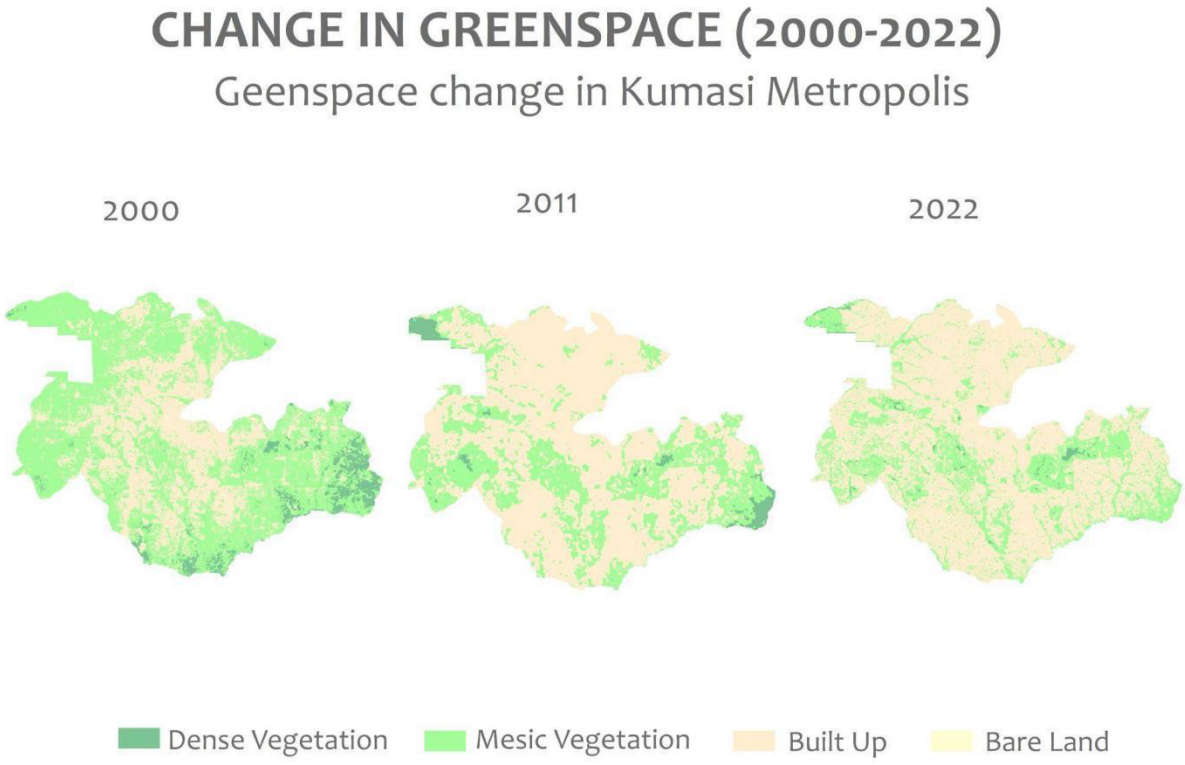


Figure 4.2: Land Use Land Cover Change in Kumasi Metropolitan Area from 2000 to 2022
Source: Authors (2023)

4.5 City Plans for enhancing the development of green Space.

Under the resilience unit of the 2022 action plan for the Accra metropolitan area, the assembly sought to improve public safety metro wide by constructing new pedestrian walkway facilities with green infrastructure (AMA Action Plan, 2022). The metropolis is intensifying efforts to provide amenities to schools as part of its strategy within the clean Accra Campaign and Greening and Beautification of Accra Project by restoring 26 selected open spaces within the metropolis. This project was launched in 2018 under SDG 15, life on earth and it is still in progress (AMA Action Plan, 2020).

SWOT analysis of green spaces and green space management conducted by the spatial authorities in the Accra metropolitan area revealed that the metropolitan's strength is the existence of a legal

framework that protects green spaces and encourages green space. The authorities added that in land use planning, it is a requirement that every special plan have a green space component before it would be approved. Also, the consciousness of the people to protect the environment against climate change and the wakeup call to everybody about climate change is also one strength.

In terms of weakness, the spatial planning authorities argued that political interference is a major weakness. They also mentioned weak law enforcement. The state agencies are very weak in enforcing the legal regimes or the legal frameworks or the policies that protect green spaces in the country.

In terms of opportunity, the spatial authorities mentioned the green Ghana campaign. Every year the metropolitan area is allocated a whole week or sometimes a month as "green Ghana". The ministry of lands and natural resources through forestry commission makes sure that Ghanaians go out to plant trees.

The spatial authorities also identified urbanization as a threat to green space management.

An extensive search of the Action Plan of the Kumasi metropolitan area revealed that there are no city plans for enhancing the development of green space. However, the interview of spatial planners in the area revealed that the city plans for managing and enhancing green spaces in the area are at the preliminary stage and not yet implemented. This point was stressed by the spatial planners in the metropolis:

> *We do not have any city plans for enhancing green space. It is in the preliminary stages and not yet implemented* (PAK1, 2023)

> *The Assembly relied on the implementation of a local plan to protect these spaces. That notwithstanding, it has realized the need for a green space plan and steps are being taken to prepare one (PAK3, 2023)*

The results from the interviews of spatial planners revealed that the spatial planning authorities are not the sole organization in charge of the management of green space. However, they do it in collaboration with the Environment Protection Agency and the Forestry Commission among and also rely on the buffer zone policy for green space management.

> *We cannot handpick one institution, so we can get agencies that have their core mandates revolving around protecting green spaces by the land planning authority, the parks and garden department, the environmental protection agency and forestry commission. Yes, there are some especially we gazette them…Companies unless NGOs within whose mandate falls within green space protection. The traditional authorities sometimes or in certain ways in certain regions play major roles or they are major stakeholders in its planning and management (PAA1, 2023)*

Though the planning authorities identified traditional authorities as a major stakeholder in the management and planning of green space, the traditional authorities argued that they are only responsible for proper allocation of lands:

> *Our main role is to ensure proper allocation of lands, but we do not really influence the green space management process* (TAA, 2023)
>
> *The Assembly does the planning, and we have no hands in it even though we are the custodian of the lands…. The metropolitan Assembly giving permit without our consent (TAF, 2023)*

4.6 Comparative analysis for green space depletion in the Accra and Kumasi metropolitan area from 2000 to 2022

The Accra metropolitan area which happens to be the capital of Ghana is bigger than the Kumasi metropolitan assembly in terms of size. In both metropolitan areas, there has been a rapid decline in size of both dense and mesic vegetation which were conceptualized as green spaces for the purpose of this study. For instance, in 2000, the dense vegetation in the Accra metropolitan area was 547.92 hectares representing 3.92% of the total surface area. Ten years later in 2011, it decreased to 223.29 hectares representing 1.6% of the total surface area. However, in 2022, the

Accra metropolitan area witnessed an increase in dense vegetation moving it from 1.6% in 2011 to 1.63% in 2022 while the Kumasi metropolitan area continued to face a decline in both dense and mesic vegetation while built up area continued to increase over the 30 years period. This is due the efforts made by the Accra metropolitan area as seen in their action plan for managing and reclaiming green space.

4.6.1 Cases Analysis

In order to get a detailed and in-depth picture of the depletion of green spaces in the Accra and Kumasi metropolitan assembly, three cases were picked from the study areas to determine the causes and drivers of the depletion of green spaces. Questionnaires were issued to business owners and individuals operating or residing within the Achimota forest, Adehyeman gardens and Fante new town park.

4.6.2 Land use land cover change of Achimota Forest from 2002 to 2022

In Accra, Ghana's capital city, at latitude 37°00.0°N and longitude 0°13′08.8°W, there is a tropical urban forest known as the Achimota Forest Reserve. 495 acres are covered by the forest. To provide a barrier and buffer between the forest and the schools and colleges in Achimota and Accra, the area of land to the south and east of the former Achimota College and Achimota School was reserved. The Ghana Institute of Public Administration and Management (GIMPA) is to the east, Christian Village is to the north, and the George Walker Bush Motorway is to the south, making the Achimota Forest Reserve the sole remaining urban forest in Accra. The forest acts as the city's lungs, a park for various animal species, a zoo for monkeys, a location for relaxation, and more (Okyerefo, 2009). The urban forest has lost forest cover as a result of recent, intense pressure. Uncontrolled waste disposal poses a further threat to its ecological integrity (see image 1). The Accraian sandstone with some interbedded shale and the Akuapimian quartzite and silicate schist are the two geological formations that the Achimota forest is located within. The reserve is home to a wide variety of animals, reptiles, and other animal species.A piece of the Achimota woodland was burned, as seen during a visit (see image 2).

Image 1: A dumping site at the Achimota forest

Source: Kennedy Mornah (March 12, 2019).

Image 2: A brownfield at the Achimota park

Source: Field work (2023)

Image 3: A burnt portion of the Achimota park.
Source: Field work (2023)

The Achimota forest's land use and land cover map revealed that while barren lands and settlements had greatly risen, thick vegetation (deep blue) and sparse vegetation (light vegetation) had decreased. The North-East edge of the forest was, however, primarily covered in sparse vegetation in 2002 (see figure 13b), with just a few spots of bare land and habitation (Yellow). In 2022, dense vegetation and bare terrain largely took the place of the forest's sparse vegetation on its northeastern edge. Even while the amount of dense vegetation rose, the amount of barren land also grew dramatically, going from small patches in 2000 to several hectares in 2022. The Ghanaian government's Action Plan for the Metropolitan Area, which focuses on green infrastructure and the planting of trees, especially in the capital, is responsible for the expansion of the dense vegetation in some areas of the forest.

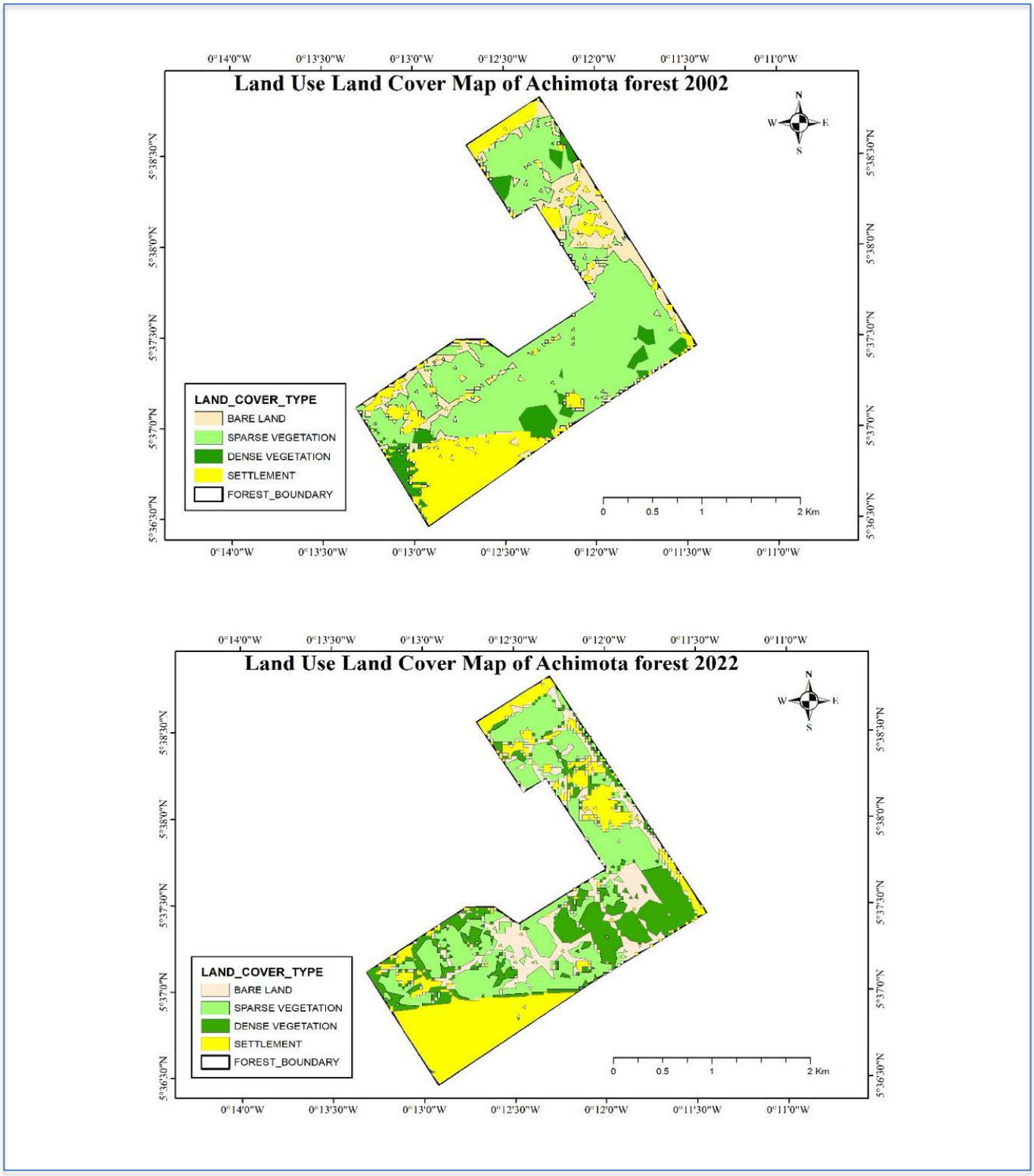


Figure 4.3a Land use Land cover change of the Achimota forest from 2000 to 2022

Source: Authors (2023).

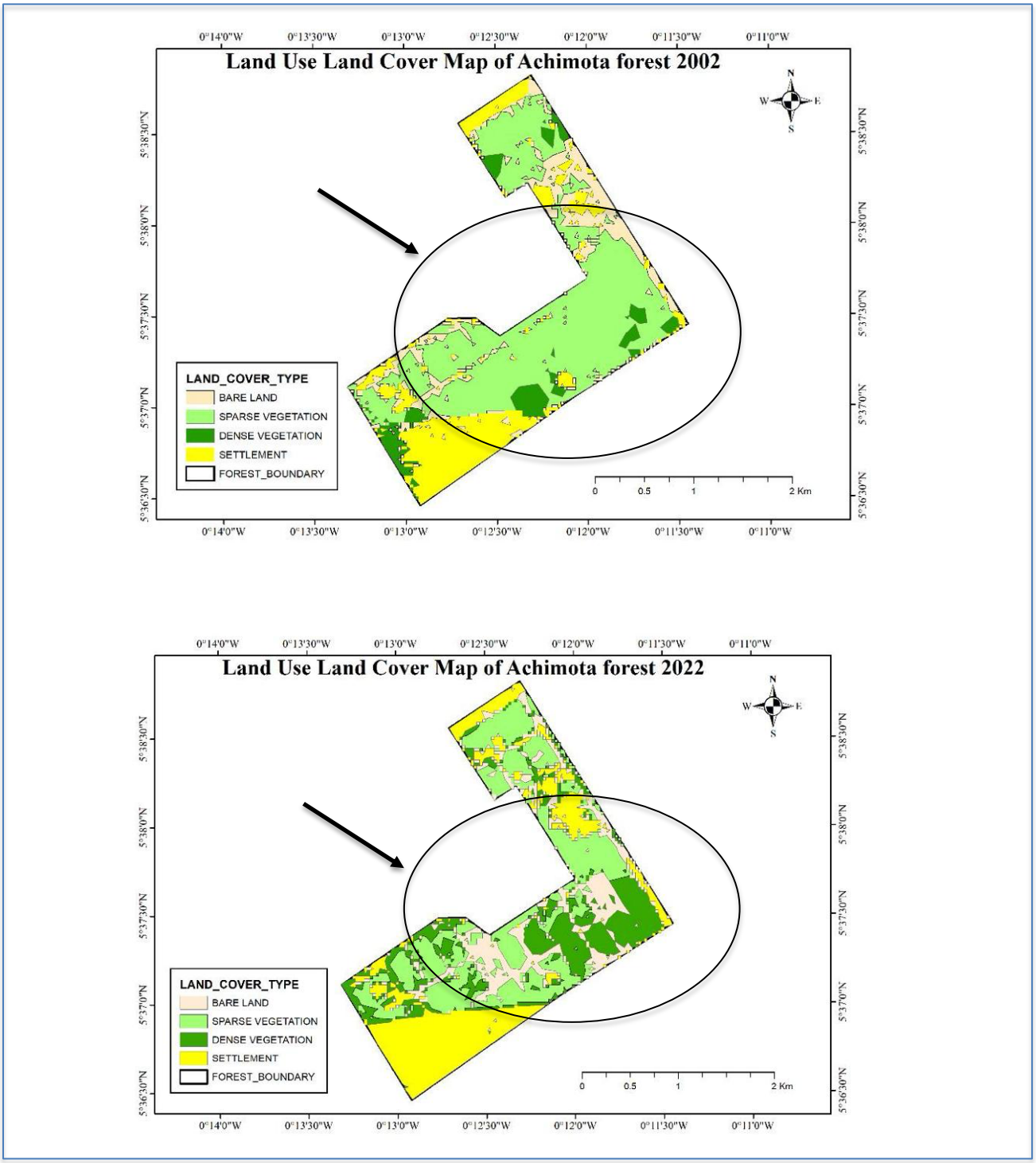


Figure 4.3b The extent of change in the Achimota forest from 2000 to 2022

Source: Authors (2023).

4.6.3 Land use land cover change of Adehyeman gardens

One of the parks in the Kumasi metropolitan region that was planned during the pre-colonial era is the Adehyeman Gardens. According to a 2017 study by Amoako and Adom-Asamoah, the garden was used as a public open place for relaxation. They continued by saying that even though the garden was still in use, commercial activity had taken over a sizable chunk of it. The investigation of the garden's land use and cover, however, painted a different image (see Figure 14). The garden was not visible on the maps since business activity had fully engulfed it. Image 3 below shows how the commercial activity has taken over the gardens. From figure 14, the rate of the depletion of the gardens from 2000 to 2010 was slower than from 2010 to 2022. This indicates that as population increases over the years, the demand for lands increases resulting in a change of land uses.

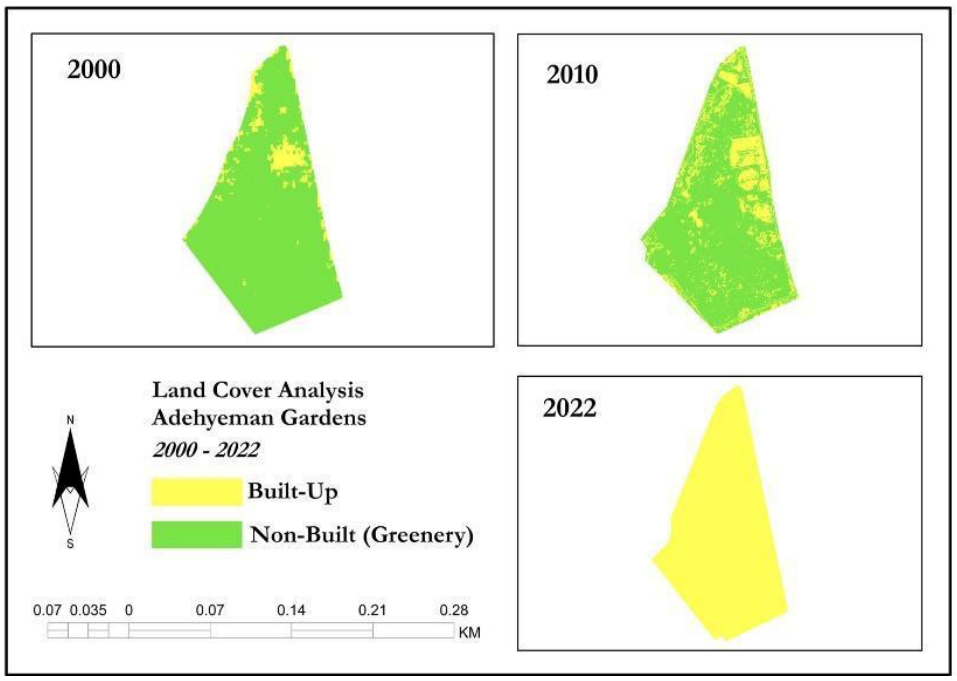


Figure 4.4 Land use land cover analysis of Adehyeman gardens

Source: Authors (2023).

Image 4: Commercial activities on the Adehyeman Garden in Kumasi
Source: Field work (2023)

4.6.4 Land use land cover change of Fante New Town Park

The same problem was identified by the land use/land cover analysis of the Fante New Town Park. Only 0.848258 acres were utilized for commercial purposes in 2012. In 2022, this increased to 3.358657 acres. In 2012, 2.654524 acres of the total area were unused (bare lands). Due to their conversion to various uses, particularly commercial operations, which reduced the area of bare land by 0.468767 acres, they shrank to 2.18761 acres in 2022. Green area covered 4.303424 acres of the Fante New Town Park in 2012. Only 2.261792 acres of green space remained in 2022 after half of it was converted to other purposes.

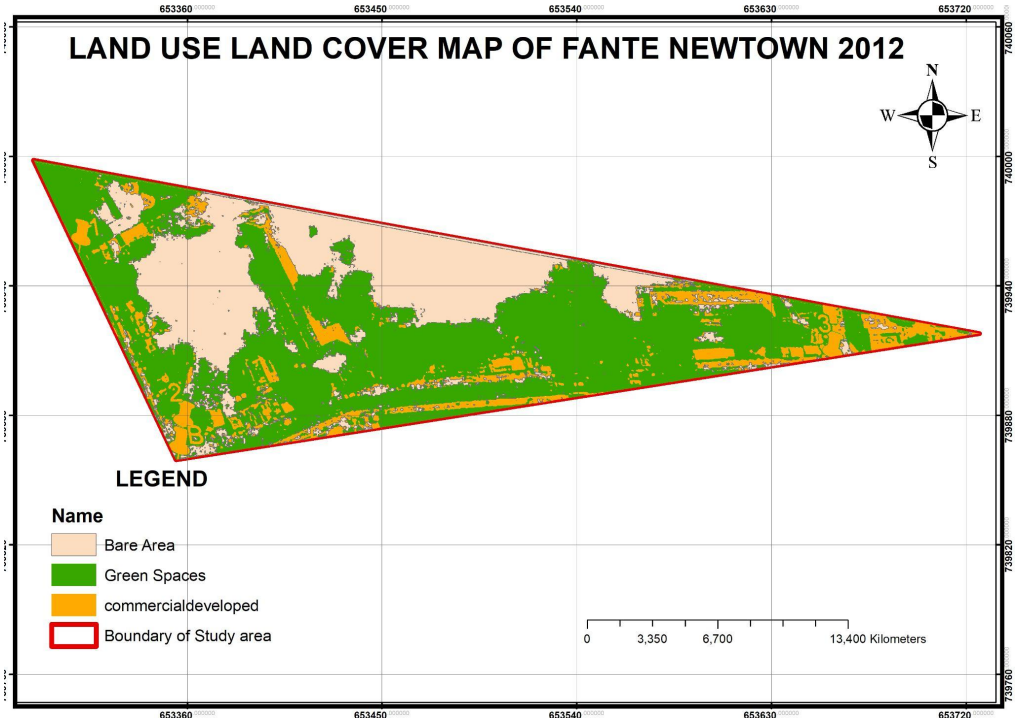


Figure 4.5 (a) Land use land cover analysis of Fante Newtown 2012

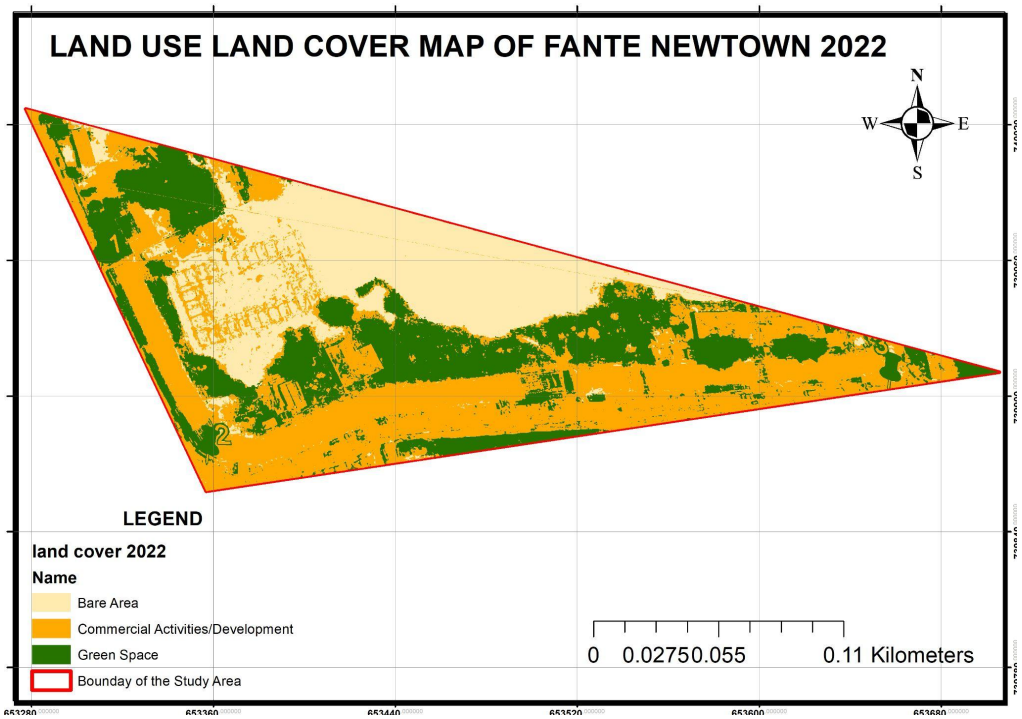


Figure 4.5 (b) Land use land cover analysis of Fante Newtown Park 2022

Image 5: Nature of green space in Fante New town
Source: Field work: 2023

4.7 Patterns of green space depletion

Previous studies reported continuous decrease in urban green space as a result of its conversion to other land use types (Keenan et al., 2015; Addo-Fordjour and Ankomah, 2017; Kleeman et al., 2017; Antwi-Agyei et al., 2019). For instance, Addo-Fordjour and Ankomah (2017) observed increased proportions of closed-canopy forest conversion to non-forest cover types (shrubs/grass and built up/bare lands) in two forests. Similar to the above-mentioned studies, our study revealed a trend in which the green urban spaces consistently decreased over time. Nonetheless, the built up and bare areas consistently

increased from 2000 to 2022 in all the three cases. Our findings show that in 2022, there was an obvious change in the land cover primarily due to rapid urban developments, leading to an upward surge in the built-up and bare areas and a decline in urban green spaces. This trend is corroborated by previous studies that equally found urbanization as being responsible for land cover changes (Attua and Fischer, 2011; Adomako, 2013; Antwi-Agyei et al., 2019). These points were stressed by some authorities:

> *Fast space of development in the city. There is a struggle for space, there is a struggle for land to develop and because of that people are just looking everywhere for any vacant land so it becomes a big threat (*PAA2, 2023)

> *Look at kumasi, it was once called a garden city but due to the attention the city gained as a major commercial area, people moved here over the years… more people means clearing lands for settlement* (PAK1, 2023)

The results of our investigation in the case of the Achimota urban forest unequivocally demonstrate the existence of encroachment in the urban forest , even if it is legally protected. Additionally, the amount of shrub and grass cover, which should eventually turn into a forest if allowed, gradually diminished at the expense of inhabited and bare areas. This pattern demonstrates how areas with bushes and grasses may be readily invaded due to their unique and sudden change if the limits of the urban forest are not well defined and protected.

4.8 Drivers of green space depletion

According to the respondents, leisure activities account for the majority of utilization of urban green spaces. These views were presented in the following way:

> *The main functions and benefits of green spaces in the Metropolis is Recreational purpose (PAK2, 2023)*

> *For instance, the Afua Sutherland park has been the surviving park that we have so a lot of people use it for picnics, also on a public holiday there are a lot of outdoor events children and other teens (PAA2, 2023)*

The interviewees also mention using the urban forest for religious purposes in relation to the Achimota park. The respondents do not attend churches, but rather prayer or fellowship groups that hold the view that they have encounters with God in the woods.

People from different religious groups use the Achimota park for prayer meetings. Almost every day, you see groups of people praying here (TLA, 2023)

The respondents who were interviewed acknowledged noting changes in the availability of green space, with the majority of the changes occurring in the recent ten years. This demonstrates that more recent alterations have been made to the green space. The replies in the two research locations do, however, differ slightly. While authorities in the Accra metropolitan region claimed that there has been an improvement in the availability of green spaces, authorities from Kumasi indicated that the area's loss of green space has been worse over time.

> *Well, it's not that bad as we have a major golf park which has become one of the leading golf parks in Accra, also have the Achimota Forest and some gardens. Some residents do have small green spaces so I will say it's in good state but there's more room for improvement (TLA, 2023)*

> *The current state of green space in the Kumasi metropolitan area is very dangerous (TLF, 2023)*

> *A few are in existence, but most have been left redundant and others are being used for other uses such as residential and commercial and it is alarming (PAK2, 2023)*

> *In Accra, the green space is neither good and neither bad, we are operating in the middle grounds (PAA1, 2023)*

The loss of green space in the Kumasi and Accra metropolitan area may have been influenced by population growth in the area. The majority of respondents confirmed this, citing urbanization as the primary factor in the general decline of green space in the two research areas. This is in line with the argument made by Fuwape and Onyekwelu (2011) that man made materials replace natural ground cover during the urbanization process,

including vegetation, bare soil, and standing water. Adomako (2013) also mentioned an inverse association between the loss of natural land cover and urban growth.

The urban districts of Accra and Kumasi have seen a threefold increase in population. Urbanization, the flow of people into urban areas, may consequently have an impact on the changes in land use, particularly around the periphery of the urban forest. Unchecked urban growth and human presence in commercial and residential areas may lead to significant changes in ecosystem trends and patterns (Grimm et al., 2000).

The responders specifically pointed out agricultural practices and logging as the key reasons for the urban forest's loss in the Achimota woodland. The majority of those surveyed anticipate farming practices would result in a loss of biodiversity. Others pointed out that there might be deforestation and land loss as a result of farming techniques in the urban forest. This is because most farmers frequently adopt slash-and-burn techniques when cultivating the land, which may result in the extinction of numerous species. The main sources of land cover changes in the urban forest were reported to be fuel wood harvesting and illegal logging, which was fueled by chainsaw operator actions. Specifically, to the Adehyeman gardens and Fante new town park in the Kumasi metropolitan area, the respondents identified commercial activities and infrastructural development as the main cause of the depletion of the green spaces in the areas.

Enablers to the implementation of green space planning standard

The political willingness of the New Patriotic Party government to plant each year in support of the country's vigorous drive for reforestation and tree planting for sustainable environment and social development was one factor that made it possible to implement the open space's planning standard. To do this, the government is prepared to invest millions of cedis to the planning of trees. "Green Ghana Day" is the name given to this initiative.

The respondents further stated that the project's implementation is made possible by inspirational leaders, organizations with prioritized objectives and targets, evaluation abilities, staff expertise and abilities, interaction, instructional adaptability, collaboration, and monitoring and communicating progress toward goals. Another enabler found in this research is the availability of data and competent employees with appropriate backgrounds who brought their deep knowledge and skills on board.

Barriers to the implementation of green space planning standard

The study identified three different types of impediments that had an impact on the adoption of green space planning guidelines, depending on their nature and location of origin. The study highlighted institutional, psychological, and structural impediments, including those from Bryson et al. (2015), Jones & Hill (2009), and Rondinelli et al. (1991).

Institutional and physiological barriers

The study's findings indicate that a number of organizations with various objectives, responsibilities, and passions were involved in the execution. The Department of Parks and Gardens and the Town and Country Planning Department, which are the major authorities, are joined in the implementation process by conventional officials, architects, private groups, spatial consultants, and researchers, among others. This frequently led to friction and dispute, which served as roadblocks to the application of the planning standard. Some respondents admitted that they sometimes found it difficult to work with other stakeholders to find common ground. The traditional authorities attributed the decrease in green space in the Accra and Kumasi urban area to a lack of coordination among stakeholders. Despite being referred to as "custodians of lands" in the Ghanaian constitution from 1992, the traditional leaders who were interviewed claimed they were not involved in city development. They added that due to modernization and the rise in urban population, they were no longer able to use traditional planning techniques like taboos and totems to safeguard forests, green spaces, and the environment as a whole.

> *The Metropolitan Assembly has already given permits and little can be done about it... Assembly does the planning (TLF, 2023)*

> *We have made it known that illegal land acquisition is prohibited and that anyone found guilty will be dealt with by losing the rights of ownership but the offenders are nor dealt with properly by the required institutions and this is worrying (TLA, 2023)*

4.1.1 Structural barriers

The findings showed that while developing the initiative and policy was simpler, carrying out the ideas contained in the policy was more challenging. One respondent emphasized the following:

> …Of course, it's always simple to say that's how it should be, but really doing it is frequently the challenging part (TLA, 2023).

The responders also attributed the causes of the depletion of green space in the Accra and Kumasi metropolitan area to lack of enforcement. According to respondents, though there exist laws that seek to protect green spaces in the country, these laws are poorly implemented by authorities.

> *Ghana has laws, I can boldly say Ghana is one of the countries with laws but these laws cannot be implemented rightly or are done partially due to selfish gains. You have heard of the Achimota park's controversy on the news, right? (TLA, 2023)*
>
> *The laws exist but what is lacking now is the will to act (PAA3, 2023)*
>
> *The people who make the laws about protecting green space are the same people destroying it…. Sir John was the CEO of a major stakeholder in charge of protecting green spaces, but we all saw what happened when he died (TLAd, 2023)*

The results also revealed that there was interference from politicians in the implementation process and also lack of funds to manage and build open spaces. One respondent emphasized this point by stating:

> *One mayor at that time started with the demolishing exercises and the next morning the matter reached the court. There was political interference and the whole process was halted. So, the office has taken other measures but it's sad to know that sometimes political interference makes it difficult to implement or achieve the overall objective of what they have intended to do. (PAA2, 2023)*

4.9 Intervention to green space depletion.

The respondents, mainly the traditional authorities and spatial planning authorities proposed several interventions that can help to tackle the rapid depletion of green spaces in the study areas. These include stakeholders collaboration, adequate allocation of funds and strong regulation as well as the bulldozer approach.

4.9.1 Stakeholders collaboration

According to Adjei Mensah (2014), one of the main issues causing inadequate management of green spaces in Kumasi was a lack of coordination among the associated bodies on these places. This was also identified as a factor in Accra based on the findings. Despite the fact that the traditional authorities are the lands' legal custodians and once used indigenous planning methods like totems, indigenous knowledge, and taboos to manage local resources, they now view themselves as passive stakeholders who are no longer involved in the spatial planning of their communities. The traditional authorities recommended that because they have a direct line to the populace and can quickly change their behavior for a successful outcome in managing green space, they should now actively participate in the development of their communities.

> *The Assembly does the planning. They give permits without our permission meanwhile the law makes us, the traditional leaders custodian of the lands in Ghana. The Assembly should collaborate with the traditional authorities in managing the green spaces (TLAd, 2023)*

> *It is so unfortunate we the traditional authorities do not have green space management plan…even in the past, there were no blueprint plan, but you dare not misuse natural resources because the indigenous planning system which consist of taboos were enforced but now it has been replaced with the western system of planning which does not involve us (TLA, 2023)*

4.9.2 Allocation of funds and strong regulations

The lack of enough funding for the development and upkeep of the green spaces is one of the key worries of the responders, particularly the planning authorities and traditional leaders. They demonstrated that the majority of lost green spaces could have survived if there had been adequate funding for their management and upkeep.

> *We need funds to grow and manage it, laws to protect it which is directly linked with the state security and a stop to political interference (TLAd, 2023)*

4.9.3 Education

Another way to improve the management of green spaces in Kumasi and Accra is through intensive educational efforts on their conservation. The literature (see Adjei-Mensah 2014) and the respondents' comments both identified educational campaigns as one specific tactic that can be utilized to preserve green places. For instance, the representatives from all the stakeholders recognized it as a project that can be utilized to raise public awareness of the importance of preserving green places.

> *I know we usually say education as a solution for everything, but education is still the way to create awareness on the importance of green spaces (PAK1, 2023)*

4.9.4 Bulldozer urbanism

The respondents added that encroachment on green space due to population growth and urbanization is one of the causes of green space depletion in the study areas. The planning authorities recommended bulldozer urbanism .Bulldozer urbanism is a word used to describe a culture that involves tearing up vast land parcels quickly for urban redevelopment, changing the natural landscape in the process. Bulldozers are the

equipment that are used the most commonly, but this operation can be carried out using a variety of approaches. Heavy machinery is also regularly used (Kaur, 2023). This approach is similar to gentrification where demolishing of problematic projects leads to urban renewal.

> *I think the measure has been the bulldozer approach. I know a lot of people are biased or against the bulldozer approach. Let me chip this in, after the June 9 or June 3 disaster, where Accra got flooded. I was part of the team that sat and worked on the entire Accra buffing all water waves 15mm. So, the 15mm is supposed to be green that will serve as the retention area whenever it rains. And there is that heavy pour and runoff of the rainwater but what do we see? We see that those areas have been encroached by development. So, we dipped that analysis, and we mapped out all water courses and the buffer areas that have been encroached. Interestingly we set out to demolish all those structures because they are sitting on water waves. Those areas are supposed to be green (PAA2, 2023)*

CHAPTER FIVE
SUMMARY AND CONCLUSION

5.1 Summary

These sub-questions, taken together, provide an answer to the main study question: what is the pattern and drivers of the depletion of green spaces in Ghana? The findings revealed green spaces in the Accra and Kumasi metropolitan area have been depleted rapidly over the last ten years. According to the study, the majority of respondents primarily use urban green spaces for pleasure. But a sizable portion of the respondents also said they went to the Achimota urban forest for religious reasons. More than half of the respondents claimed that using forests had some advantages in this regard. The majority of responders also said they had noticed changes in the urban forest's land cover.

The study looked into three specific cases: the Achimota forest in the Accra metropolitan area, the Adehyeman gardens and Fante new town park, both in the Kumasi metropolitan area, in order to understand the nature and pattern of the loss of green space in the studied areas. The study's findings showed that even though the Achimota forest had been dwindling over the previous ten years, an increase in green spaces had been anticipated in 2022 based on an examination of changes in land use and cover. However, there are still fewer green places in the Kumasi metropolitan region than there used to be. This is attributable to the Accra metropolitan area's most current action plan, which focuses on creating and improving green spaces in the region. Such proposals were not included in the action plans of the Kumasi metropolitan area.

The findings show that urbanization, agriculture, commercial activities, and infrastructure development are the main causes of the loss of green space in the three scenarios that were chosen. In all three cases, urbanization was a common factor in the quick loss of green space. However, the researchers identified particular reasons for the loss of green space in relation to each scenario, as indicated in the table 3 below, based on the responses and the land use land cover change map.

Table 5.1 Drivers of green space depletion

Drivers of green space depletion	General	Dominant specific drivers		
1. Urbanization 2. Agriculture 3. Commercial activities 4. Infrastructure development	Urbanization	Achimota Park	Fante New Town Park	Adehyeman Park
		Agriculture Infrastructure development	Infrastructure development	Commercial activities

An analysis of Ghana's zoning regulations and planning standards reveals that, despite the fact that no explicit provisions were made for urban green spaces, the document did allow for the zoning of open spaces, which, according to the literature, include both green space and grey space. The document states that a decentralized planning mechanism will be used to put the guidelines into action. The respondents identified several factors that help or hinder the implementation of the planning guidelines in relation to green spaces. These factors were conceptualized as barriers and enablers.

Similar to the literature analysis, the results showed that there were three types of barriers that prevented the adoption of the green space guidelines: structural barriers, institutional barriers, and physiological barriers. Nevertheless, based on the responses, it was challenging to draw a definite distinction between psychological and structural barriers. The researchers combined psychological and structural obstacles into a single category in order to paint a clear picture of the barriers. The barriers identified from the study are outlined in the table below.

Table 5.2 List of Barriers

Categories	**Barriers**
Institutional barriers	● Limited resources ● Interference from politicians
Structural and psychological barriers	● Differences in priority ● Lack of collaboration ● Lack of accountability

The enablers to the implementation of the guidelines were mainly the political willingness of the Ghanaian government to protect the biodiversity of the country after it was revealed that the country's achievement of SDG 15 is in jeopardy due to the structural and functional changes brought about by economic development in Ghana. This supports Lezine and Reed's (2007) assertion that political will plays a crucial role in the creation and execution of policies.The accessible nature of financial resources, data, and employees were other enablers that were noted. Azhoni et al. (2018) referred to these elements as readiness and ability. Even though these characteristics were present, some respondents said the guidelines' implementation had failed, which supports the claim made by Azhoni et al. (2018) that the existence of these factors does not automatically translate into a policy's success. As a result, policy effects are not always predictable, especially where adaptability is difficult or constrained. Therefore, players and institutions have no authority over the concept of enablers.

Table 5.3 List of enablers

Categories	Enablers
Political willingness	Implementation of Green Ghana Day
Availability of data	Development of green space plans
Availability of financial resources	- Provision of adequate logistics - Developing skills of personnel

The respondents added that the bulldozer approach, education, cooperation among stakeholders and provision of funds to manage green spaces are the solutions to green space depletion in Ghana. The final result of the study is conceptualized in figure 16 below. The result is also aligned with theoretical and conceptual frameworks. However, the new addition is the interventions that were identified by the respondents.

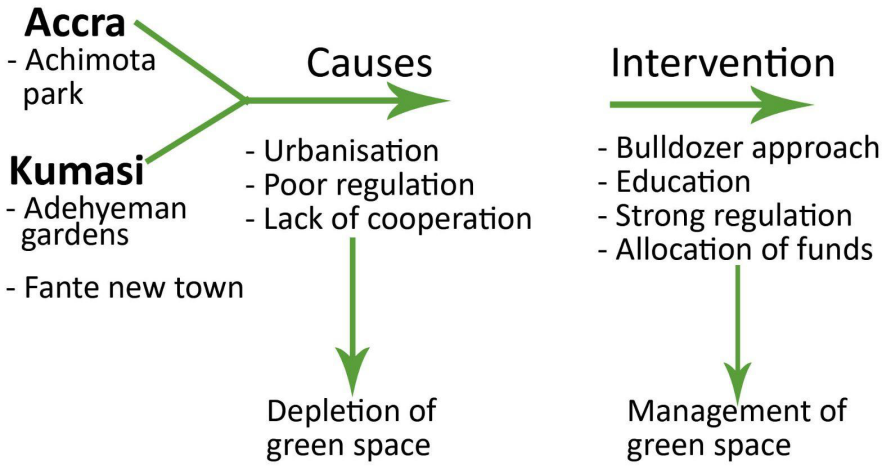


Figure 5.1: Conceptualisation of results

source: Authors (2023)

5.2 Conclusion

Policy recommendation

Traditional authority (chiefs) in Ghana have an excessive impact on land management and spatial planning since a sizable portion of the nation's land is owned under customary tenurial arrangements. Traditional authorities' roles in land management and spatial

planning are given legal weight by national constitutional provisions that acknowledge chiefs as trustees of the land held under customary tenure. Indigenous planning was utilized in the past by traditional authorities to manage ecosystems and green spaces. Indigenous planning based on indigenous knowledge, beliefs, and customs aided in the decision-making process for improving the physical, social, and economic conditions of the locations.

However, in this contemporary era, spatial planning has been dominated by conventional or modern (western) planning while indigenous planning has been described as outdated leaving traditional authorities as passive agents in spatial planning. Western planning has often been portrayed as a villain in the African continent that needs to be replaced with indigenous planning. However, it is impossible to overthrow this system for a completely new one because this system is rooted in the judicial and legislative system of Ghana.

Contemporary Ghanaian society is a unique product of the two (Indigenous and western planning). Therefore, in order for Ghana to experience real progress, it is necessary to build an ideology that may inspire the creation of institutions that are the result of the fusion or reconciliation of these two segments, or at least to view them as complementary to one another (Bamikole,2012) since the major issues identified was the lack of the collaboration between the modem and traditional institutions.

This approach to designing the built environment provides "useful" data for projects focused on place-based governance and illuminates the dynamics and incentives that influence how people perceive a certain location. Such a value-driven perspective on place-shaping will probably become more and more essential as society moves toward autonomy, self-assurance, and the interactive society, where people are obligated to take ownership of their environment, both individually and collectively. In accordance with Woodley (2004), planners are typically outsiders in local communities and must transition from the expressive to the reflective aspects of planning (Dobbins, 2009) by employing the Forester's analogy of "planning together" which will give them a deeper understanding of

what the locals value, feel responsible for, and are ready to dedicate themselves to in the larger context of their place (Horlings, 2015).

Reflection of research process and outcome

In light of the study's findings, it is clear that green space management and depletion constitute a significant research field especially in developing countries like Ghana. Urbanization, bad regulation, and a lack of cooperation among stakeholders are only a few of the factors that contribute to the loss of green space, and each merits its own study. Although the broad focus on the many aspects of green space depletion is one of research's strengths, it is also a drawback because it gives less detailed information on each topic than would be anticipated from independent research. This study's use of comparative studies (many case studies), as opposed to other studies that only use one study, is another strength. This methodology exposed various tactics employed by the case studies to manage green space and offer a platform for others to learn from.

This study's mixed-method approach is a strength. Through literature searches, surveys, interviews, and analysis of changes in land use and land cover, a thorough and detailed image of the types of green spaces present in the study areas was created. The qualitative method approach provided insights and knowledge which were not available until the field survey was conducted. The quantitative method approach on the other made it possible to quantify the responses in order to know which responses are the highest and the lowest respectively.

The data collection was a challenge for us as a result. The spatial planning authority which is in charge of the overall planning activities in the metropolis did not have access to spatial maps on the current stage of the green areas in the metropolis. Due to the commercial activities, they are engaged in, providing responses to the questions became inconvenient

to them. Answering questions whilst being interrupted by customers sometimes made respondents become reluctant to continue the process.

Time was one constraint that impeded the progress of this survey. The institutions interviewed during the survey had very busy schedules which made arranging for a meeting with the respondents difficult. That notwithstanding, the data was collected on time swiftly to ensure that a good analysis is done. The blue corridor was not recognized as a sort of green infrastructure in the research areas, despite the blue corridor being an example of green infrastructure in the theories employed in this study. Public parks and gardens are the sole forms of green infrastructure in the research locations. The causes of the disappearance of green space in the examples follow the same pattern as those reported in the literature, where the causes included urbanization and bad regulation. The study also showed that the interventions for green space management place-specific rather than the application of general scientific principles as indicated by the technical side of planning.

5.3 Recommendation for further studies

The study's findings emphasized how crucial it is for traditional and modern institutions to work together to enforce laws that protect green places. It is important to remember that the modern system is dynamic and has the potential to eclipse other systems. As a result, study is required to examine how modern and traditional authorities may work together to develop strategies for managing urban green spaces sustainably.

Again, the study also highlighted the importance of governmental actors (lawmakers and politicians) in upholding legislation that safeguards green spaces. The study did not interview any government officials except the planning authorities who happen to have no power in terms of enforcement of the laws. In nations where corruption is a serious problem and where the state still has the majority of the power, governmental actors may be particularly important. Many parts of the world still experience this issue. Therefore, further research is required to better understand the perspectives of different state actors and how they could affect the outcomes of green space protection.

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Appendix

Interview guide

Interview Guide for Traditional Authorities.

ID.....
..

Position.....
....

Date of interview.....

Town……

1. Who is in charge of allocating land in your community for development purposes?

……

2. What efforts are you making as a Traditional Authority to ensure effective implementation of land use plans?

.....

……

3. What are the major land uses in your community?.....

4. What types of green spaces are found within your community?

……

5. Does the Traditional Authority have a green space management plan?

……

6. If yes, what is the level of its implementation?

……

7. If answer to 6 is no, what factors impede the Authority from designing a green space management plan?

…….

……

8. What role does the Authority play in the planning and management of green spaces?

……

9. Do local regulations, ordinances, taboos, etc. exist for green spaces, trees, nature areas, etc.? ……..

10. If yes, kindly provide examples of these.

……

11. If answer to 9 is yes, how are these regulations enforced?

……

11.b If answer to no 9 is no, why?

……

12. What is the current state of green spaces in your community?

……

13. What are the functions and benefits of green spaces in your community?

13a. Functions

……

Benefits

……

14. What are the problems associated with green spaces in your community?

……

15. What factors contribute to the depletion of green spaces in your community?

……

16. Are there any areas within your community that were earmarked as nature reserves/ green spaces/ environmentally sensitive areas/ sacred grove but have been encroached upon without your consent?

……

17. What measures were/have been taken by your Authority to reclaim encroached green spaces and to promote green spaces in your community?

……

18. What are the effects of green space depletion in your community?

……

19. How do you intend to promote the development of green areas in this community

……

20. What support do you need to promote the development of green areas ?

……

21. What recommendations do you have with respect to the development of green areas?

……

……

Interview Guide for Spatial Planning Department

Id 1…….

Position…….

Date of interview…….

Study Area……..

Definition of green space

1. How do you understand green space?

……
……
……..

Spatial coverage of green spaces

2. What is the total amount of green space within the metropolis?

……
……..

3. Total Metropolitan area

…….....
.....

4. Total area of green space

……
……..

5. Area of green space per inhabitant

……
…

6. Percentage of green space under public control

Types of green spaces

7. What types of green spaces currently exist in the City?

……
……
……

Evaluation of green spaces

8. Does your organization have a Geographic Information System ―GIS or similar mapping software tools allowing evaluation of green spaces in the Metropolis? ……..

9. If yes, how is it used?

10. If not, why?

……
……
……

State of green spaces

11. What is the current state of green spaces in the Metropolitan Area ?

Benefits of green spaces

12. What are the main functions and benefits of green spaces in the Metropolis?

……
……
……
……..

Planning and management of green spaces

13. What is the department‘s main role in the planning and management of green spaces?
……
……
……..

Green space management plan

14. Does the assembly have a green space management plan? …….

15. If yes, what is the percentage of its implementation? ……..

16. When was the first green space management plan designed by the assembly?

……
…….

17. If answer to 16 is no, what factors have prevented the assembly from designing a green space management plan?
……

……
……
……..

Actors involved

18. Which Metropolitan organization(s) are responsible for planning and management of the City‘s green spaces?
……..

……
……
……

19. Are there other public actors, such as state institutions, that are involved in green space planning and management? ……

20. If yes, name these institutions.

Legislation/Laws

21.Do local regulations, ordinances, etc. exist for green spaces, trees, nature areas, etc.?
.....
.....

22. If yes, Kindly state some of them. ……..

……
……..

Stakeholders

23. Which of the following groups is/are involved in green space planning and management? (Kindly Underline where applicable)

Businesses / Companies Interest groups Traditional Authorities

The general public Others (Specify)……

SWOT analysis of green spaces and green space management

24. What are the most important Strengths, Weaknesses, Opportunities and Threats with respect to the city‘s green spaces, their planning and management?

Strength……
……

Weaknesses……
…….

Opportunities……
……

Threats……
……..

Social problems assessment of green spaces

25. What are some of the social issues that are associated with green spaces in the Metropolis?

……
……
……
……

26. Are there green spaces in the Metropolis which have been re-zoned for other land uses?
……
……
……
……

27. If yes, what led to the rezoning of those green spaces?

……
……
……..

28. If answer to 24 is yes, kindly state location(s) of those re-zoned green spaces and the new land uses…….

Encroachment on green spaces

29. Are there any areas within the Metropolis that were earmarked as nature reserves/ green spaces/ environmentally sensitive areas but have been encroached upon without your consent?.....

30. If the answer to above is yes, please provide the names of the locations and the kinds of development activities taking place there. ……..

……
……
……

31. If answer to 27 is yes, how has your office responded to those acts?

……
……
……

Factors that contribute to green space depletion

32. What factors contribute to the depletion of green spaces in the Metropolis?

Infrastructural development

Which of the following infrastructural developments contribute(s) to the depletion of green spaces in the Metropolis? (Please tick)

Others

(specify)……..

Effects of depletion of green spaces

33. What are the effects of green space depletion in the Metropolis?.....

……
……..

Promotion of green spaces

34. How can green spaces be promoted in the Metropolis?

……
……
……
……

35. What measures were/have been taken by your department to reclaim encroached green spaces and to promote green spaces in the Metropolis? (Mention with respect to selected cases)

……
……
……
……

36. Is there any funding available to promote green spaces?.....

If no. Why?.....

……

37. What plans have been made to promote green spaces in this metropolis?

……
……
……
……

Id 1……

Date of interview……..

Study Area……..

QUESTIONNAIRE FOR HOUSEHOLDS

1. Age of Respondent 31-35 [ ] 36-40[ ] 41-45 [ ] 46-50 [ ]
   51-55 [ ] 56-60 [ ] 61+ [ ]
2. Sex of Respondent Male [ ] Female [ ]
3. Do you live in this community? Yes [ ] No [ ]
4. How many years have you lived in this community?
   Less than 1 year [ ] 1-4 years [ ] 5-10 years [ ] 11-15 years [ ]
5. Why do you choose to live in this community? Social Ties [ ] Economic Benefits [ ]

Other reasons (specify)…… …… …

7. What is your highest level of education?

Basic [ ] Secondary [ ] Tertiary [ ] Non [ ]

8. What is your employment status? Employer [ ] Employee [ ] Self Employed [ ] Unemployed [ ]

9. If employed, what economic activity do you engage in? Agriculture [ ] Industrial [ ] Commerce and Service [ ]
10. How were you able to obtain this ?

Family land [ ] Acquired from a chief [ ] Through a politician [ ] Others (specify)…… 11. Did you acquire a permit for your building?
Yes [ ] No [ ]

12. Are you aware of the existence of a community plan? Yes [ ] No [ ]

13. If yes, is your building in conformity with this plan? Yes [ ] No [ ]
14. What are the major land uses in the town? Residential [ ] Educational [ ] Commercial [ ] Green/open space [ ]

15. How do you understand green spaces?

……
……
……

……
……

16. What types of green spaces exist in your community?

Wetlands [ ] Public parks [ ]
In private residences [ ] In public offices [ ]
Greens in educational areas [ ] Stretches along main roads and streets [ ]

Others (specify)……

17. Do you have a green space in your house? Yes [ ] No [ ]

18. If yes, what kind of green space is it?

Lawn [ ] Garden [ ]
Others (Specify)……

19. If answer to 17 is no, give reasons

Do not find it necessary [ ] High cost associated with the creation of green space [ ]
Difficulty in getting materials for planting [ ] I needed space for more buildings[ ]
Green space not financially rewarding [ ]

Others (specify) ……..

20. Do you know any benefits associated with green spaces? Yes [ ] No [ ]

21. If the answer is yes, what are some of these benefits?

Aesthetic Benefits [ ] Controls soil erosion [ ]

Reduction of atmospheric CO_2 [ ] Reduction of wind speed [ ]

Spaces for social interaction [ ] Maintenance of micro-climate [ ]

Food Security [ ]

Others (Specify)…….....

22. Have you identified any issues related to green spaces in your community? Yes [ ] No [ ]

23. If the answer to 21 is yes, what are some of the problems?

Physical threats to human safety [ ] A dumpsite [ ]
A hideout for criminals [ ] Breeding place for dangerous animals [ ]
An environment for sexual violence [ ] Allergies from pollen grains of plants [ ]

Others (specify)…….....

23. Are you aware of any local regulations that seek to conserve green spaces, trees, nature areas, etc.? Yes [ ] No [ ]

24. If the answer is yes, please provide examples of these.

Forest preservation laws [ ] Local nature protection areas [ ]

Zoning regulations for green space [ ] Others (Specify)……

25. If answered 24, how did you know about them?

……
…

26. If answer to 25 is yes, are these regulations enforced? Yes [ ] No [ ]

27. Are you aware of any green space which has been changed to a different use? Yes [ ] No [ ]

28. If yes, where is it located and what land use has it been converted to? Location……....

Converted/ new land use……

29. Which of these factors contribute(s) to the depletion of green spaces in your community? Laxity in the enforcement of development controls [ ] Lack of control over all lands by city authorities [ ] Problem of ownership of green space lands [ ]

Uncooperative attitudes of the general public towards the preservation of green spaces [ ] High land rent for other land uses in the city [ ] Others(Specify)……

30. Which of the following infrastructural development contribute(s) to the depletion of green spaces in your community?

High tension electric power lines [ ] Building in waterways/wetlands [ ]
Road construction [ ] Residential facilities [ ]
Commercial facilities [ ] Burying of telecommunication cables [ ]
Burying of electrical cables [ ] Erection of telecommunication masts [ ]

Others (specify)…… ……..

31. Have you destroyed any green space on your premises due to expansion works or renovation of your house?

Yes [ ] No [ ]

32. If the answer is yes, give reasons?

New development more financially rewarding than the green space [ ]

Others (specify)…… ……

33. What are the effects of green space depletion in your community?

Loss of urban biodiversity [ ] Depletion of spaces for social interactions [ ]
Urban heat island [ ] Reduction in urban agriculture [ ]
Air pollution [ ] Lack of places of recreation and social interactions [ ]

34. How do you intend to include green spaces in your community/ in your house?

Others (Specify)…… ……
……

35. Suggest possible measures for the promotion of green spaces in your community.