Addis Ababa University

College of Technology and Built Environment

School of Built Environment

Department of Urban and Regional Planning

ASSESSING THE CONTRIBUTIONS OF URBAN GREEN SPACES FOR ECOSYSTEM SERVICE IN LIDETA SUB-CITY, ADDIS ABABA, ETHIOPIA

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Assessing the Contributions of Urban Green Spaces for Ecosystem Service in Lideta Sub-City, Addis Ababa, Ethiopia

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DECLARATION

I, Adinew Mecha, declare that thesis work initialed Assessing the Contribution of Urban Green Spaces for Ecosystem Service in Lideta Sub-city is my own original work and has not been submitted for any award. All information from other published and unpublished sources is properly cited and authenticated in accordance with relevant scholarly practice.

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The undersigned certify that they have read and hereby recommend to Addis Ababa University, Urban Planning to accept the research submitted by Adinew Mecha entitled Assessing the Contribution of Urban Green Spaces for Ecosystem Service in Lideta Sub-city, Addis Ababa, Ethiopia in partial fulfillment of the requirements for award of master degree in Urban Planning.

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List of Acronyms

AACUBGDB	Addis Ababa City Urban Beautification and Green Development Bureau
ANOVA	Analysis of Variance
AASBPDA	Addis Ababa Sub-City Parks Development Agency
ES	Ecosystems Services
GI	Green infrastructure
GIS	Geographic Information System
LULCC	land use land cover change
UHI	urban heat island
UGS	Urban Green Spaces

Abstract

Green infrastructures are vital for sustainable and continuous urban development, as they contribute to environmental preservation and wellbeing of human life in general for ecosystem services. However, the challenges faced by raped growth of urbanization and makes these infrastructures, leading to the degradation of urban landscapes and ecosystems. Enhancing ecological benefits, pollution control, and UGS biodiversity contributes to a higher quality of life and long-term sustainability. The objective of this study is to assess the contributions of urban green space for ecosystem service in Lideta Sub-City, Addis Ababa, Ethiopia. The researcher used both qualitative and quantitative research approaches were used in the study. The researcher determined the sample size 400 respondent from the sub city's, total population of 214,768 people, by using the Yamane's (1967) formula. In analyzing data SPSS software version 26 (Statistical System for Statistical Analysis) was used which provides descriptive and statistical analysis for analyzing quantitative data. Employing descriptive statistics, correlation, and regression analysis, the study examines variables such as ecological benefits, pollution control, and UGS biodiversity, assessing their influence on quality of life and wellbeing. The analysis reveals a positive and significant correlation between ecological benefits, pollution control, UGS biodiversity, and the overall wellbeing of individuals. The validity and sufficiency of the links between the independent and dependent variables are demonstrated by the suggested model. Further research and the implementation of inclusive and safety measures ensure the of green infrastructures. The study concludes by offering insightful information about the vital role that green infrastructures play in sustainable development as well as useful suggestions for legislators and urban planners looking to improve people's quality of life and wellbeing while successfully protecting and optimizing the advantages of urban green spaces.

Keywords*:* ***Ecological benefits, green infrastructures, pollution control, quality of life, sustainable development, wellbeing***.

CHAPTER ONE

1. INTRODUCTION

1.1. Background of the Study

In the twentieth century, the population of large cities increased in many parts of the world. These benefits continue as urban development affects the city's microclimate (Gianna 2001). The special conditions of the urban microclimate environment are the high configuration of space and the geometry of urban canyons; distribution and provision of green areas and all outdoor spaces; your location; population and urban density and layout of buildings (Georgi and Dimitriou, 2010).

Past and present, the world is experiencing unprecedented urbanization, with more than 50% of the world's population living in cities. By 2050, the global urban population is expected to reach 6.3 billion; this is almost double the global population of 3.5 billion in 2010. The rapid growth of the city has caused greater pressure on land as well as natural resources and the environment in infrastructure development and construction at the expense of urban green spaces (Gelan, 2021).

Therefore, in the developed countries of the world, the urban environment is deteriorating at an alarming rate. Therefore, many people in cities and towns around the world face environmental problems in their lives. Urban green spaces have become an important part of protecting the urban environment due to their important role in providing space for many ecosystem services for human health. Despite the many benefits of urban green spaces, they are under pressure, especially in the fast-growing cities of sub-Saharan Africa (Azagew & Worku, 2020).

Ecologists, economists, social scientists, planners, and other scholars have agreed on the definition of urban green space: "Public and private open space in the city covered with vegetation for direct or indirect use by users (Byrne et al., 2015). In other words, it is land consisting mostly of rough, permeable, "soft" surfaces such as soil, grass and trees. It is the umbrella of all these. All parks, parks and other green areas designed for recreation, Accessible or publicly controlled areas, including water buffers and other green spaces. Urban green space refers to the use of land covered with natural vegetation or plants in the built and planned area. (Tylor et al., 2017). The importance of green spaces has developed alongside urban theory, which often includes horticultural, ecological and spatial impacts.

The role of urban green spaces has attracted much scientific and policy attention, especially in the formation and development of world cities and economies, due to their benefits to human health and environmental protection (Kabisch, 2015). According to previous paper works of other researches green spaces are connected to the human body, mind and soul. At the environmental and ecological level, they do many things, such as improving air, soil and water quality, reducing environmental noise, reducing thermal amplitude changes, preventing wind, reducing erosion processes, controlling floods, improving storm infiltration and surface runoff, reducing floods, etc. support biodiversity (Cilliers, S. 2015).

Green spaces help reduce the thermal impact of buildings, provide shade for pedestrians and areas, and can improve air quality and the environment. Significant knowledge from LULCC research is needed to improve urban green infrastructure planning and management (Konijnendijk et al., 2013). Previous studies have shown that urban environmental studies do not take geographical indicators into account (Standish el al., 2013). However, the city's green infrastructure allows residents to visually and energetically experience the outdoors. Green space in the city is important because it aims to provide the best experience for people living in the city and to eliminate the negative effects of the city on the built environment (Gashu and Gebre-Egziabher, 2018). Urban green areas and their surroundings can provide many benefits to society and play an important role in improving urban life. Urban green resources can contribute to health, reduce urban pollution, protect biodiversity and contribute to public health by providing a variety of products and services.

These benefits should incorporate both monetary and non-monetary values of biodiversity and ecosystem services, including how they relate to physical and mental health and social equity in access to services.

Consequently, our environment and social impacts on public health, recreation and the health of urban populations can be improved by green spaces. These benefits include reducing pollution and noise, improving the microclimate, and improving infrastructure. Green spaces can also provide roadside habitat for wildlife, control erosion, and protect urban water supplies for municipal water supplies. Open space is one of the human life essential for human development, therefore, according to Faria (2009), the shape, size and geographical distribution of these areas should be defined which have a direct impact on the human development of people society and nature.

• The implications for individuals are associated with biological and physiological needs, such as the importance of receiving solar energy, clean air, and refreshing wind, among others. Open spaces are directly associated with the daily lives of individuals and they serve as places of contact with the elements of nature.

• The social implications involve the dynamics of the reproduction of social relations and society; most of the time, these spaces are the scenes of family gatherings, meeting friends, etc.

1.2. Statement of Problem

This time urbanization is main problem facing to the world in changing the ecosytem. It is estimated that in more than half a century, the proportion of the population living in cities has increased from 50% to 66% today. This rapid urban expansion affects natural resources, including open spaces, and impacts ecosystems and the services they provide. The city has already felt the negative effects of climate change, such as extreme weather conditions, heat, rain, floods and droughts, causing economic losses, conflicts and negative impacts on human health and well-being (Davis and Nauman, 2017).

Urbanization puts great pressure on natural resources and poses a risk to urban livelihoods. To reduce some of these negative impacts, urban green housing has emerged as an effective and cost-effective solution. Careful planning and management of urban green spaces can provide many benefits to urban residents by creating a green space network (Kasai, T. 2016).

Urban green space is an important part of “green construction” and plays an important role in providing public open space and essential services to urban residents. They can work to improve the health of city residents of all races. It is important that everyone has access to public green spaces and that they are distributed fairly throughout the city (Shenglin Ben, 2023). Although more than half of the world's population lives in cities, many countries around the world are doing business at a very fast pace. This urban growth puts pressure on urban infrastructure, space and the environment to accommodate the growing population (World Health Organization - Europe, 2017).

In response to population growth, many cities and towns began creating and transforming areas such as open spaces, fields, parks, and wetlands to meet the needs of development. However, this rapid development has led to the destruction of urban green areas, reduced life expectancy,

exposure and diseases, increased air pollution, and changes in the microclimate in many areas (Schebella et al., 2012).

As the world's population continues to grow and urbanization must continue to grow, the negative effects of green space destruction are often overlooked. Urban green spaces provide many benefits to the people of the world. Many studies have revealed that Addis Ababa, the capital of Ethiopia, has not yet reached international city standards. Urban planning and design strategies often fail to prioritize urban open spaces and ignore the urban living environment. Although the green and beautiful office of the new city was built, it lacked planning and strategy. However, green areas, parks and open spaces in the city are managed by this institution (Azagew and Worku, 2020).

The value and benefits of urban green spaces are widely recognized; however, there is a need to encourage discussions on nature's diversity and agriculture in urban theory and practice. This involves analysis of activities, values and benefits associated with urban green spaces (Mensah, C. A. 2014).

Therefore, the main aim of this study is to determine the environmental impact of urban green spaces in Addis Ababa, Ethiopia. Through qualitative analysis, this study aims to identify and understand the unique ways urban green spaces contribute to the local environment.

1.3. Research questions

This research addresses the following research questions:

1. What is the extent and distribution of green areas in Lideta Sub-City?
2. How do UGS contribute for air quality and temperature regulation, in supporting biodiversity and nature conservation within the sub-city?
3. How do urban green spaces in Lideta Sub-City contribute to enhancing the physical and mental health of residents?
4. What are the key factors that hinder the intended contributions of UGS in Lideta Sub-City?

1.4. Objective of the Study

1.4.1. General Objective

The general objective of this study is to assess the contributions of urban green space for ecosystem service in Lideta Sub-City, Addis Ababa, Ethiopia.

1.4.2. Specific Objectives

1. To determine the extent, distribution, and condition of green spaces in Lideta Sub-City.
2. To assess the contributions of UGS in supporting biodiversity and nature conservation Lideta Sub-City.
3. To explore the physical and mental health benefits derived from urban green spaces in Lideta Sub-City.
4. To investigate the factors that hinders the intended contributions of UGS in Lideta Sub-City.

1.5. Significance of the Study

Based on the findings derived from the assessment of environmental contributions and challenges, this research endeavors to propose practical and effective strategies that can ameliorate the identified environmental issues. These strategies have been designed to maximize the positive impacts of urban green spaces and mitigate the negative effects resulting from the challenges faced by Lideta Sub-City.

Ultimately, the anticipated outcome of this study is the development of a set of actionable recommendations and strategies that can be implemented by relevant stakeholders, including urban planners, policymakers, and community organizations. By adopting these recommendations, it is expected that the environmental challenges related to urban green spaces in Lideta Sub-City can be effectively addressed, leading to a more sustainable and environmentally friendly urban environment.

1.6. Scope of the Study

Spatial scope, the study was carried out in Lideta sub-city, one of the 11 sub-cities of Addis Ababa. However, this study does not include the new variation of geographical area in order to focus on collecting official data from only one sub-city.

Thematic scope, the study applied to evaluate the contribution of urban green spaces/areas for ecosystem service in the study area.

1.7. Limitation of the Study

During the course of this study, the researcher encountered certain constraints. One notable challenge was the difficulty in accessing most government officials in the study areas due to their frequent absence from their offices, fieldwork commitments, and heavy workloads. These factors contributed to delays in data collection.

1.8. Structure of the thesis

The research paper is structured into five chapters. Chapter 1 provides a brief introduction to urban green space and outlines the research problem, research questions, research purpose, limitations, and scope of the study. The second chapter delves into the state of the art pertaining to urban green infrastructures, providing definitions of key terms and concepts. The third chapter focuses on describing the study area and the research methodology employed. The fourth chapter presents the main findings of the study, while the final chapter offers a summary of the findings along with proposed recommendations.

CHAPTER TWO

2. LITERATURE REVIEW

2.1. Explanation of related concepts

Infrastructures of urban areas especially green spaces aims to address the many impacts of the 21st century city on human urban ecosystems and help achieve development goals as a solution to environmental health and quality of life in cities around the world making cities inclusive, safe, strong and sustainable.

Urbanization is the process of establishing major cities and expanding urbanized areas as a result of forward-thinking economic activity. The population's demography shift, which draws more people from rural areas, quickens the pace of urbanization. In the context of nations, urbanization is distinct, though, since these locations are home to a highly populated population that demands access to better living and working conditions.

Green infrastructure is a network of planned natural and semi-natural places that includes blue and green spaces as well as other ecosystems. It is maintained and designed to offer a range of ecosystem services at different sizes (Monteiro et al., 2020). It is known that green infrastructure is an important indicator of the environmental sustainability of the city. Green infrastructure refers to any landscape that includes greenery and open space. Parks, parks, communities and green spaces around and between cities, as well as environmental areas connected to trees and groundwater, provide cities with green lungs that support the health of the community. (Mazelina, 2011).

Urban open space is a mixture of green space and urban gray space, which is part of the urban landscape by making a positive contribution to the urban landscape or making it accessible through public access (Mensah, 2014).

Green spaces are an important part of life that uses different microclimates for human thermal comfort, probably because they have good value in terms of aesthetic value and economic copy investment (Adıgüzel, 2018). According to some, urban green spaces are crucial for improving the standard of living in cities since they offer a host of advantages to city dwellers (Tempesta, 2015).

Green space also refers to an open area that offers several advantages, including enhancing the quality of life and promoting cultural, social, economic, and environmental well-being as well as physical and mental health.

Green parks refer to specific areas for public recreation in cities/towns, excluding parks. The tree can be planted with grass and other trees and includes sports, games and entertainment.

An ecosystem is a well-functioning system of plant, animal, and microbial communities associated with an uninhabitable environment.

Ecology is the study of living organisms and how they interact with their environment. Ecologists study the relationships that exist between living things and their surroundings**.**

2.2. Relevance of urban green spaces

Urban green spaces are essential for improving environmental quality and reducing the adverse consequences of transportation development and industrialization (Omangi, 2023). Access to nature is dwindling as the world undergoes fast growth and climate changes, resulting in environmental hazards such as hot and cold weather, urban climate (CSR) impacts, heat waves, snow and floods. Governments around the world are looking for effective strategies to reduce these environmental problems. An important measure to solve these problems is the use of urban green areas (UGS). Forests, parks, plants, meadows in addition to public parks are considered important to the health and well-being of the environment as they provide many opportunities in terms of UGS, quality, financial and environmental aspects. Benefits include:

- Increase habitat and biodiversity,
- Reduce urban heat loss through shading and evaporation,
- Reduce hot and cold temperatures,
- Reduce noise,
- Provide carbon-monoxide, Br
- Control or reduce floods,
- Increase village resilience and promote sustainable lifestyles,
- Improve physical and mental health,
- Promote social cohesion and integration by providing a place for residents to gather together,
- Reduce spending on public works,

- Create better opportunities for business recovery and savings on healthcare expenses, as well as providing health, environmental and social benefits that play an important role, depending on its spatial location, composition and configuration. (Woldesemayat and Ceneviz, 2021).

Sadeghian and Vardanyan (2013), Georgi and Dimitriou (2010) and Rakhshandehroo et al. (2017) demonstrated their role in the environment and health benefits. In some countries, urban green spaces are thought to be an environment that helps reduce stress and improve mood. Research results show that urban green infrastructure lands in Addis Ababa experienced rapid change and destruction from 2003 to 2016. Existing urban green infrastructure (such as recreational facilities) is inadequate and inaccessible to most urban residents (Azagew & Worku, 2020)

Urban green infrastructure plays a vital role in any plan and can be linked to urban or local water management plans. Now, at a time when land is valuable and the city has its greatest challenges, the importance of green areas cannot be denied and the aim should be to ensure the multi functionality of the area. One change that is ongoing but still needs to be implemented is to increase green construction in spatial planning and see it as part of the wider urban area (Molla, 2015).

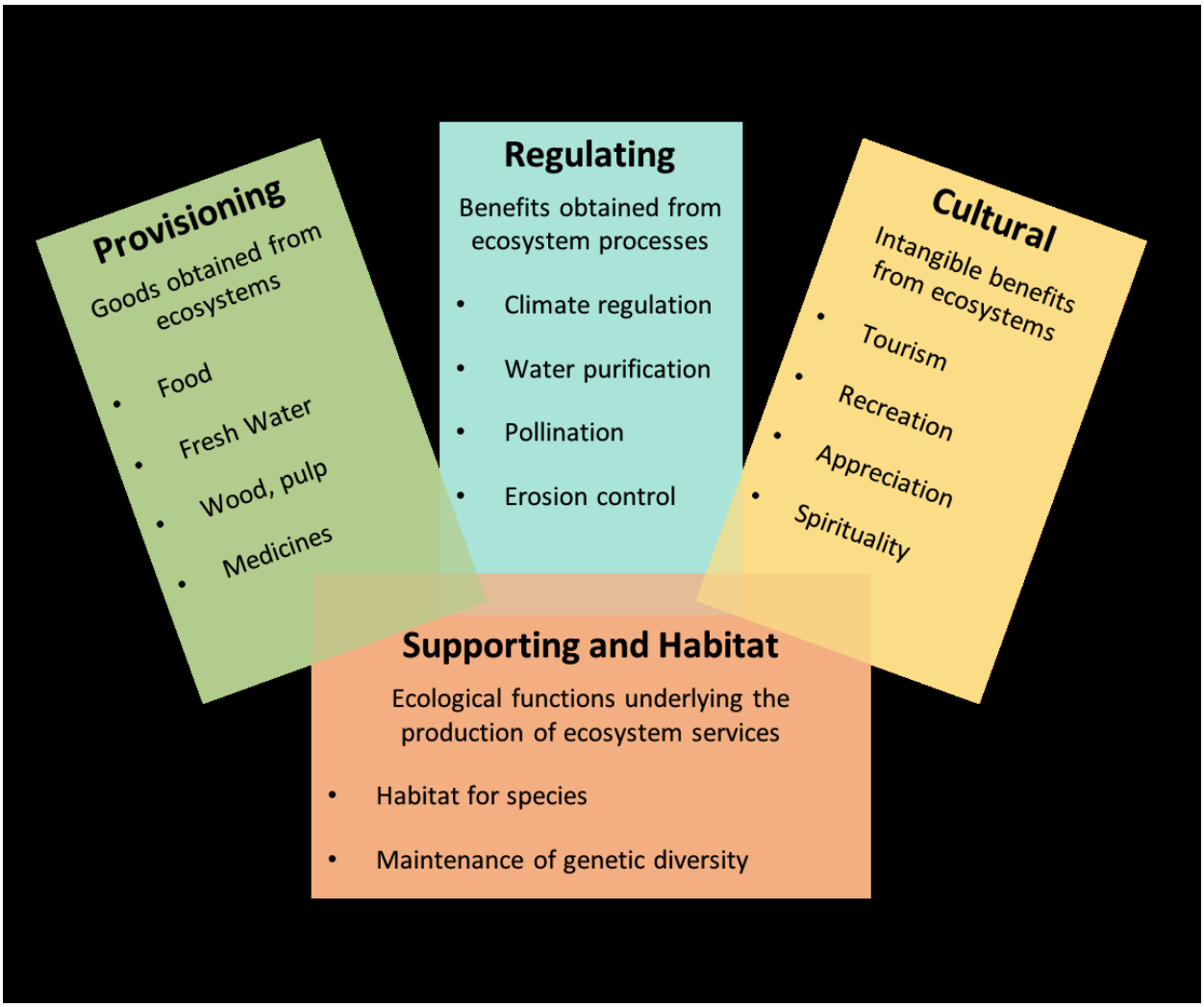
In addition to having social, psychological, and physiological benefits, urban green spaces allow people to breathe clean, fresh air, which is why they are essential to the health of cities and their citizens. Reducing pollution and creating a sustainable city is possible by creating green areas. Green space is a natural environment that has environmental functions such as preventing noise, reducing carbon emissions and air pollution, controlling microclimate, controlling temperature, as well as ecological functions such as reproducing and protecting ecologically sensitive areas. It adds nutrients and stabilizes ecosystems for many species. It also improves environmental and visual aesthetics and also enhance social and communal bonds in society (Rajput et al., 2021).

2.3. Ecosystem Service of Green Spaces

The sustainability of people's lives is greatly aided by parks and other green areas. The numerous advantages that nature offers, such as ecosystem services, are the primary cause of this. Parks and green spaces are important elements of human adaptation that need to be planned carefully as they provide opportunities to create sustainable and supportive environments. Thus, ecosystem services are the advantages that individuals obtain from ecosystem activity, either

directly or indirectly (Cilliers, 2015). Variety of benefits those urban green spaces provide to city residents, include environmental, social, and economic benefits, are often referred to as "ecosystem services." According to the Annual Ecosystem Assessment, ecosystem services are divided into four categories: (Jastra, 2014) Providing green space (including food and water) protects streams, rivers and water resources, supports biodiversity, wetlands, fish and wildlife habitat, and improves the environmental, social and overall health and quality of life of citizens (Kasai, 2016).

- Management (e.g. temperature, precipitation regulation) by controlling air quality or providing services for flood and disease control. Examples include wastewater treatment, erosion control, and local climate control (Cilliers, 2015).
- **cultural (e.g. recreation)** The main role of urban green spaces is to provide open spaces for recreational, social and ecological purposes; they are also important for the natural environment, biodiversity and air quality (https://www.sciencedirect.com/science/article/ pii/ S0169204611001587).
- Habitat or support (e.g. land formation). Ecosystems provide habitat for plants and animals and can support different populations of plants and animals (Cilliers, 2015).
- Habitat or supportive (e.g. soil formation). Ecosystems provide living spaces for plants or animals and can also maintain a diversity of plants and animals (Cilliers, 2015).



Adapted from Gomez-Baggethun et al 2013

Fig. 1. Ecosystem Services of Green Spaces

2.3.1. Environmental values

3. Urban green areas enhance people's quality of life and serve a variety of purposes in the urban environment. Thus, there is broad agreement about the significance and worth of urban green areas for the design and development of ecological or sustainable cities in the twenty-first century. Growing urbanization and traffic, particularly in emerging nations, not only damage the environment but also raise labor and health expenses (Haq, 2011).

2.3.2. Ecological Benefits

From urban temperature management to biodiversity protection, urban green areas offer cities a range of ecological services. Temperatures, rainfall patterns, and sun radiation are frequently

different in large cities than in rural areas. In metropolitan constructed settings, there are significant variations in solar radiation, air temperature, wind speed, and humidity (Case, 2019).

2.3.3. Pollution controlling benefits

Urban pollution refers to pollution such as chemicals, small particles and biological substances in solid, liquid or gaseous form. Wind and noise are common in the city. The city is full of automobiles, which contribute to noise pollution and the release of carbon dioxide and carbon monoxide. Emissions of nitrogen oxide and sulfur dioxide from companies are extremely harmful to both the environment and people. As a result of this, children, the elders and people with respiratory problems are often affected by these pollutants. When dust clouds are associated with plants, urban planting can reduce pollution. Research shows that an average of 85% of pollutants in parks can be filtered (Bolund and Sven, 1999). Noise from traffic and other sources can cause stress and health problems for city residents. Urban green spaces in crowded cities can reduce noise in terms of quantity, quality and proximity to noise. One of the biggest urban issues and a key cause of the global burden is air pollution. For example, particulate matter (PM) is often associated with death and disease in urban areas (Kavanagh et al. 2009) highlighted the unique role of urban trees in reducing air pollution, citing their role in influencing air quality and absorbing various pollutants. Additionally, trees cool the air through transpiration, which lowers ozone generation and influences ozone photochemistry. Stunted trees are a common feature in parks with a lot of tree cover, which might be problematic because the forest's pollution levels are frequently greater (Rakhshandehroo, et al., 2017).

2.3.4. Nature Conservation

Because they provide habitat for plants and animals, green spaces preserve the quality of the soil and water. Urban green spaces serve as a link between rural and urban regions. They offer a sense of perspective, seasonal variation, and a link to the natural world (Haq, 2011). The connection of green business is important for the management of urban conditions that are self-sufficient and stable, with several analytical eyes, which includes the growth and use of plants suitable for local conditions (Rakhshandehroo, et al., 2017).

2.3.5. Cooling effect of green space

In addition to actually cooling the area, urban green areas can also have negative effects on the environment. This phenomenon is called cooling of urban green spaces. The most important issues related to cooling urban green spaces are density and cooling, which play an important

role in urban heating and urban planning. The air temperature is compared to a control point outside the specific area. It is generally accepted that the area affected by green space is equal to the width of the green space (Aramde et al., 2019). Air conditioning costs are inclined by the size, structure and design of green spaces, the design and structure of the urban environment, and weather conditions. However, it is unclear how cooling rates vary with distance from green space and how they change over time. After identifying greeneries for urban cooling, it was concluded that in order for future research on urban green space planning to be effective, it was necessary to explore the role of prioritizing the space between green areas and the abundance and distribution of green areas.

2.4. Classification of urban green infrastructures

Descriptions of green buildings include urban forests, large grounds, and gardens, open spaces such as parks, streams, and road rights-of-way, including green roofs, permeable vegetation areas, swales, rain gardens, and "greenways."

2.5.Urban Green Spaces Standards

The population size, green space, and surrounding green space are displayed in the urban green space model. Accordingly, the situation is different in every city. Indicate the public spaces and international green spaces currently used per capita in cities in many countries. The World Health Organization often recommends using the world's per capita area as a reference point in green space management. (Yared Girma , 2019)

Table 2.1: Green Space per capita suggested by different cities

Organization. **No**	**Explanation**	**Green space per capita**
1	Suggested standards by the united nations	30 square meters
2	Suggested standards by the National institute of the US	14 square meters
3	Suggested standards by the public health bureau and the ministry of housing of US	18 square meters
4	Suggested standards by the ministry of housing and urban development of Tehran	12 square meters
5	Suggested standards by WHO	9 square meters

Source: Hassen and Hooman, 2012 and Singh, 2010.

The Food and Agriculture Organization of the United Nations (FAO) set the worldwide guideline of at least 9 square meters of open green space per person, and the World Health Organization (WHO) approved it.

Table 2: Public green space by proportion of surface area and green space per capital.

Cities	**Green space proportion by surface area in percent**	**Green space per capital square meter**
Singapore	17.8	7.5
Europe (average of 26 large cities)	18.5	104
Hong Kong	1.81	3
USA (Average)	27	32
Paris	9.4	80
India /Delhi	20	21
India/Chandigarh	35.7	55
The Netherlands (Average 22 large cities)	19 19 228	228

Source: Bop, 2013 and Singh and others, 2010

Table 2 shows the world's urban green space by location, describing the proportion of each city's green space in total land area. According to Table 2, people living in different cities differ according to the green area values in the city. For example, 19% of the average land area of the Netherlands is covered with public green areas, with an average of 228 square meters per person. It is known as the city with the greenest areas per capita among the cities in the world (Eyasu Berhe Teferi, 2018)

Main principles of urban green infrastructure planning

Principles	Planning of urban green infrastructure needs to
Multi-Functionality	✓ Consider combining all activities and benefits of urban green space in the same ecological, social and economic capital.
Connectivity	✓ Consider the connection between the structure and function of different green spaces at different levels and aspects, such as recreation, biodiversity, urban safety and storm water management. ETC.
Green-Grey integration	✓ Considering the integration and integration of urban green spaces with other urban areas (e.g. infrastructure, energy and communications, transportation and water lines ground) expresses the relationship between body and function.
Social inclusiveness	✓ Involve diverse community groups in decision-making, paying special attention to vulnerable groups. ✓ Seek to meet the needs and interests of all stakeholders.

Source (Krippendorff, 2013; Rall et al. 2015)

2.6. Determinants of urban green space development management

In order to improve the health advantages and general quality of life for urban dwellers, Urban Green Spaces (UGSs) must be easily accessible and used. Nonetheless, it is clear that a variety of variables affect the usability and accessibility of UGSs rather than just one. Thus, using a socio-ecological framework, this study intends to thoroughly examine the factors that influence UGS accessibility and usage, emphasizing their intricate relationships (ALENE Endalew Terefe, 2004). The necessity of water, clean air, minerals, plants, vegetables, animals, and all natural fruits, among other things, for humans to enjoy their everyday lives is the foundation of life on Earth. It is among the creatures that live in a natural setting that offers natural resources, but the habitat is not permanent, and many of these resources are contaminated, destroyed, or disappear as a result of human consumption. Urban populations face significant ecological threats from

urban development, such as water and air pollution, reduced vegetation cover of agricultural lands and forests, and overdraft of groundwater (Vargas, et.al, 2018).

Decisions regarding public use of green spaces are complex, interrelated and diverse. Having green areas in the city is a top priority. It is suggested that the size of the problem means that having a larger green area will bring more benefits. The size of urban green space can also determine how it is used, as larger areas can be used for physical activities, while smaller areas are often used for "conversation" and "rest and rotation." Another important determinant of green space use, mentioned in many studies, is its usefulness (Alemaw Kefale, 2017).

The active development of urban green areas is a component of sustainable urban planning in an expanding urban agglomeration. The loss of green space in the city not only affects the safety and ecological system of the city, but also affects the image of the city and the satisfaction of all residents (Eshetu, 2021). Comprehensive information about the nature, value and distribution of green space is required for sustainable planning. Monitoring tools are therefore needed to provide detailed information about urban green space diversity, and this must now go beyond measuring the green percentage of each area in a plan. Additional data such as mass, density and their relationships are needed to reflect differences in the importance of green spaces in specific contexts (Journal and Humanities social, 2019).

2.6.1. Common determinants of urban Green space

1. **Absence of city level green space policy**: Addis Ababa's green zone policy does not yet exist. The Ethiopian Forest Development, Conservation and Utilization Policy and Strategy, published in 2007, did not take into account the role of urban forests in meeting the population's needs for forest products and promoting business use of forests (Kasai, 2016).
2. **Institutional arrangement**: Implementing green space rules, strategies and plans requires proper planning. It is monitored by many organizations, including the construction of green areas in Addis Ababa. (Eshetu, S. B., Yeshitela, K., & Sieber, S., 2021)
3. **Socio-Economic and Demographic Factors**

   The development of green spaces has been hampered in several African towns by the lack of attention paid to them during the building process. In many African nations, green

space is regarded as one of the most significant areas. Reducing poverty and providing basic social services such as homes, schools, hospitals and water are ideal goals for many African countries (Mensah, 2014). As a result, national and local governments focus less on the creation and protection of green areas and do not allocate the necessary funds. Because green space is less important, many city governments do not have adequate protection for city parks, putting tourists in the park at risk.

4. **Change of green space into other land use types:** In Addis Ababa, the conversion of communal or community green spaces and urban agricultural lands into residential and commercial areas is a major challenge in the creation, maintenance and provision of services of green spaces. Floodplains that were supposed to be used for storm water and groundwater management were converted to various land uses.
5. **Landscape Standards** Although most developing countries struggle to plan and implement green space construction and maintenance based on landscape standards, landscape standards are a good management tool, especially for urban green spaces (parks).
6. **Force of Urbanization**

   For our green cities, rapid urbanization presents both opportunities and problems. There are issues with growing urbanization and the strains it places on society and the environment.

2.7. Empirical Evidence

According to Sileshi and Hailu (2020) evaluation the current status, accessibility, and limitations of UGI in the metropolitan city of Addis Ababa, Ethiopia. This study attempts to map and calculate UGI status from 2003 to 2016 based on land use data in Arch GIS. Finally, the study explores the issues behind the current state of UGI based on literature review, expert interviews, and field observations. Research shows that UGI land use decreased by 9.2% from 2003 to 2016. Urban farmland reduced (down 11.9%), followed by urban forests (down 3.7%). Access indicators also show that urban residents do not have adequate recreation and entertainment opportunities. The per capita park area of the city is very low (0.37 m2) compared to the Ethiopian UGI standard (15 m2) and a huge part of the city population (more than 90%) does not have access to these existing parks within minimum walking distance. We conclude that Urban Infrastructure is deteriorating, does not have the capacity to live in large cities, and has no

precedent for large cities. Therefore, implementation of zoning plans and strict regulations are important for the management of urban areas. In addition, the development of small and medium-sized parks in planned areas, new extensions and new areas of the city are important in terms of access to play opportunities.

Shibire, (2021) seek to assess urban green space policies and plans, as well as their capacity to handle planning and implementation difficulties. The main goal is to determine Addis Ababa's green city design, policy, and implementation tactics as well as the difficulties encountered. Field observations, focus groups, and in-depth interviews were used to gather primary data. Secondary data obtained from literature review and analysis of Addis Ababa policies and master plans were used. Review newsletters from stakeholders and planning organizations through discussions with stakeholders. Triangulation was used for data analysis and analysis. Existing regulations and publications should be supported by laws and guidelines to form the basis for successful projects. The incentives provided in the forest policy are not implemented. The December Strategic Plan (2017-2027) shows that the rate of green urban development and public services will increase to 30% by 2020. In the 10th Master Plan, principles such as multifunctional, connectivity, green-gray interaction and harmony were taken into account in the development of green areas. This study concluded that rules and guidelines are not clearly defined by responsible organizations and management of green spaces in Addis Ababa is poor.

Shibire (2021) analyzed green city planning, policy and implementation strategies in Addis Ababa and the problems encountered during implementation. Primary and secondary data were used to conduct this research. Primary data were collected through interviews with key informants, focus group discussions, and field observations. Secondary data was analyzed based on Google Maps, satellite images and secondary data; Literature review, policy and strategic analysis of Addis Ababa. Stakeholders and institutional arrangements were identified through interviews with different stakeholders and multidisciplinary analysis. Triangulation method was used for data validation and analysis. According to Law (No. 1712004); Planning, Publication and Implementation of Addis Ababa City Master Plan, City Administration may make regulations for the protection and preservation of parks and plants. Existing regulations and publications should be supported by laws and guidelines to form the basis for successful projects. The incentives provided in the forest policy are not used as expected. 10 Master Plan's green

space development plan includes the principles of multitasking, connectivity, green-gray interaction and social interaction. The plan proposes 8,364 hectares of green space in different basin radii in the 2017-2027 planning model. Key interviewees listed challenges in implementing green space projects, such as poor communication, increasing population and urbanization, and lack of proper planning. Political determination, the use of new technologies and the potential of existing green spaces are ways that can lead to progress. Addis Ababa's green space cover changes over time. The biggest decrease in green space is experienced in housing projects. Local government and federal government systems have some overlapping responsibilities, which can lead to delays in implementation and a lack of appropriate monitoring and evaluation. Establish mechanisms and forums to ensure public participation and collaboration with stakeholders in decision-making on “priority” issues. Additionally, monitoring and evaluation of programs and activities should be completed by various organizations and relevant organizations.

In response to population growth, many cities and towns began creating and transforming areas such as open spaces, fields, parks, and wetlands to meet the needs of development. However, this rapid development has directed to the destruction of urban green areas, reduced life expectancy, exposure and diseases, increased air pollution, and changes in the microclimate in many areas (Schebella et al., 2012).

As the world's population continued to increasing and urbanization must continue to rise, the adverse effects of green space destruction are often overlooked. Urban green spaces afford many advantages to the people of the world. Many studies have revealed that Addis Ababa, the capital of Ethiopia, has not yet reached international city standards. Urban planning and design strategies often fail to prioritize urban open spaces and ignore the urban living environment. Although the green and beautiful office of the new city was built, it lacked planning and strategy. However, green areas, parks and open spaces in the city are managed by this institution (Azagew and Worku, 2020).

2.8. Conceptual Framework

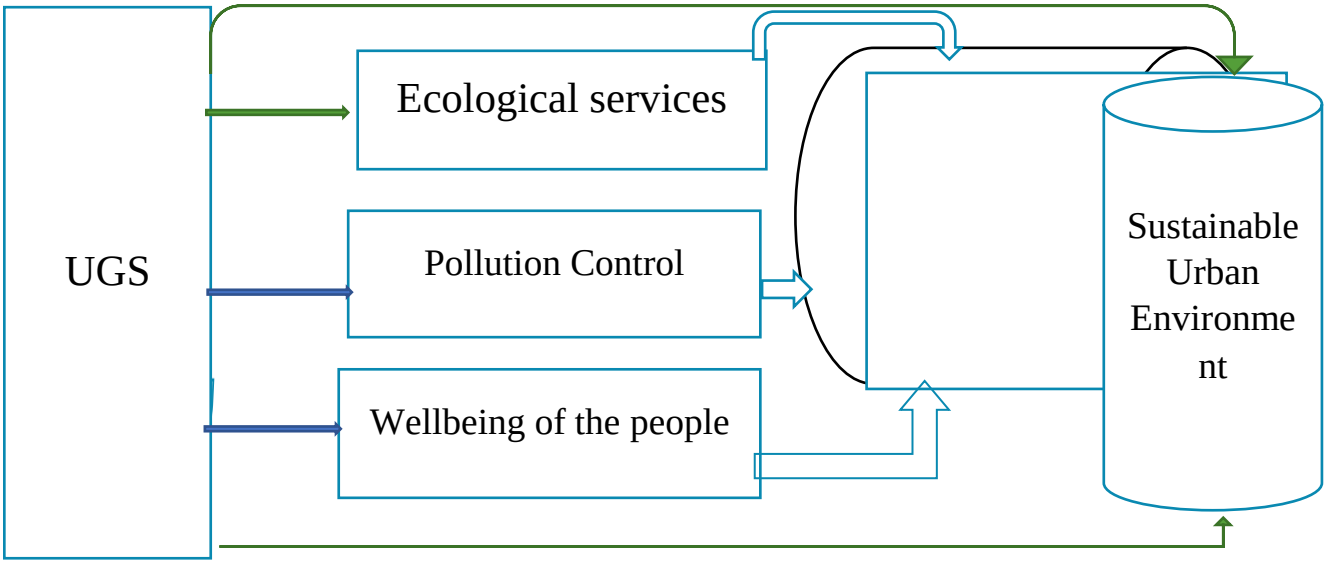


Figure 1: Conceptual Framework

Source: Own Author Compilation (2025)

CHAPTER THREE

3. METHEDOLOGY

3.1. Description of the Study Area

This research was accompanied in the sub-city of Lideta, a sub-city of Addis Ababa, the capital city of Ethiopia. Addis Ababa is of social, economic and political importance as the center of the country. Geographically, Addis Ababa is located in the heart of Ethiopia at latitude 8°55' to 9°5' and longitude 38°40' to 38°50'. Its history dates back to 1887, when there were several huts and scattered huts. Over time, the city underwent an expansion covering an area of about 530 square kilometers. Its altitude is 2,400 meters and the annual average temperature is 16°C.

Addis Ababa is the capital of Africa (Addis Ababa Planning and Development Commission / AAPDC 2020; Addis Ababa City Council 2015). It is located between 8055' and 9005' north latitudes and between 38040' and 38050' east longitudes. The air condition is pleasant and temperate, with an average altitude of 2500 meters. It is the capital, largest city, educational and administrative center of the country (UN-Habitat 2008; AADPC 2020). Addis Ababa's total land area is about 527 km² or 54,000 hectares; the city has a high climate zone with temperatures up to 10°C depending on altitude and wind pattern (World Meteorological Organization 2019). It is a privileged city with three levels of government: it is the top-level city government, and there are 10 sub-city leaders in the middle (of course the 11th sub-city Lemi Kura was not considered in the study because the new sub-city has not yet been established), with 121 Werda sub-regional administrations (AAPDC) 2020).

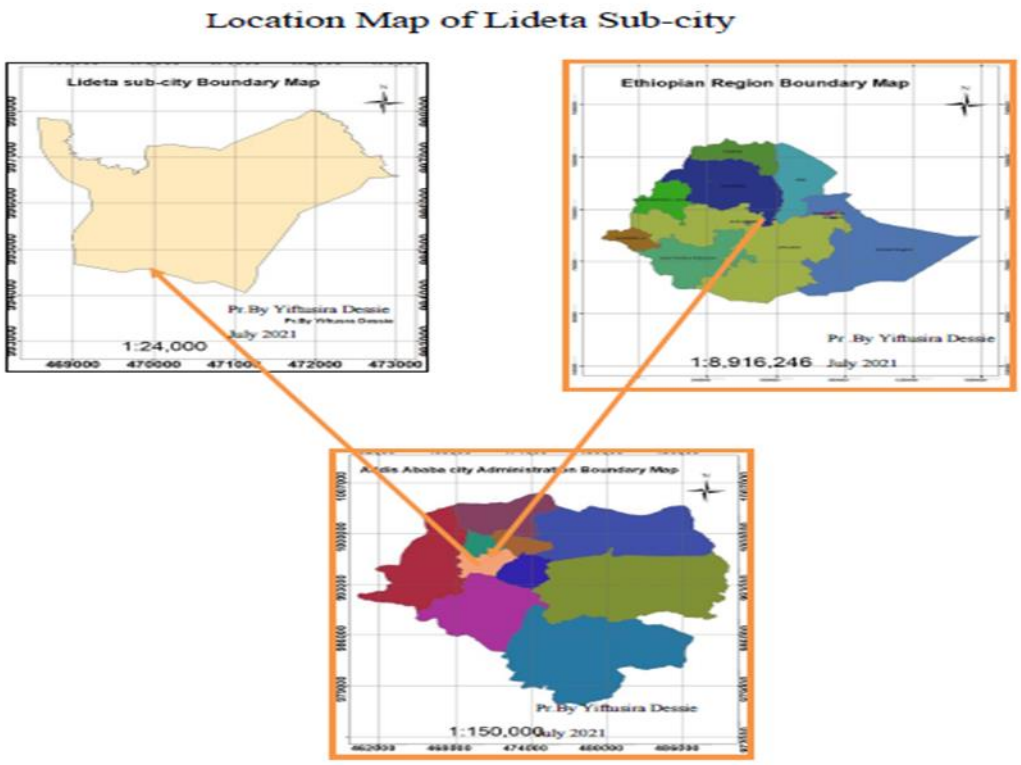


Figure 2: Study area map

3.2. Design and Approach of the of the Study

Both qualitative and quantitative research approaches were used in the study. By using mathematical models for measurement, quantitative research aimed to provide a vital connection between empirical data and the mathematical representation of quantitative connections between dependent and independent variables. By examining factual data and developing connections using statistical methods, quantitative research aims to assess the study topic objectively. As described by Creswell (2014), quantitative research involves testing objective theories by examining the connections among variables, with these variables being measurable and typically collected through instruments, enabling the analysis of numerical data using statistical procedures.

Conversely, qualitative research offers a "subjective" evaluation of the research topic in the form of beliefs, attitudes, perceptions, or opinions about the study's subjects.

3.3. Population of the Study

Residents of Lideta sub-city, which is made up of ten woredas (districts), make up the study's target population. All of the woredas in the sub-city were included in the research to guarantee

representative data. According to information from the Mayor's Office of Addis Ababa, Lideta sub-city is expected to have 214,768 residents in 2022.

3.4. Sample Size determination and Sampling Techniques

The researcher determined the sample size from the sub city, which has a total population of 214,768 people, according to the formula developed by Yamane (1967). The formula is as follows:

$$n = \frac{N}{1 + N(e)^2}$$

Where: N=Size of population n=sample size

e=level of statistical significance (0.05 or 5%)

Substituting the values, the calculation becomes:

214,768/〖1+214,768(0.05)〗^{2} =399.25, approximately 400 respondents

Therefore, 400 is the sample size calculated using this approach at a 95% confidence level and a 5% level of statistical significance.

To ensure fair representation of all woredas within the sub-city, the researcher employed the proportionate stratified sampling technique. This technique is chosen to give equal opportunities for all woredas to be included in the sample. By implementing this sampling approach, the researcher aims to capture a comprehensive understanding of the sub-city by considering the unique characteristics and perspectives of each woreda.

3.5. Data sources and Type

This researcher primarily utilized primary data sources, which involved collecting data directly from the respondents. The primary data collection methods employed was questionnaires and interviews.

From the two sections of questionnaire, gathering participant demographic data, including gender, age, marital status, and educational attainment, was the main goal of the first section and participants can express their ideas and feelings about the study issue using a 5-point Likert scale in the second section of the survey. A survey was created and distributed to all 400 respondents. Accordingly, 381 surveys were completed appropriately and the response rate was

95.25%. In total, responses from 381 participants were processed and used for analysis.

By utilizing these primary data collection methods, the research aimed to gather firsthand information directly from the target population and key stakeholders, ensuring a broad understanding of the research topic.

3.6. Method of Data Analysis

Qualitative data from key questions and images were analyzed by combining short descriptions and narratives. In this process, researchers gain important insights and observations by better understanding and interpreting the data obtained. SPSS software version 26 (Statistical System for Statistical Analysis) provides descriptive and statistical analysis to analyze quantitative data from research. Data is gathered and described using statistics like frequency distributions, percentages, averages, and standard deviations. Regression analysis and correlation are two examples of inferential statistics that are used to examine relationships and draw conclusions about data. Explanations and statistics are supported by graphical representations and diagrams to improve the clarity and visual presentation of the data. These visual aids help you find better information and better understand patterns and trends. The research combines qualitative and quantitative observations to analyze and harmonize collected data for deeper scientific understanding.

3.6.1. Descriptive Statistics analysis

Use a variety of data analysis techniques, including mean, standard deviation, frequency, and percentage, to examine the gathered data. Each measure's descriptive statistics were derived using a 5-point Likert scale, where 1 denoted "disagree" and 5 denoted "agree." According to Zaidaton and Bagheri (2009), the total mean score (M) between 4.21-5.00 is considered as the respondent agrees (SA) and if the respondent's mean score is 3.41-4.2, they agree. Means (A). If the average score is 2.61-5.00, they agree with (A). 3.40 is considered neutral (N), participants who score between 1.81-2.60 indicate that they do not agree, and participants who score between 1-1.80 indicate that they strongly disagree. Therefore, the content of the analysis is as follows.

3.6.2. Econometric Analysis

A correlation study was carried out to investigate the link between two variables. The Pearson Product-Moment Correlation Coefficient was used as a statistical measure to assess the extent of association between these variables. The correlation coefficient ranges between -1.00 and +1.00,

with the sign (+ or -) indicating the direction of the relationship. Positive correlation signifies a direct positive association between the variables is shown by a positive correlation, whereas an inverse, negative relationship is indicated by a negative correlation (Ruud et al., 2012). The table below provides a clear representation of the strength of the relationship between the variables, categorized as negligible, low, moderate, substantial, or very strong.

Table 3.1: Correlation Coefficient

Correlation coefficient(r)	Strength of correlation
0.01 up to 0.09	Negligible association
0.10 up to 0.29	Low association
0.30 up to 0.49	Moderate association
0.50 upto0.69	Significant correlation
0.70 and above	Very strong association

Source: Joe W. Kotrlik, J. C. Atherton, A. Williams and M. KhataJabor (2011).

The association between urban green space (UGS) and human health was examined in this study using a multiple linear regression model. Regression analysis is a technique used to determine the relationships two or more variables (Kothari, 2004). This helps us understand how well the independent variables explain the variance in the variables. According to Kothari (2004), simple linear regression is performed to estimate the relationship between a dependent variable (denoted by Y) and an explanatory variable (denoted by x), using data from a given population that varies in time when analyzed. The variance of a set of independent variables (x) can be found using the equation Yi = β0 β1xi ei. Here β0 represents the intercept and β1 represents the downward direction. Simple linear regression evaluates the relationship between y and x.

In the case of multiple linear regressions, there are p explanatory variables and the relationship between the dependent variable and the explanatory variable is represented by the following equation:

$$Yi = \beta0 + \beta1X1i + \beta2X2i + \beta3X3i + ... + \beta pXpi + ei$$

Here β0 is a constant and β1 through βp are the coefficients associated with p that describe the variance of the variable of interest. Multiple horizontal lines extend the concept of repeated lines by taking into account multiple descriptions, while simple horizontal lines can be considered a special feature of multiple horizontal lines with p = 1. The term "linear" is used because many

linear regression models assume that y is directly related to the combination of variables. Multiple linear regression analysis is based on a set of p explanatory variables (x1, x2... xp). Therefore, this study uses multiple regression analysis to test the independent variables and the relationship between variables to investigate the impact of UGS on human happiness.

This study focuses on various regression hypotheses, including convergence, error independence, variance, normality, and convergence. This section describes each hypothesis, reviews the results of the null hypothesis, and discusses testing each hypothesis and interpreting the results. Linearity describes the variance of a variable as a function of the predicted (independent) variable (Darlington, 1968). Multiple regression estimates the relationship between dependent and independent variables when the relationship is linear in nature. The potential for nonlinear relationships is high in social studies, so cross-sectional analysis should be considered (Osborne and Waters, 2002). The variance hypothesis means that the error variance at each level of the variable is equal. This means that the researcher thinks the error equals the difference (Keith, 2006). This occurs when the rate of change around the regression line is the same for all values of the predictor variable.

Collinearity (also known as multicollinearity) refers to the assumption that independent variables are not equal (Darlington, 1968; Keith, 2006). When linearity is low, researchers may interpret regression coefficients as the effect of independent variables (Keith, 2006; Poole and O'Farrell, 1971). This means we can trust the possibility and impact of change. Multicollinearity occurs when multiple independent variables are related to each other or when one independent variable is closely related to other independent variables (Keith, 2006). Multiple regressions assume that the variable is normally distributed (Darlington, 1968; (Osborne and Waters, 2002)). This indicates that the residuals will move to the curve and that the error is regularly distributed (Keith, 2006). This assumption gives the researcher information about the values and is based on the normal distribution's shape (Keith, 2006). Once the size is known, new patterns can be predicted

3.7. Reliability of the Instrument

In order to evaluate the consistency and reliability of the tool used in this study, the concept of reliability defined by Kothari (2004) should be taken into account. A tool that produces similar results after repeated use is considered reliable. Cronbach's alpha (reliability coefficient) is often used to evaluate the internal consistency or reliability of psychometric test scores for a sample of

subjects. In this study, Cronbach's alpha was calculated to evaluate the reliability of the instrument data. According to Zikmund, Babin and Griffin (2010), measurements with α coefficients ranging from 0.8 to 0.95 are considered highly reliable, while measurements with α coefficients ranging from 0.7 to 0.8 are considered highly reliable. Additionally, coefficient alpha between 0.6 and 0.7 indicates good reliability. Therefore, it is suggested that to ensure reliability, the Cronbach's alpha value for each dimension and the overall scale should be greater than 0.7. The research team sought to evaluate the consistency and reliability of the scale used in this study by calculating Cronbach's alpha. This evaluation provides insight into how well the tool evaluates your project and helps ensure the quality and reliability of the data collected.

Table 3.2: Reliability Statistics

Reliability Statistics	
Cronbach's Alpha	N of Items
.855	68

Source: Researcher survey analysis result, 2023

All the Cronbach’s alpha is greater than 0.7. Therefore, our instrument is in good quality.

3.8. Validity of the Instrument

The degree to which the study measures what it claims to measure is a measure of validity. Put more simply, it emphasizes measurement precision (John et al., 2007). All events used to develop the instrument have demonstrated construct level and content validity in previous studies and were adapted for use in this study. In addition, various steps were taken in creating the survey, which was examined with the advice of experts and assistants in the field, to ensure that the research results did not contain major errors. These metrics include survey layout, question correctness, instruction clarity, and other remarks.

3.9. Ethical Consideration

According to Creswell (2012), "Researchers must respect the participants and the research environment because they are required to collect data." Throughout the study process, researchers uphold impartiality, humanism, and high professional standards; they also refrain from lying, manipulating, or distorting data for unfair, prejudiced, or other reasons. It is believed

that this position is an obligation of justice. This involves explaining to participants the goal of the research and the intended use of the findings. The information that researchers obtain is kept private. In order to allow participants to freely and securely voice their requirements, their identities will remain anonymous.

CHAPTER FOUR

4. RESULT AND DISCUSSION

4.1. General Information (Demographic Data) of the Respondents

Ethiopia is one of the least urbanized and one of the most rapidly urbanizing countries in sub-Saharan Africa. The share of the population living in cities has increased from an estimated 7.1% in 1994 (Lamson-Hall et al., 2018) to 16% in 2016 and is expected, to reach 60% by 2040 at the current annual growth rate of 3.5% (United Nation, 2014, Lamson-Hall et al., 2018).

The first part of the questionnaire consists of items about the demographic information of the respondents. It covers the personal data of respondents, such as gender, age, academic level. The following table shows the demographic characteristics of the respondents.

Table 0.1: Demographic information of the respondents

		Frequency	Perc %
Gender	Male	343	90.0%
	Female	38	10.0%
Age	Below 25	2	0.5%
	25-30	21	5.5%
	31-35	177	46.5%
	36-40	128	33.6%
	Above 41	53	13.9%
Level of Education	Illiterate	0	0.0%
	Grade 1-8	39	10.2%
	8-12	0	0.0%
	Diploma	41	10.8%
	Bachelor Degree	262	68.8%
	Master Degree	39	10.2%
	PhD	0	0.0%
Marital Status	Single	183	48.0%
	Married	189	49.6%
	Divorced	0	0.0%
	Widowed	9	2.4%
Occupation	Government employee	331	86.9%
	Merchant	9	2.4%

	NGO Worker	8	2.1%
	Private Worker	33	8.7%
Are you aware of the benefits of the green areas?	Yes	342	89.8%
	No	39	10.2%

Based on the data presented in the table, an analysis of the demographic characteristics of the respondents can be observed. Out of the total 381 respondents, there were 343 males and 38 females. This indicates that the majority of the target population consisted of males, accounting for 90% of the respondents, while females represented 10%. Thus, a higher number of male respondents participated in the study.

Furthermore, when examining the age distribution of the respondents, it is evident that 21 individuals (5.5%) were between 25-30 years old, 177 individuals (46.5%) were 31-35 years old, 128 individuals (33.6%) were 36-40 years old, and the remaining 53 individuals (13.9%) were above 41 years old. Consequently, the majority of the respondents fell into the age group from 31-35 years old.

Regarding educational qualifications, the respondents displayed a range of backgrounds. Of the total, 39 individuals (10.2%) held grades 1-8, 41 individuals (10.8%) had a diploma, 262 individuals (64.8%) possessed a bachelor's degree, and the remaining 39 individuals (10.2%) held a master's degree. Hence, a significant proportion of respondents, accounting for 64.8%, had obtained a bachelor's degree.

In terms of marital status, the majority of the respondents, encompassing 189 individuals (49.6%), were married, while the remaining 183 individuals (48%) were single.

Furthermore, when considering the occupation of the respondents, the largest group consisted of government employees, comprising 331 individuals (86.9%). Additionally, 9 individuals (2.4%) were involved in merchant activities, 8 individuals (2.1%) were NGO workers, and the remaining 33 individuals (8.7%) worked in the private sector.

As part of the survey, respondents were asked about their awareness of the benefits of green areas. A significant majority of the respondents, 342 individuals (89.8%), indicated that they were indeed aware of the benefits associated with green areas. This suggests a high level of awareness among the respondents regarding the advantages of green spaces.

4.2. Current status and accessibility of UGS

Public urban green spaces have been increasingly recognized as one of the most crucial elements in sustainable urban planning worldwide. They can provide crucial ecosystem services to urban residents, including recreational activities for sports, entertainment, and leisure, improved air quality, and climate mitigation and storm water control. (Fan, et al., 2017). There are few national studies examining the availability of urban green spaces at the household and individual levels, despite the fact that adequate living conditions and a healthy environment in urban areas depend heavily on having sufficient and equitable access to these spaces. (Wüstemann, et al.,2017).

Table 0.2: Current status and accessibility of UGS

	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	
	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %
There are enough GS in my area	30	7.9%	155	40.7 %	25	6.6%	152	39.9 %	19	5.0%
The GS are in good condition my area	20	5.2%	282	74.0 %	2	0.5%	69	18.1 %	8	2.1%
The GS are well equipped in my area	18	4.7%	275	72.2 %	49	12.9 %	39	10.2 %	0	0.0%
The GS in my area are suitable for children to play	18	4.7%	269	70.6 %	49	12.9 %	45	11.8 %	0	0.0%
The green spaces are safe in my area	29	7.6%	210	55.1 %	56	14.7 %	86	22.6 %	0	0.0%
The GS are attractive in my area	46	12.1 %	194	50.9 %	41	10.8 %	92	24.1 %	8	2.1%
GS are important for the appearance of my area	0	0.0%	126	33.1 %	12	3.1%	165	43.3 %	78	20.5 %

GS attracted me to my area	43	11.3 %	226	59.3 %	39	10.2 %	47	12.3 %	26	6.8%
I think there are sufficient green areas in my locality	58	15.2 %	190	49.9 %	77	20.2 %	56	14.7 %	0	0.0%
I am satisfied with the current availability of green areas in the sub city	9	2.4%	144	37.8 %	137	36.0 %	74	19.4 %	17	4.5%
I think that available green areas are enough in number	13	3.4%	278	73.0 %	9	2.4%	73	19.2 %	8	2.1%
I evaluate the nature of green areas in my sub-city is very good	9	2.4%	214	56.2 %	85	22.3 %	65	17.1 %	8	2.1%
GS are accessible to the people in the sub city	13	3.4%	148	38.8 %	173	45.4 %	45	11.8 %	2	0.5%
I think the physical and aesthetic quality of this field is enough	13	3.4%	138	36.2 %	185	48.6 %	45	11.8 %	0	0.0%
I think the art products and sculptures in this field are enough	55	14.4 %	180	47.2 %	101	26.5 %	45	11.8 %	0	0.0%
I think the places of entertainment (café-bar)	49	12.9 %	157	41.2 %	98	25.7 %	68	17.8 %	9	2.4%

in this field are enough										
I think children's playgrounds are enough and functional UGS help me to have a better quality of life	45	11.8 %	134	35.2 %	105	27.6 %	80	21.0 %	17	4.5%

In the provided tables, participants were posed various questions to assess the current status and accessibility of urban green spaces (UGS). The first statement asked respondents to rate their level of agreement with the statement "There are enough green spaces in my area." Out of the participants, 30 individuals (7.9%) strongly agreed, 155 (40.7%) disagreed, 25 (6.6%) remained neutral, while 152 (39.9%) agreed and 19 (5%) strongly agreed. The majority of respondents disagreed with the statement, indicating that there is an insufficient presence of green spaces in Lideta sub-city.

The second statement focused on the condition of green spaces in the participants' area, with respondents asked to rate their agreement. Of the respondents, 20 individuals (5.2%) strongly disagreed, 282 (74%) disagreed, 2 (0.5%) were neutral, 69 (18.1%) agreed, and 8 (2.1%) disagreed. The majority of participants disagreed with the statement, suggesting that the green spaces in Lideta sub-city are not in good condition.

Furthermore, the majority of respondents disagreed with the statement "The green spaces are well equipped in my area," indicating that the green spaces in Lideta sub-city are lacking in proper amenities.

The idea that "the green spaces in my area are suitable for children to play" was strongly disagreed by 18 (4.7%) participants, and 269 respondents (70.6%) disagreed with the statement. Additionally, 49 (12.9%) remained neutral, while 45 (11.8%) agreed. This suggests that the majority of respondents disagreed, indicating that the green spaces in Lideta sub-city are not suitable for children to play.

Regarding the safety of green spaces in the area, the majority of participants disagreed with the statement "The green spaces are safe in my area." Out of the respondents, 29 (7.6%) strongly disagreed, 210 (55.1%) disagreed, 56 (4.7%) remained neutral, 86 (22.6%) agreed, and 56 (14.7%) strongly agreed. The majority of respondents disagreed, implying that the green spaces in Lideta sub-city are not safe.

Similarly, the majority of respondents disagreed with the statement "The green spaces are attractive in my area," suggesting that the green spaces in Lideta sub-city are not visually appealing.

When asked about the importance of green spaces for the appearance of their area, the majority of respondents agreed with the statement. Out of the participants, 126 (33.1%) disagreed, 12 (3.1%) remained neutral, 165 (43.3%) agreed, and 78 (20.7%) strongly agreed. This implies that green spaces are considered important for the appearance of Lideta sub-city.

The statement "Green spaces attracted me to my area" was commonly disagreed upon by the respondents, indicating that the green spaces in Lideta sub-city did not serve as a major attraction.

The majority of respondents disagreed with the statement "I think there are sufficient green areas in my locality," suggesting that they believe there is an insufficiency of green areas in the locality.

Similarly, the majority of respondents disagreed with the statement "I am satisfied with the current availability of green areas in the sub-city," indicating that they are dissatisfied with the current availability of green areas in Lideta sub-city.

Furthermore, the majority of respondents disagreed with the statement "I think that available green areas are enough in number," implying that they perceive the available green areas in Lideta sub-city to be inadequate.

In addition to the previous questions, respondents were also asked to express their level of agreement regarding the evaluation of the nature of green areas in their sub-city. Out of the participants, 9 individuals (2.4%) strongly disagreed with the statement, while 214 (56.2%) disagreed, 85 (22.3%) remained neutral, and 65 (17.1%) agreed. Additionally, 8 (2.1%) of the respondents strongly agreed with the idea that the nature of green areas in their sub-city is very good. Since the majority of respondents disagreed with this statement, it implies that the

communities in Lideta sub-city do not perceive the nature of green areas in their sub-city as very good.

Moreover, the majority of respondents disagreed with the statement that green areas are accessible to the people in the sub-city. This suggests that in Lideta sub-city, green areas are not easily accessible to the community.

Participants were also asked to rate their agreement levels on the idea that the physical and aesthetic quality of the fields in their sub-city is sufficient. However, the majority of respondents disagreed with this statement, indicating that they believe the physical and aesthetic quality of the fields in Lideta sub-city is not adequate.

Likewise, the majority of respondents disagreed with the idea that the art products and sculptures in the fields of Lideta sub-city are sufficient, suggesting that the community perceives a lack of these artistic elements.

Furthermore, the majority of respondents disagreed with the statement that the places of entertainment, such as café bars, in the fields of Lideta sub-city are enough. This implies that the community believes this an insufficient number of entertainment venues in these areas.

In addition, the majority of respondents disagreed with the statement that children's playgrounds are enough and that functional UGS contribute to a better quality of life. This indicates that the community does not consider the existing children's playgrounds to be adequate and that functional UGS do not significantly improve their quality of life in Lideta sub-city.

Table 0.3: Descriptive statistics of Current status and accessibility of UGS

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Current status and accessibility of UGS					
There are enough green spaces in my area	381	1.00	5.00	2.9344	1.14864
The green spaces are in good condition my area	381	1.00	5.00	2.3780	.91130
The green spaces are well equipped in my area	381	1.00	4.00	2.2861	.71048
The green spaces in my area are suitable for children to play	381	1.00	4.00	2.3176	.74086

The green spaces are safe in my area	381	1.00	4.00	2.5223	.92489
The green spaces are attractive in my area	381	1.00	5.00	2.5328	1.04986
Green spaces are important for the appearance of my area	381	2.00	5.00	3.5118	1.15074
Green spaces attracted me to my area	381	1.00	5.00	2.4409	1.06366
I think there are sufficient green areas in my locality	381	1.00	4.00	2.3438	.90896
I am satisfied with the current availability of green areas in the sub city	381	1.00	5.00	2.8583	.90952
I think that available green areas are enough in number	381	1.00	5.00	2.4357	.90855
I evaluate the nature of green areas in my sub-city is very good	381	1.00	5.00	2.6037	.86929
Green areas are accessible to the people in the sub city	381	1.00	5.00	2.6719	.74691
I think the physical and aesthetic quality of this field is enough	381	1.00	4.00	2.6877	.72153
I think the art products and sculptures in this field are enough	381	1.00	4.00	2.3570	.86975
I think the places of entertainment (café-bar) in this field are enough	381	1.00	5.00	2.5564	1.00268
I think children's playgrounds are enough and functional UGS help me to have a better quality of life	381	1.00	5.00	2.7113	1.06406
Overall				2.597	

This section delves into the examination of the current status and accessibility of urban green spaces (UGS). Analyzing the standard deviation, it is slightly above 1, indicating a dispersed response from the participants.

Taking a closer look, the mean rating for the statement "There are enough green spaces in my area" is 2.93. This suggests that respondents hold a neutral stance regarding the adequacy of green spaces in their area. Consequently, in Addis Ababa's Lideta sub-city, there are somewhat sufficient green spaces, but there is still room for improvement.

This indicates that respondents generally disagreed with the notion that green spaces in their area are in good condition. Thus, in Lideta sub-city, the overall condition of green spaces is deemed inadequate.

The statement "The green spaces are well equipped in my area" yields a mean rating of 2.28. This signifies that in Addis Ababa's Lideta sub-city, the majority of respondents believe that green spaces lack proper equipment and amenities, emphasizing their insufficient state in the area.

Considering the overall mean for the current status and accessibility of UGS, which is 2.597, respondents adopt a neutral position. This interpretation suggests that there is still a need for additional green spaces in the area, indicating a desire for improved accessibility and availability of UGS.

4.3. Ecological Benefits of UGS

The development of an evaluation indicator system for the ecological benefits of UGSs needs to consider the natural environmental characteristics of UGSs and important factors that affect the quality of the natural environment (Ji, et al., 2023).

This part discusses the ecological benefits of UGS. The tables below and discussion is presented as follows.

Table 0.4: Ecological Benefits of UGS

	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	
	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %
UGS improve the climate	43	11.3%	9	2.4%	42	11.0 %	176	46.2 %	111	29.1 %
UGS improve air quality	2	0.5%	41	10.8 %	57	15.0 %	177	46.5 %	104	27.3 %
UGS act as ecological corridors between urban, per urban and rural areas.	2	0.5%	21	5.5%	47	12.3 %	215	56.4 %	96	25.2 %
UGS help reduce daytime higher temperature	4	1.0%	9	2.4%	58	15.2 %	131	34.4 %	179	47.0 %
UGS control water regime and reduce runoff	2	0.5%	16	4.2%	43	11.3 %	169	44.4 %	151	39.6 %
UGS helps to prevent water floods by absorbing excess water.	2	0.5%	11	2.9%	71	18.6 %	177	46.5 %	120	31.5 %
The risk of flooding is lower where there are plenty of UGS to intercept and absorb storm water	4	1.0%	9	2.4%	6	1.6%	222	58.3 %	140	36.7 %
The vegetation cools the environment through evaporative cooling which consumes energy	2	0.5%	2	0.5%	50	13.1 %	176	46.2 %	151	39.6 %
Parks are cooler than the urban areas that surround them	2	0.5%	0	0.0%	42	11.0 %	194	50.9 %	143	37.5 %

The above table sought the opinions of participants on various statements. The initial statement focused on whether urban green spaces (UGS) enhance the climate. According to the data, a significant number of respondents strongly disagreed with this notion (43 individuals, comprising 11.3% of the participants), while a smaller proportion disagreed (9 individuals, or 2.4% of the participants). The remaining respondents expressed neutral (42 individuals, or 11%)

or affirmative views (176 individuals, accounting for 46.2%), with a substantial portion strongly agreeing with the statement (111 individuals, or 29.1%). Consequently, a majority of participants concurred that UGS improve the climate in Lideta sub city, Addis Ababa.

The second statement concerned the impact of UGS on air quality, and only a marginal percentage of respondents strongly disagreed with this idea (2 individuals, representing 0.5% of the participants). Notably, the majority of participants agreed with the statement, indicating that UGS do indeed enhance air quality in Lideta sub city, Addis Ababa. Conversely, the statement regarding UGS acting as ecological corridors between urban, peri-urban, and rural areas garnered disagreement from the majority of respondents.

Consequently, the findings suggest that UGS in Lideta sub city, Addis Ababa, function as ecological corridors connecting urban, peri-urban, and rural regions.

The majority of respondents concurred with the statement that UGS help reduce daytime high temperatures. This implies that UGS in Lideta sub city, Addis Ababa, play a role in mitigating excessively hot temperatures during the day.

Furthermore, the statement regarding UGS controlling water regime and reducing runoff received agreement from most respondents. Therefore, it can be inferred that UGS in Lideta sub city, Addis Ababa, effectively regulate the water regime and minimize runoff.

Likewise, the statement emphasizing that UGS help prevent water floods by absorbing excess water was supported by the majority of participants. Thus, UGS in Lideta sub city, Addis Ababa, contribute to preventing water floods by effectively absorbing surplus water.

Moreover, most respondents agreed with the statement that the presence of abundant UGS reduces the risk of flooding by intercepting and absorbing stormwater. Consequently, in Lideta sub city, Addis Ababa, the risk of flooding is lower in areas with ample UGS.

Lastly, the majority of respondents agreed with the statement that parks are cooler than the surrounding urban areas. This implies that parks in Lideta sub city, Addis Ababa, exhibit lower temperatures compared to the adjacent urban regions.

Table 0.4: Descriptive statistics of Ecological Benefits of UGS

Ecological Benefits of UGS					
	N	Minimum	Maximum	Mean	Std. Deviation
UGS improve the climate	381	1.00	5.00	3.7953	1.21399
UGS improve air quality	381	1.00	5.00	3.8924	.94394
UGS act as ecological corridors between urban, per urban and rural areas.	381	1.00	5.00	4.0026	.80295
UGS help reduce daytime higher temperature	381	1.00	5.00	4.2388	.86946
UGS control water regime and reduce runoff	381	1.00	5.00	4.1837	.83215
UGS helps to prevent water floods by absorbing excess water.	381	1.00	5.00	4.0551	.81409
The risk of flooding is lower where there are plenty of UGS to intercept and absorb storm water	381	1.00	5.00	4.2730	.70638
The vegetation cools the environment through evaporative cooling which consumes energy	381	1.00	5.00	4.2388	.73496
Parks are cooler than the urban areas that surround them	381	1.00	5.00	4.2493	.68693
Overall				4.10	

The data presented in the tables provides insights into the respondents' mean and standard deviation (SD) regarding the statements on the ecological benefits of urban green spaces (UGS) in Lideta sub city, Addis Ababa.

For the statement "UGS improve the climate," the mean response was 3.79, indicating that the respondents agreed with the statement. The slightly higher standard deviation suggests some dispersion in the responses. This implies that UGS in Lideta sub city, Addis Ababa, have a positive impact on the climate.

Similarly, for the statement "UGS improve air quality," the mean response was 3.89, indicating agreement among the respondents. The standard deviation, although slightly higher, also suggests some variability in the responses. Consequently, UGS in Lideta sub city, Addis Ababa, contribute to enhancing air quality.

Regarding the statement "UGS act as ecological corridors between urban, peri-urban, and rural areas," the mean response was 4, indicating agreement among the respondents. This implies that UGS in Lideta sub city, Addis Ababa, effectively serve as ecological connectors between different areas. Overall, the mean value for the ecological benefits of UGS was 4.10, signifying agreement among the respondents with the ideas presented. Consequently, in Lideta sub city, Addis Ababa, the ecological benefits provided by UGS are considered favorable.

The high level of agreement among respondents regarding the ecological benefits of UGS in Lideta sub city aligns with findings from other studies conducted in different urban settings. This consistency across studies reinforces the significance of UGS in promoting ecological sustainability in urban areas. It indicates that the positive impact of UGS on the local environment is recognized and appreciated by residents, which is a common trend observed in various urban contexts.

The studies provide evidence of the ecological benefits of Urban Green Spaces (UGS) as discussed. Richard, Mitchell & Popham (2007) found that access to green spaces in urban areas is associated with improved mental health and well-being. People living closer to UGS tend to have lower levels of stress, anxiety, and depression. Sugiyama et al. (2008) conducted a study that showed that exposure to green spaces is linked to increased physical activity levels among residents. UGS provides opportunities for recreational activities such as walking, jogging, and cycling, which can promote a healthier lifestyle. Maas et al. (2009) explored the impact of green spaces on overall health and found that living near UGS is associated with lower rates of chronic diseases such as cardiovascular disease and diabetes. Access to green spaces encourages physical activity and social interactions, which are beneficial for health. Hunter et al. (2015) investigated the role of UGS in improving air quality and reducing pollution in urban areas. Green spaces act as natural filters, absorbing pollutants and particulate matter from the air, thereby contributing to cleaner and healthier air quality.

The review by Martin Ely and Sheryn Pitman (2013) on the benefits of green infrastructure for the Botanic Gardens of Adelaide and the Department of Environment, Water, and Natural Resources in South Australia likely highlights the importance of UGS in providing ecological benefits such as biodiversity support, climate regulation, and storm water management. These findings underscore the significance of UGS in promoting environmental sustainability and human well-being in urban settings. Ecosystem services are crucial for human well-being, as they encompass the benefits derived from ecosystem functions that support and enhance our quality of life (Costanza et al., 1997). Bolund and Hunhammar (1999) identified six major categories of ecosystem services that are particularly relevant in urban areas, including air filtering, microclimate regulation, noise reduction, rainwater drainage, sewage treatment, and recreational/cultural values. Additionally, food production and erosion control are also potentially important in urban settings. In Australian cities, two key ecosystem services provided by urban green spaces are cooling and air quality improvement. Green spaces help mitigate the urban heat island effect by providing shade and cooling effects, while also acting as natural filters that absorb pollutants and enhance air quality.

4.4. Pollution Control

Urban ecology, geology, and other related fields, as well as national and local policy makers, have been interested in the prevention and mitigation of urban disasters through existing land uses because of the greater severity of ecosystem degradation, resource scarcity, environmental pollution, and natural disasters in cities (Layke et al., 2012).

This section presents and discusses about the pollution controls of UGS at Addis Ababa, Lideta sub city. To measure it different statement were requested to the respondents and respondents rate their agreement levels on each statement.

Table 0.5: Pollution Control

	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	
	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %
UGS can reduce noise pollution	4	1.0%	17	4.5%	20	5.2%	202	53.0%	138	36.2 %
UGS can absorb the noise generated by human activities	2	0.5%	8	2.1%	88	23.1%	153	40.2%	130	34.1 %
UGS decrease carbon emission levels.	0	0.0%	4	1.0%	58	15.2%	166	43.6%	153	40.2 %
UGS improve ambient air quality since it contributes to air pollution removal and carbon sequestration	4	1.0%	18	4.7%	44	11.5%	216	56.7%	99	26.0 %
UGS can absorb different gaseous pollutants	9	2.4%	10	2.6%	53	13.9%	161	42.3%	148	38.8 %
UGS reduce the level of NOx and SOx and remove large amounts of airborne pollution	2	0.5%	37	9.7%	116	30.4%	101	26.5%	125	32.8 %
UGS reduces solid waste (household garbage limits etc.)	2	0.5%	20	5.2%	134	35.2%	84	22.0%	141	37.0 %
UGS provides local recycling and composting centers.	2	0.5%	24	6.3%	148	38.8%	145	38.1%	62	16.3 %
Green spaces provide clean air for breathing by removing pollutants and cool down the air temperature	4	1.0%	28	7.3%	54	14.2%	163	42.8%	132	34.6 %

The above table displays data on the pollution levels in Lideta sub city, Addis Ababa, and the respondents' ratings regarding the potential of urban green spaces (UGS) to mitigate pollution.

The first question focused on whether UGS can reduce noise pollution. The responses indicated that a small percentage strongly disagreed (4 respondents, 1% of the sample), while a slightly

higher proportion disagreed (17 respondents, 4.5%). A neutral stance was taken by 20 respondents (5.2%), and the majority of respondents agreed (202 respondents, 53%), with a significant portion strongly agreeing (138 respondents, 36.2%). This suggests that UGS have the potential to reduce noise pollution in Lideta sub city, Addis Ababa.

The second question addressed the ability of UGS to absorb noise generated by human activities. The responses showed that a very small percentage strongly agreed (2 respondents, 0.5%), while a slightly higher proportion disagreed (8 respondents, 2.1%). A larger number of respondents remained neutral (88 respondents, 23.1%), and the majority agreed (153 respondents, 40.2%), with a significant portion strongly agreeing (130 respondents, 34.1%). Consequently, the majority of respondents agreed that UGS in Lideta sub city, Addis Ababa, can absorb noise generated by human activities.

The respondents largely agreed that UGS can decrease carbon emission levels, implying that UGS in Lideta sub city, Addis Ababa, have a positive impact on reducing carbon emissions.

Additionally, the majority of respondents agreed with the statement that UGS improve ambient air quality by contributing to air pollution removal and carbon sequestration.

However, the question about UGS's ability to absorb different gaseous pollutants received some disagreement. A small percentage strongly disagreed (9 respondents, 2.4%), while a slightly higher proportion disagreed (10 respondents, 2.6%). A significant number remained neutral (53 respondents, 13.9%), and the majority agreed (161 respondents, 42.3%), with a considerable portion strongly agreeing (148 respondents, 38.8%). Nonetheless, the majority of respondents agreed that UGS in Lideta sub city, Addis Ababa, have the ability to absorb different gaseous pollutants.

Similarly, the majority of respondents agreed with the statement that UGS reduce the levels of nitrogen oxides (NOx) and sulfur oxides (SOx) and remove substantial amounts of airborne pollution.

Moreover, the majority of respondents agreed with the statement that UGS play a role in reducing solid waste, such as household garbage, by providing local recycling and composting centers. Finally, the majority of respondents agreed that green spaces in Lideta sub city, Addis Ababa, provide clean air for breathing by removing pollutants and contribute to cooling down the air temperature.

Table 0.6: Descriptive statistics of Pollution Control

	N	Minimum	Maximum	Mean	Std. Deviation
Pollution Control					
UGS can reduce noise pollution	381	1.00	5.00	4.1890	.80850
UGS can absorb the noise generated by human activities	381	1.00	5.00	4.0525	.83815
UGS decrease carbon emission levels.	381	2.00	5.00	4.2283	.73830
UGS improve ambient air quality since it contributes to air pollution removal and carbon sequestration	381	1.00	5.00	4.0184	.81252
UGS can absorb different gaseous pollutants	381	1.00	5.00	4.1260	.91184
UGS reduce the level of NOx and SOx and remove large amounts of airborne pollution	381	1.00	5.00	3.8136	1.01796
UGS reduces solid waste (household garbage limits etc.)	381	1.00	5.00	3.8976	.98543
UGS provides local recycling and composting centers.	381	1.00	5.00	3.6325	.84691
Green spaces provide clean air for breathing by removing pollutants and cool down the air temperature	381	1.00	5.00	4.0262	.93715
Overall				4.00	

The data presented in the table reveals the mean ratings provided by the respondents regarding the effectiveness of urban green spaces (UGS) in reducing various forms of pollution in Lideta sub city, Addis Ababa.

For the statement "UGS can reduce noise pollution," the mean response was 4.19, indicating a strong agreement among the respondents. This suggests that UGS in Lideta sub city have a significant potential to reduce noise pollution.

Similarly, for the statement "UGS can absorb the noise generated by human activities," the mean response was 4.05, indicating agreement among the respondents. This implies that UGS in Lideta sub city have the ability to absorb noise generated by human activities.

Regarding the statement "UGS decrease carbon emission levels," the mean response was 4.23, indicating agreement among the respondents. This suggests that UGS in Lideta sub city contribute to the reduction of carbon emissions.

Furthermore, for the statement "UGS improve ambient air quality since it contributes to air pollution removal and carbon sequestration," the mean response was 4.02, indicating agreement among the respondents. This implies that UGS in Lideta sub city positively influence ambient air quality by removing air pollutants and sequestering carbon.

Overall, the mean rating for pollution control was 4.00, indicating agreement among the respondents with the statements related to pollution control. This suggests that UGS in Lideta sub city play a significant role in improving pollution control measures.

In conclusion, based on the respondents' ratings, it can be inferred that UGS in Lideta sub city, Addis Ababa, effectively contribute to reducing noise pollution, absorbing noise from human activities, decreasing carbon emissions, improving ambient air quality, and overall pollution control.

Pollution control is a critical aspect of maintaining a sustainable and healthy urban environment, and green spaces play a significant role in mitigating air pollution. Ecosystem services provided by urban green spaces, such as cooling and air pollution reduction, are essential for improving air quality and human well-being. Bolund and Hunhammar (1999) highlighted the importance of these ecosystem services in urban areas, emphasizing the role of green spaces in filtering pollutants and enhancing air quality. Additionally, research by Zupancic et al. (2015) further supports the positive impact of green spaces on reducing air pollution and cooling urban environments. By acting as natural filters that absorb pollutants and providing cooling effects, green spaces help alleviate the negative effects of air pollution and contribute to creating a healthier and more sustainable urban environment. Therefore, promoting and preserving green spaces in cities is crucial for pollution control and enhancing the quality of life for urban residents.

4.5. UGS Biodiversity and Nature Conservation

Today, the majority of urban green spaces (UGSs) are subject to rigorous management procedures, which include, among many other things, mowing, pruning, and/or chemical input.

A rising number of studies have raised concerns about the biodiversity potential of reduced-intensity care regimes and questioned the utility of well-manicured UGSs. (Hu, et al., l2024). The presence of green spaces in urban environments not only supports biodiversity but also plays a vital role in sustaining various animal populations within cities. While some species, like the Peregrine falcon, can adapt to the built environment as habitat (Chace and Walsh, 2006), many others heavily rely on green spaces for survival in urban settings. Sadler et al. (2010) emphasized the importance of local habitat structure in supporting diverse taxonomic groups, noting that increased resource availability and reduced predation in urban green spaces can lead to higher population densities of certain animal species compared to their counterparts outside cities (Shochat et al., 2006; Williams et al., 2006). Overall, the research underscores the critical role of urban green spaces in fostering biodiversity and providing essential habitats for native species within urban environments.

Table 0.7: UGS Biodiversity and Nature Conservation

	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	
	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %
UGS provide flora and fauna and diverse habitat.	19	5.0%	38	10.0 %	28	7.3%	183	48.0 %	113	29.7 %
Green spaces provide habitat for a variety of birds, fish, animals, insects, & other organisms, while also providing corridors and greenways to link habitats.	11	2.9%	41	10.8 %	94	24.7 %	151	39.6 %	84	22.0 %
UGS prevent soil erosion and absorb rainwater, thereby improving drainage.	2	0.5%	37	9.7%	84	22.0 %	209	54.9 %	49	12.9 %
UGS provide common bird and animal species and support biodiversity conservation	2	0.5%	27	7.1%	105	27.6 %	188	49.3 %	59	15.5 %
UGS have good natural features such as grass, trees and flower beds.	11	2.9%	26	6.8%	30	7.9%	230	60.4 %	84	22.0 %

The data presented in the above table illustrates the respondents' agreement levels regarding the ecological aspects of urban green spaces (UGS) in Lideta sub city, Addis Ababa.
For the statement "UGS provide flora and fauna and diverse habitat," 5% of the respondents strongly disagreed, 10% disagreed, 7.3% remained neutral, 48% agreed, and 29.7% strongly agreed. The majority of the respondents agreed with the statement, indicating that UGS in Lideta sub city indeed provide flora and fauna and diverse habitats.

Regarding the statement "Green spaces provide habitat for a variety of birds, fish, animals, insects, and other organisms, while also providing corridors and greenways to link habitats," 2.9% of the respondents strongly disagreed, 10.8% disagreed, 24.7% remained neutral, 39.6% agreed, and 22% provided agreement. The majority of the respondents agreed with this statement, implying that green spaces in Lideta sub city serve as habitats for various organisms and contribute to habitat connectivity.

The statement "UGS prevent soil erosion and absorb rainwater, thereby improving drainage" received agreement from the majority of the respondents. This indicates that UGS in Lideta sub city play a role in preventing soil erosion, absorbing rainwater, and enhancing drainage.
Furthermore, the majority of the respondents agreed with the statement "UGS provide common bird and animal species and support biodiversity conservation." This implies that UGS in Lideta sub city contribute to the presence of common bird and animal species and aid in the conservation of biodiversity.

Lastly, the statement "UGS have good natural features such as grass, trees, and flower beds" received agreement from the majority of the respondents. This suggests that UGS in Lideta sub city possess desirable natural features, including well-maintained grass, trees, and flower beds.

Therefore, based on the respondents' ratings, it can be inferred that UGS in Lideta sub city, Addis Ababa, provide flora and fauna, diverse habitats, habitat connectivity, soil erosion prevention, rainwater absorption, improved drainage, common bird and animal species, biodiversity conservation, and appealing natural features such as grass, trees, and flower beds.

Table 0.8: Descriptive statistics of UGS Biodiversity and Nature Conservation

	N	Minimum	Maximum	Mean	Std. Deviation
UGS Biodiversity and Nature Conservation					
UGS provide flora and fauna and diverse habitat.	381	1.00	5.00	3.8740	1.09779
Green spaces provide habitat for a variety of birds, fish, animals, insects, and other organisms, while also providing corridors and greenways to link habitats.	381	1.00	5.00	3.6719	1.02596
UGS prevent soil erosion and absorb rainwater, thereby improving drainage.	381	1.00	5.00	3.6982	.83396
UGS provide common bird and animal species and support biodiversity conservation	381	1.00	5.00	3.7218	.82798
UGS have good natural features such as grass, trees and flower beds.	381	1.00	5.00	3.9186	.90971
Overall				3.78	

The average rating received for the statement regarding the provision of flora and fauna and diverse habitat by urban green spaces (UGS) was 3.87. This rating indicates that respondents agreed with the statement, suggesting that UGS in Addis Ababa, specifically in Lideta sub-city, indeed provide a wide range of plant and animal life as well as diverse habitats.

In the case of green spaces, the average rating received for their ability to offer habitats for various birds, fish, animals, insects, and other organisms, while also serving as corridors and greenways to connect habitats, was 3.67. The standard deviation for this rating was 1.03. These numbers suggest that in Addis Ababa, Lideta sub-city, green spaces do provide habitats for a variety of species, including birds, fish, animals, insects, and other organisms. Additionally, they serve as important pathways to link different habitats.

With regard to soil erosion prevention and rainwater absorption, the average rating received for UGS was 3.70. This indicates that UGS in Addis Ababa, Lideta sub-city play a role in preventing soil erosion and absorbing rainwater, thereby enhancing drainage.

The statement regarding UGS providing support for biodiversity conservation and offering habitats for common bird and animal species received an average rating of 3.72. This suggests that in Addis Ababa, Lideta sub-city, UGS indeed provide suitable habitats for common bird and animal species, contributing to the conservation of biodiversity.

The natural features of UGS, such as the presence of grass, trees, and flower beds, received an average rating of 3.92. This indicates that respondents strongly agreed with this statement. It implies that UGS in Addis Ababa, Lideta sub-city are characterized by appealing natural elements, including well-maintained grass areas, various types of trees, and attractive flower beds.

The overall mean rating for UGS Biodiversity and Nature Conservation was 3.78. This indicates that respondents generally agreed with the statement concerning the importance of UGS for biodiversity and natural conservation in Addis Ababa, Lideta sub-city.

Recent research has delved into the multifaceted effects of urban green spaces on urban environments and the various inhabitants within them. One significant aspect that has garnered attention is the role of urban green spaces in maintaining biodiversity and conserving native species. Studies by Sadler et al. (2010) have highlighted the importance of urban green spaces in supporting species richness and providing vital habitats for native flora and fauna. Kendal et al. (2012) found that urban green spaces can exhibit higher species richness compared to native vegetation outside cities, emphasizing their role in biodiversity conservation.

Furthermore, urban areas have been identified as crucial habitats for certain native species like flying foxes (Williams et al., 2006) and can also serve as important refuges for threatened species (Ives et al., 2016). Nielsen et al. (2014) noted that parks harbor a high diversity of plants and animals, including exotic species, while residential gardens contribute significantly to plant species diversity (Smith et al., 2006). In Australia, residential gardens have been found to have higher levels of species diversity than native vegetation (Kendal et al., 2012).

4.6. Factors Affecting the UGS

Factor that influences UGS is the design and layout of green spaces. Studies by Jim and Chen (2010) and Lin et al. (2014) have highlighted the importance of well-designed and well-maintained green spaces in attracting visitors and promoting physical activity. Factors such as accessibility, safety, aesthetics, and amenities within green spaces can enhance their appeal and functionality for urban residents.

Additionally, socio-economic factors play a significant role in determining the quality and equity of UGS in cities. Research by Wolch et al. (2014) and Rigolon et al. (2016) has shown that socio-economic disparities can affect access to green spaces, with marginalized communities often having limited access to high-quality green spaces. Addressing these inequalities through equitable planning and investment in UGS is essential to ensure that all residents can benefit from the environmental and health advantages of green infrastructure. Another important factor is the size and distribution of green spaces within a city. Research by Bolund and Hunhammar (1999) and Loures et al. (2012) has shown that the availability of green spaces and their proximity to residential areas can impact their use and benefits to residents. Larger green spaces and a higher density of UGS can provide more opportunities for recreation, social interaction, and biodiversity conservation.

This section discusses about the factors which may affects the urban green spaces in Addis Ababa, Lideta sub city. Users were requested to fill questionnaires different questions which can measure the factors were requested to rate their agreement levels.

Table 0.9: Factors Affecting the UGS

	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	
	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %
Lack of public awareness	9	2.4%	45	11.8%	114	29.9%	102	26.8%	111	29.1%
Low level of community participation	0	0.0%	45	11.8%	116	30.4%	108	28.3%	112	29.4%
Poor implementation of government policies	0	0.0%	62	16.3%	117	30.7%	32	8.4%	170	44.6%
Lack of budget	8	2.1%	75	19.7%	123	32.3%	68	17.8%	107	28.1%
Lack of skilled human power	0	0.0%	52	13.6%	157	41.2%	82	21.5%	90	23.6%
Shortage of land in urban areas	9	2.4%	106	27.8%	81	21.3%	56	14.7%	129	33.9%
Illegal Settlement	0	0.0%	35	9.2%	97	25.5%	180	47.2%	69	18.1%
Lack of regular follow-up	0	0.0%	43	11.3%	77	20.2%	174	45.7%	87	22.8%
Problem of pollution from different Sources	9	2.4%	17	4.5%	100	26.2%	144	37.8%	111	29.1%
Lack of coordination among different stake holders	0	0.0%	0	0.0%	64	16.8%	173	45.4%	144	37.8%

The respondents were asked to rate their agreement levels on various factors presented in the tables above. One of the statements presented was "Lack of public awareness." It was strongly disagreed by 9 respondents (2.4%), disagreed by 45 respondents (11.8%), neutral by 114 respondents (29.9%), and strongly agreed by 111 respondents (29.1%). The majority of the respondents agreed with the statement, indicating that lack of public awareness is a significant factor affecting urban green spaces (UGS) in Addis Ababa, specifically in Lideta sub-city.

Regarding the statement "Low level of community participation," the majority of the respondents agreed with it. This suggests that in Addis Ababa, Lideta sub-city, the low level of community participation is a factor that affects UGS.

The statements "Poor implementation of government policies," "Lack of budget," "Lack of skilled human power," "Shortage of land in urban areas “and” Illegal Settlement" were agreed upon by the majority of the respondents. This implies that in Addis Ababa, Lideta sub-city, these factors have an impact on UGS.

The statement "Lack of regular follow-up" was disagreed by 43 respondents (11.3%), neutral by 77 respondents (20.2%), agreed by 174 respondents (45.7%), and strongly agreed by 87 respondents (22.8%). The majority of the respondents agreed with the statement, suggesting that lack of regular follow-up is a major factor affecting UGS in Addis Ababa, Lideta sub-city.

Both the "Problem of pollution from different sources" and "Lack of coordination among different stakeholders" statements were agreed upon by the majority of the respondents. This indicates that in Addis Ababa, Lideta sub-city, these factors, namely pollution from various sources and lack of coordination among different stakeholders, are significant factors affecting UGS.

Factors affecting urban green spaces (UGS) are diverse and can vary depending on the context of the city and its specific characteristics. Several studies have identified key factors that influence the quality, accessibility, and effectiveness of UGS in urban areas.

4.7. Quality of life and wellbeing of the people

Table 0.10: Quality of life and wellbeing of the people

	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	
	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %
UGS can improve wellbeing in a wider sense	0	0.0%	0	0.0%	8	2.1%	276	72.4%	97	25.5%
UGS have Health benefits	0	0.0%	8	2.1%	2	0.5%	236	61.9%	135	35.4%
UGS have social benefits that links people to participate in communal or group activities in urban parks	0	0.0%	0	0.0%	0	0.0%	257	67.5%	124	32.5%
UGS enhance Aesthetic value of the city	0	0.0%	8	2.1%	8	2.1%	242	63.5%	123	32.3%
UGS help to enjoy the weather and get fresh air	0	0.0%	0	0.0%	2	0.5%	267	70.1%	112	29.4%
UGS to reduce stress, relax	0	0.0%	8	2.1%	2	0.5%	237	62.2%	134	35.2%
For beautification and recreation	0	0.0%	0	0.0%	21	5.5%	215	56.4%	145	38.1%
Psychological satisfaction	0	0.0%	8	2.1%	2	0.5%	228	59.8%	143	37.5%
Carrying out different ceremony	0	0.0%	9	2.4%	2	0.5%	229	60.1%	141	37.0%
Combating climate change	0	0.0%	0	0.0%	17	4.5%	253	66.4%	111	29.1%
Create job opportunity	0	0.0%	8	2.1%	41	10.8%	277	72.7%	55	14.4%
Education	0	0.0%	0	0.0%	8	2.1%	305	80.1%	68	17.8%
UGS are beneficial to the specific health concerns affecting lower-income urban communities.	0	0.0%	9	2.4%	4	1.0%	327	85.8%	41	10.8%
Exposure to green space reduces stress and increases sense of wellness and belonging.	0	0.0%	0	0.0%	95	24.9%	165	43.3%	121	31.8%

UGS improve the urban environment and life satisfaction	0	0.0%	17	4.5%	4	1.0%	268	70.3%	92	24.1%
A daily base interaction with green landscapes is needed for physical well-being and other health benefits,	9	2.4%	0	0.0%	18	4.7%	267	70.1%	87	22.8%
A weekly visit can enhance human wellbeing and mental growth,	0	0.0%	0	0.0%	37	9.7%	296	77.7%	48	12.6%
Green environment improves work performance & prevent mental stress effects	0	0.0%	2	0.5%	58	15.2%	267	70.1%	54	14.2%

The above table presents the ratings given by participants to assess various aspects related to the quality of life and well-being of individuals. The initial question posed to respondents was whether urban green spaces (UGS) can enhance well-being on a broader scale. The majority of respondents agreed with this statement, indicating that in Lideta sub city, Addis Ababa, UGS can contribute to improving overall well-being.

Regarding the health benefits of UGS, only a small percentage (2.1%) of respondents expressed neutrality, while the rest either agreed or strongly agreed with the notion that UGS provide health benefits. This suggests that in Lideta sub city, Addis Ababa, UGS are perceived to have positive impacts on health.

All participants agreed that UGS offer social benefits by facilitating communal or group activities in urban parks. This implies that in Lideta sub city, Addis Ababa, UGS play a role in fostering social connections and encouraging community engagement.

When it comes to the aesthetic value of the city enhanced by UGS, a small portion (2.1%) of respondents disagreed, while an equal number expressed neutrality. However, the majority (63.5%) of participants agreed, and a significant portion (32.3%) strongly agreed that UGS contribute to enhancing the aesthetic appeal of the city. Therefore, it can be inferred that in Lideta sub city, Addis Ababa, UGS are perceived to enhance the overall aesthetic value.

The majority of respondents, except for two neutral respondents, agreed that UGS contribute to enjoying favorable weather conditions and obtaining fresh air. This suggests that in Lideta sub

city, Addis Ababa, UGS are seen as a means to experience pleasant weather and improve air quality.

Most respondents agreed with the various benefits associated with UGS, such as stress reduction, relaxation, beautification and recreation, psychological satisfaction, hosting different ceremonies, combating climate change, and creating job opportunities. This implies that in Lideta sub city, Addis Ababa, UGS are perceived to offer these advantages.

The majority of respondents agreed that daily interaction with green landscapes is necessary for physical well-being and other health benefits. This implies that in Lideta sub city, Addis Ababa, a regular engagement with green spaces is considered important for maintaining physical well-being and reaping health benefits.

Table 0.11: Descriptive statistics of Quality of life and well-being of the people

	N	Minimum	Maximum	Mean	Std. Deviation
Quality of life and well-being of the people					
UGS can improve wellbeing in a wider sense	381	3.00	5.00	4.2336	.47075
UGS have Health benefits	381	2.00	5.00	4.3071	.59177
UGS have social benefits that links people to participate in communal or group activities in urban parks	381	4.00	5.00	4.3255	.46916
UGS enhance Aesthetic value of the city	381	2.00	5.00	4.2598	.60104
UGS help to enjoy the weather and get fresh air	381	3.00	5.00	4.2887	.46521
UGS to reduce stress, relax	381	2.00	5.00	4.3045	.59090
For beautification and recreation	381	3.00	5.00	4.3255	.57501
Psychological satisfaction	381	2.00	5.00	4.3281	.59822
Carrying out different ceremony	381	2.00	5.00	4.3176	.60822
Combating climate change	381	3.00	5.00	4.2467	.52518
Create job opportunity	381	2.00	5.00	3.9948	.58036
Education	381	3.00	5.00	4.1575	.41849

UGS are beneficial to the specific health concerns affecting lower-income urban communities.	381	2.00	5.00	4.0499	.45898
Exposure to green space reduces stress and increases sense of wellness and belonging.	381	3.00	5.00	4.0682	.75083
UGS improve the urban environment and life satisfaction	381	2.00	5.00	4.1417	.64143
A daily base interaction with green landscapes is needed for physical well-being and other health benefits,	381	1.00	5.00	4.1102	.69086
A weekly visit can enhance human wellbeing and mental growth,	381	3.00	5.00	4.0289	.47207
Green environment improves work performance in office and prevent mental stress effects	381	2.00	5.00	3.9790	.56156
Current status and accessibility of UGS	381	1.24	4.00	2.5970	.66043
Ecological Benefits of UGS	381	1.00	5.00	4.1032	.52442
Pollution Control	381	1.89	5.00	3.9983	.67084
UGS Biodiversity and Nature Conservation	381	1.40	5.00	3.7409	.74092
Factors Affecting the UGS	381	2.80	5.00	3.7425	.76080
Quality of life and wellbeing of the people	381	3.00	4.94	4.1926	.38815
Overall	381			4.08	

Based on the collected data, the mean rating for the statement "UGS can improve well-being in a wider sense" was 4.23. This indicates that respondents generally agreed with this statement, suggesting that UGS can indeed have a positive impact on overall well-being in a broader context. Consequently, it can be inferred that in Lideta sub city, Addis Ababa, UGS have the potential to enhance well-being in various aspects.

Regarding the statement "UGS have social benefits that link people to participate in communal or group activities in urban parks," the mean rating was 4.33. This indicates that at Addis Ababa, Lideta sub city, UGS are perceived to have social benefits, facilitating participation in communal

or group activities within urban parks. These findings suggest that UGS in this area encourage social interactions and community engagement.

The statement "UGS enhances the aesthetic value of the city" received a mean rating of 4.26. This implies that respondents generally agreed with the notion that UGS contribute to enhancing the aesthetic appeal of the city. Therefore, in Lideta sub city, Addis Ababa, UGS are perceived to play a role in improving the overall visual appeal and beauty of the urban landscape.

The overall mean rating for the quality of life and well-being of the people was 4.08. This indicates that respondents agreed with the statements related to the quality of life and well-being. Consequently, it can be inferred that in Lideta sub city, Addis Ababa, the quality of life and well-being of the people were perceived as good, largely attributed to the presence of UGS.

Recent research has highlighted the numerous benefits of urban green spaces on human health and well-being. Studies by Maas et al. (2009), Fan et al. (2011), and De Vries et al. (2013) have shown that urban green spaces can contribute to increased social cohesion, while research by Bratman et al. (2012), Hartig et al. (2014), and Cohen-Cline et al. (2015) has demonstrated the positive impact of green environments on mental well-being. The majority of these studies suggest a positive relationship between greener environments, contact with nature, and physical health. Review papers by Lee & Maheswaran (2011), Konijnendijk et al. (2013), Hartig et al. (2014), Lovell et al. (2014), and Wolf & Robbins (2015) have outlined various benefits of green infrastructure and the need for more rigorous methodologies in research. Additionally, international reviews indicate that urban green spaces facilitate physical activity, particularly in providing attractive, open spaces for leisure activities. The mental health benefits of green spaces are also well-documented, with strong evidence supporting their positive impact on mental well-being. Further research is needed to understand the mechanisms and duration of these benefits for designing effective population-level greening interventions.

In addition to the benefits mentioned above, urban green spaces have also been found to have positive effects on air quality and temperature regulation. Studies by Nowak et al. (2014), Escobedo et al. (2011), and Beckett et al. (2014) have shown that trees and vegetation in urban areas can help reduce air pollution, absorb carbon dioxide, and provide shade, which can lower temperatures and mitigate the urban heat island effect.

Furthermore, research by Kondo et al. (2015), Astell-Burt et al. (2014), and Alcock et al. (2014) has highlighted the role of green spaces in promoting physical activity and reducing the risk of chronic diseases such as obesity, diabetes, and cardiovascular diseases. Access to green spaces has been associated with increased levels of physical activity, which can contribute to overall health and well-being.

Moreover, green spaces have been shown to have a positive impact on biodiversity and ecosystem services in urban areas. Studies by Goddard et al. (2010), Luck et al. (2009), and Cilliers et al. (2013) have demonstrated the importance of urban green spaces in supporting wildlife habitats, pollination services, and water management.

Overall, urban green spaces play a crucial role in enhancing the quality of life in cities by providing numerous environmental, social, and health benefits. It is important for policymakers, urban planners, and public health officials to recognize the value of green infrastructure and incorporate it into urban planning and development to create sustainable cities.

4.8. Correlation Analysis between independent and dependent variables

Table 0.12: Correlation Analysis between Independent variables and Dependent Variable

Correlations					
		Ecological Benefits of UGS	Pollution Control	UGS Biodiversity and Nature Conservation	Quality of life and wellbeing of the people
Ecological Benefits of UGS	Pearson Correlation	1	.795**	.684**	.758**
	Sig. (2-tailed)		.000	.000	.000
	N	381	381	381	381
Pollution Control	Pearson Correlation	.795**	1	.700**	.737**
	Sig. (2-tailed)	.000		.000	.000
	N	381	381	381	381
UGS Biodiversity and Nature Conservation	Pearson Correlation	.684**	.700**	1	.726**
	Sig. (2-tailed)	.000	.000		.000
	N	381	381	381	381
Quality of life and wellbeing of the people	Pearson Correlation	.758**	.737**	.726**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	381	381	381	381
**. Correlation is significant at the 0.01 level (2-tailed).					

4.8.1. Correlation Analysis between Ecological Benefits of UGS and Quality of life and wellbeing of the people

From the above table it can be seen that ecological benefit of UGS (r=0.758, p<0.01) is positively correlated with quality of life and Wellbeing of the people in Lideta sb city. This implies the presence of moderate relationship between ecological benefit of UGS and wellbeing of the people in Lideta sub city which is statistically significant. And change in ecological benefits has a corresponding effect on wellbeing of the people.

Correlation Analysis between pollution control and quality of life and wellbeing of people

It can be seen in the above table that pollution control is positively correlated with quality of life and wellbeing of life (r=0.737, p<0.01) and is of moderate positive relation and statistically significant. This means an increase pollution control will increase quality of life and wellbeing of the people. Correlation Analysis between pollution control and quality of life and wellbeing of people

It can be seen in the above table that Biodiversity and Nature Conservation UGS is positively correlated with quality of life and wellbeing of life (r=0.726, p<0.01) and is of moderate positive relation and statistically significant. This means an increase UGS Biodiversity and Nature Conservation will increase quality of life and wellbeing of the socity.

4.9. Linear Regression Analysis

4.9.1. Multi linear regression Assumption tests

4.9.1.1. Linearity Test

The correlation Analysis show that ecological benefits of UGS (r=0.758, Sig=0.000), pollution control (r= 0.737, Sig=0.000), UGS Biodiversity and Nature Conservation (r=0.726 , Sig=0.000), which indicate all are correlated at 0.01 significant level. The significant correlations indicate the linearity which indicates the linearity assumption is proved.

Normality tests

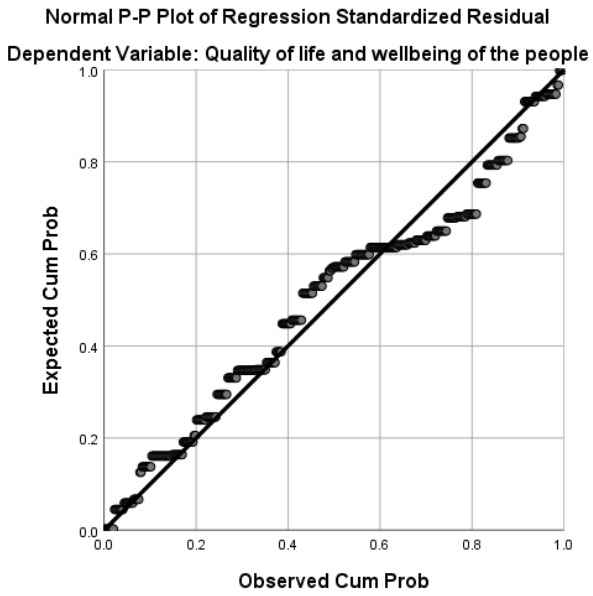


Figure 3: P-P plots

4.9.1.2. Multi collinearity Test

When two or more of the explanatory variables have a strong correlation, this is known as multi-collinearity. This is problematic because it might be challenging to determine which of them best accounts for any common variation in the result. Additionally, it raises the possibility that the two variables truly reflect the same underlying component. Examining a correlation matrix is the most straightforward method of determining whether or not explanatory variables are substantially associated with one another. A more precise approach is to use the collinearity statistics that SPSS can provide. The Variance inflation factor (VIF) and tolerance statistic can tell you whether or not a given explanatory variable has a strong relationship with the other explanatory variables.

Table 0.13: Collinearity Statistics

Model		Collinearity Statistics	
		Tolerance	VIF
1	(Constant)		
	Ecological Benefits of UGS	.337	2.969
	Pollution Control	.323	3.099
	UGS Biodiversity and Nature Conservation	.466	2.145

Because every VIF value is less than 10 and every tolerance value is greater than 0.1, the values in table 4-10 thus show minimal co-linearity. As a result, these tests demonstrate that there is no multi-colinearity among the variables employed in the study.

4.9.2. Multiple Linear Regression Analysis

Regression analysis is a statistical technique for identifying the relationship between variables that have a cause-and-effect relationship. The main objective of univariate regression is to examine the relationship between a dependent variable and one independent variable and develop a linear relationship equation between the two.

Table 0.14: Multiple Linear Regression Model Summary

Model	R	R Square	Adjusted R Square	Durbin-Watson		
				df1	df2	Sig. F Change
1	.820[a]	.673	.670	3	377	.000

According to the above table, the combined effects of the three independent variables—pollution prevention, ecological benefits, and UGS biodiversity and nature conservation—account for 67.3% (R2 = 0.673) of the dependent variable, which is people's quality of life and well-being. This indicates that the independent variables obviously account for 45.4% of the subcity residents' quality of life and wellbeing, with additional factors not included in this study determining the remaining 32.70%.

Table 0.15: Anova Result

ANOVA[a]						
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	38.505	3	12.835	258.148	.000[b]
	Residual	18.744	377	.050		
	Total	57.250	380			
a. Dependent Variable: Quality of life and wellbeing of the people						
b. Predictors: (Constant), UGS Biodiversity and Nature Conservation, Ecological Benefits of UGS, Pollution Control						

The combination of variables has a statistically significant influence on people's quality of life and wellbeing, as indicated by the results in Table above, where F=258.148 is more than 1 and

P<0.01. As a result, the total set of elements has a positive correlation and a statistically significant impact on people's wellbeing and quality of life.

Table 0.16: Multiple Regression Coefficients

Coefficients								
Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	1.951	.090		21.574	.000		
	Ecological Benefits of UGS	.263	.038	.356	7.009	.000	.337	2.969
	Pollution Control	.132	.030	.229	4.406	.000	.323	3.099
	UGS Biodiversity and Nature Conservation	.169	.023	.323	7.479	.000	.466	2.145
a. Dependent Variable: Quality of life and wellbeing of the people								

The above table allows for a straightforward comparison of the relative contributions of unalike variables by examining the beta values in the unstandardized coefficients. The beta value indicates the strength of each variable's contribution. In this regard, the Ecological benefits of Urban Green Spaces (UGS) (Beta = 0.263, P = 0.000) stands out as the most influential factor in explaining the dependent variable. The findings demonstrate that a positive change or a one-unit increase in "Ecological benefits of UGS" leads to a 0.263-unit increase in the level of quality of life and well-being experienced by individuals. Following closely is UGS Biodiversity and Nature Conservation (B = 0.169, P = 0.000), and pollution control (B = 0.132, P = 0.000). These independent variables also exert a significant impact on the quality of life and well-being of individuals. The statistical significance of each variable, as indicated by the coefficients table, demonstrates that all variables have a significance level of less than 0.01, indicating their substantial influence on the quality of life and well-being of individuals.

According to the study cited in the text, the ecological advantages of urban green spaces (UGS) are the most significant contributing factor to the explanation of people's well-being and quality of life. According to the statistical study, the ecological advantages of UGS and the degree of quality of life are positively correlated; for every unit rise in ecological benefits, well-being increases by 0.263 units.

This finding aligns with previous research by Schebella et al. (2012) and Azagew and Worku (2020), which also indicated that ecological benefits of UGS have a significant impact on the quality of life and well-being of individuals. The presence of green spaces with ecological benefits such as biodiversity, ecosystem services, and natural beauty can enhance the overall experience of urban residents and contribute to their physical and mental health.

Additionally, the study identified UGS biodiversity and nature conservation, as well as pollution control, as important factors that affect the excellence of life and well-being of individuals. The statistical analysis showed that these independent variables have a significant impact on well-being, with coefficients of 0.169 and 0.132 respectively. The significance level of less than 0.01 for all variables indicates their substantial influence on the quality of life and well-being of individuals.

Supporting evidence from studies by Sileshi and Hailu (2020) and Shibre et al. (2021) further reinforces the idea that biodiversity and nature conservation in greeneries play a crucial role in increasing the life quality of residents and well-being of them. These studies provide additional validation for the positive impact of green spaces on physical and mental health, social cohesion, and overall urban livability.

In conclusion, the results from the study emphasize the importance of ecological benefits, biodiversity, and nature conservation in UGS for promoting life quality and well-being in municipal environments. By recognizing the significant influence of these factors and incorporating them into urban planning and management strategies, cities can make more good, healthy, and vibrant spaces for their residents.

Green Space and Stress: Evidence from Cortisol Measures in Deprived Urban Communities" by Alcock et al. (2014): This study investigated the impact of green spaces on stress levels in urban communities. The researchers found that access to green spaces was associated with lower cortisol levels, indicating reduced stress among residents living in areas with more greenery.

The Influence of Urban Green Spaces on Well-being" by Gascon et al. (2015): This study examined the relationship between UGS and well-being in urban populations. The researchers found that exposure to green spaces was positively correlated with improved mental health, physical activity levels, and overall well-being among residents.

The Benefits of Green Spaces: A Meta-Analysis of the Relationship between Green Areas and Health" by Twohig-Bennett and Jones (2018): This meta-analysis synthesized findings from multiple studies on the health benefits of green spaces. Researchers found that exposure to green areas were associated with reduced risk of various health conditions, including cardiovascular disease, obesity, and mental health disorders.

Urban Green Spaces and Health: A Review of Evidence" by Shanahan et al. (2016): This review article summarized existing research on the health benefits of urban green spaces. The authors highlighted the positive effects of green areas on physical health, mental well-being, social interactions, and community cohesion.

These studies, along with the one mentioned earlier, contribute to a growing body of evidence supporting the importance of UGS in enhancing quality of life, promoting well-being, and improving overall health outcomes in urban populations.

4.9.3. Regression Mathematical Model (Estimation of Multiple Regression equation)

Therefore, based on the result in the regression coefficient Table above and according to the above general mathematical equation, the estimated regression model of this study for QWBP is presented below.

$$QWBP = 0.1951 + 0.263 * \text{EBU} + 0.123 * \text{PC} + 0.169 * \text{UBNC}$$

4.10. Qualitative data analysis from the interview

The analysis of qualitative data from the interview offers insights into the green spaces in Addis Ababa's Lideta sub-city. There are a total of 26 green spaces in the sub-city, serving different purposes, including recreational areas. While the sub-city boasts relatively good green areas, additional work is still needed. These green areas contribute to the community in various ways, such as protecting against pollution and providing ecological benefits.

The findings of the interviews shed light on the difficulties that recreational parks in Addis Ababa's inner suburbs confront, especially with regard to a lack of funding for community amenities and landscaping. These difficulties fall into the following categories: technical, capacity building, environmental, social, economic, and physical difficulties. Social challenges include incomplete and insufficient public spaces and recreation facilities, as well as service delivery problems. Other social challenges encompass unfair distribution and inaccessibility of

recreational parks, lack of inclusivity for elderly and children, criminal activities, prohibited behaviors in the park, land use changes, low service delivery and user satisfaction, security issues, and land use incompatibility.

Urban green infrastructures in Addis Ababa's inner sub-cities face a number of difficulties, such as institutional, managerial, social, physical, economic, and environmental issues. On the other hand, there are also chances that can increase their management and growth. These chances include urban green infrastructures proclamations, standards, strategies, policies, and principles; climate resilient urban green development strategies; the 10th Development Plan of Addis Ababa; an increase in professionals; the establishment of planning commissions, river-side development, and climate change protection offices; local development plans; urban renewal and upgrading projects; and involvement of private developers and NGOs. Raising public awareness of green areas also offers a chance that may be taken advantage of in the future.

In general, Addis Ababa's green space planning and execution issues fall into one of four categories: institutional, political, social, or economic.

Institutional challenges:

Institutional challenges revolve around insufficient involvement of housing associations in planning, poor communication between organizations, and lack of coordination between different organizations.

A) Political challenges:

Political challenges include the need for long-term planning for urban forestry, avoiding politicization that could disrupt the city's long-term plans, and the challenge of reconciling tree-planting campaigns with existing master plans.

B) Lack of awareness:

Lack of awareness among society contributes to encroachment on green spaces due to rapid urbanization, with the urban population settling in peripheral areas and reducing existing green areas. The lack of awareness is exacerbated by people parking their cars in front of green spaces, causing discomfort and limiting their usability.

It is important to address these challenges and create a better understanding and appreciation for green spaces among the public, while involving relevant institutions and political leaders in effective planning, coordination, and implementation processes.

Figure 4: Picture of grren spaces at Lideta sub city

It is important to address these challenges and create a better understanding and appreciation for green spaces among the public, while involving relevant institutions and political leaders in effective planning, coordination, and implementation processes.

When we see from the above pictures there is a problem of using the places for parking of vehicle purpose this is comes from low perceptions of the residents about the usages of urban green spaces.

C) Economic challenges

The green areas of Addis Ababa are impacted by the city's economic growth in both direct and indirect ways. According to key informants, the impoverished are unlawfully encroaching into Addis Ababa's riverbank regions, and the city's people' financial circumstances make it difficult

to build river barriers. Additionally, city dwellers engage in the collection of fuelwood from the city's green spaces.

There is a pressing necessity used for extensive urban planning and implementation work, particularly in emerging urban centers and rural areas. Effective urban plans are crucial to ensure efficient and sustainable land use. Without proper planning, several issues may arise, including the disappearance of nearby agricultural land, the expansion of illegal settlements, and disruptions in ecological balance leading to environmental pollution. Delaying the preparation of urban plans until later stages of urban center development can result in the demolition of structures, leading to a wasteful use of resources.

To address these challenges, it is important to strengthen the linkages and integration between urban centers, their surrounding rural areas, and nearby urban centers. This integration will enable urban centers to achieve their development goals while safeguarding the environment and promoting sustainable land use practices.

CHAPTER FIVE

5. CONCLUSION AND RECOMMENDATIONS

5.1. Conclusion

The results showed that by preserving and controlling the environment, green infrastructures are essential for advancing sustainable development. Urban landscapes and ecosystems are disappearing as a result of the tremendous strain placed on urban green infrastructures by growing urbanization and uncontrolled urban expansion.

Several significant conclusions were drawn from the data analysis carried out in this study utilizing regression, correlation, and descriptive statistics. First, as predicted, there is a strong and positive correlation between ecological benefits and people's well-being and quality of life. The regression findings and Pearson correlation coefficient corroborated this. The dependent variable of quality of life and wellbeing also showed positive and substantial correlations and contributions from UGS Biodiversity and Nature Conservation and pollution reduction.

Collectively, the bundle of training practices including ecological benefits of UGS, pollution control, and UGS Biodiversity and Nature Conservation accounted for 67.3% of the variation in the life quality and wellbeing of the people in Lideta sub-city, as indicated by the significant F-value.

Hence, this research paper confirms the significant effect of these factors on the quality of life and wellbeing of the people to varying degrees. The proposed model was found to be adequate, and all hypotheses were strongly supported, demonstrating a positive and significant relationship between the independent and dependent variables. These results support the direct impact of the determinant variables on people's quality of life and wellbeing and are consistent with the body of current literature.

Overall, this study highlights the importance of considering ecological benefits, pollution control, and UGS Biodiversity and Nature Conservation in promoting the life quality and comfort of the people. By understanding and addressing these factors, policymakers and urban planners can work towards creating sustainable and thriving communities.

5.2. Recommendations

These results are consistent with previous research and offer proof of the direct impacts of the determinant variables on people's wellbeing and quality of life.

1. **Enhance Ecological Benefits of UGS**: Given the significant impact of ecological benefits on the life quality and welfare of the people in Lideta sub-city, it is recommended that responsible parties, including the government and the community, prioritize and invest more attention in preserving enhancing the ecological benefits of urban green areas. It can be achieved through effective management and conservation strategies.

2. **Improve Pollution Control**: Considering the positive relationship between pollution control and the life quality and wellbeing of the environment, it is essential to further enhance the existing level of pollution control. Implementing alternative approaches such as increasing the number of green areas within the city can significantly contribute to pollution reduction. Planting more trees and creating green buffers can help mitigate the negative effects of pollution.

3. **Conduct Further Investigation**: The study suggests that further research should be conducted in larger sample sizes to measure user expectations and identify additional determinant factors affecting the urban environment and wellbeing of the respective community. This would enable policymakers and planners to make informed decisions and improve existing practices to meet the needs of the community effectively.

4. **Upgrading and Adding Facilities in Recreational Parks**: It is suggested that the Addis Ababa Sub-City Parks Development Agency (AASBPDA) allocate sufficient budgets to add necessary facilities, upgrade existing ones, and ensure effective and efficient service delivery in recreational parks. This includes improving amenities such as children's playgrounds, facilities for the elderly, parking areas, water access points, sports facilities, and benches.

5. **Redesign Parks for Inclusive Access**: Parks should be redesigned to ensure equivalent access for all age groups. The government should subsidize private developers or eliminate park entry fees to make them accessible to everyone. By promoting inclusivity,

parks can cater to the needs of various segments of the community and foster a sense of community.

6. **Enhance Safety Measures**: Addressing crime challenges in recreational parks is crucial to ensuring the safety of park users. Officials responsible for park management should provide information regarding forbidden activities and maintain crime records to raise awareness and implement appropriate safety measures. This includes collaboration with local law enforcement agencies and the installation of security systems where necessary.

7. **Increase Public Awareness**: among the main issues one of the major problems is the general lack of knowledge of urban green infrastructure, such as cobblestone roads, parks, and trees along the street. It is recommended to incorporate urban green infrastructure education into the curriculum starting from high school. Additionally, promotional campaigns through various media channels like radio and television should be utilized to raise public awareness and change people's perceptions about the importance of urban green spaces.

8. **Regular Monitoring and Maintenance**: for ensuring the proper functioning and preservation of urban green infrastructures, regular monitoring and maintenance should be implemented. Government authorities should regularly inspect and assess the condition of urban green spaces, including recreational parks, to control any unauthorized changes or commercialization. Adequate measures should be taken against private developers who fail to provide the intended services.

By implementing these planning recommendations, policymakers and urban and development planners can work towards creating sustainable and vibrant communities that prioritize the life quality and wellbeing of the people while preserving and maximizing the benefits of urban green infrastructures.

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APPENDIX I: Questionnaire

Research Topic: Study on the Environmental Contributions of Urban Green Spaces in Lideta Sub-City, Addis Ababa, Ethiopia

Dear Participant,

I am a post graduate student at Addis Ababa University. Currently, I am undertaking a research on the Study on the Environmental Contributions of Urban Green Spaces in Lideta Sub-City, Addis Ababa, Ethiopia. You are one of the respondents selected to participate on this study. Please assist me in giving correct and complete information to present a representative finding on **the subject.** Your participation is entirely voluntary, and the questionnaire is completely anonymous. I confirm you that the information that you share me will be kept confidential and only used for **academic purpose**. Therefore, I kindly request you to answer the questions freely and openly to share your competence and knowledge with myself.

Thank you in advance for your kind cooperation and dedicating your time

Instructions

- No need of writing your name
- Indicate your answers with a check mark (√) in the appropriate box.

A. Gender

1. Male ☐ 2. Female ☐

B. Age

1. Below 25 ☐ 2. 25- 30 ☐ 3. 31- 35 ☐

4. 36 - 40 ☐ 5. Above 41 ☐

C. level of education

1. Illiterate ☐ 2. Grade 1-8 ☐ 3. Grade 8-12 ☐

4. Diploma ☐ 5. Bachelor Degree ☐

6. Master 7. PhD ☐ 8. Other sate here_____

D. Marital Status

1. Single ☐ 2. Married 3. Divorce ☐ 4. Widowed ☐

F. Occupation

1. Government employee ☐ 2.Merchant ☐ 3. NGO Worker ☐ 4.

Private Worker ☐ 5. Other state here_____

G. Are you aware of the benefits of the green areas?

Yes ☐ No ☐

SECTION B: QUESTIONS ON GREEN AREAS

please indicate your responses to each of the following statements. Indicate with a √ in the appropriate answer box; please rate your response as follows:

No	**Statements**	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
A	**Current status and accessibility of UGS**					
1	There are enough green spaces in my area					
2	The green spaces are in good condition my area					
3	The green spaces are well equipped in my area					
4	The green spaces in my area are suitable for children to play					
5	The green spaces are safe in my area					
6	The green spaces are attractive in my area					
7	Green spaces are important for the appearance of my area					
8	Green spaces attracted me to my area					
9	I think there are sufficient green areas in my locality					
10	I am satisfied with the current availability of green areas in the sub					

	city					
11	I think that available green areas are enough in number					
12	I evaluate the nature of green areas in my sub-city is very good					
13	Green areas are accessible to the people in the sub city					
14	I think the physical and aesthetic quality of this field is enough					
15	I think the art products and sculptures in this field are enough					
16	I think the places of entertainment (café-bar) in this field are enough					
17	I think children's playgrounds are enough and functional UGS help me to have a better quality of life					
B	**Ecological Benefits of UGS**					
1	UGS improve the climate					
2	UGS improve air quality					
3	UGS act as ecological corridors between urban, per urban and rural areas.					
4	UGS help reduce daytime higher temperature					
5	UGS control water regime and reduce runoff					
6	UGS helps to prevent water floods by absorbing excess water.					

7	The risk of flooding is lower where there are plenty of UGS to intercept and absorb storm water					
8	The vegetation cools the environment through evaporative cooling which consumes energy					
9	Parks are cooler than the urban areas that surround them					
C	**Pollution Control**					
1	UGS can reduce noise pollution					
2	UGS can absorb the noise generated by human activities					
3	UGS decrease carbon emission levels.					
4	UGS improve ambient air quality since it contributes to air pollution removal and carbon sequestration					
5	UGS can absorb different gaseous pollutants					
6	UGS reduce the level of NOx and SOx and remove large amounts of airborne pollution					
7	UGS reduces solid waste (household garbage limits etc.)					
8	UGS provides local recycling and composting centers.					
9	Green spaces provide clean air for breathing by removing pollutants and cool down the air temperature					
D	**UGS Biodiversity and Nature Conservation**					

1	UGS provide flora and fauna and diverse habitat.					
2	Green spaces provide habitat for a variety of birds, fish, animals, insects, and other organisms, while also providing corridors and greenways to link habitats.					
3	UGS prevent soil erosion and absorb rainwater, thereby improving drainage.					
4	UGS provide common bird and animal species and support biodiversity conservation					
5	UGS have good natural features such as grass, trees and flower beds.					
E	**Factors Affecting the UGS**					
1	Lack of public awareness					
2	Low level of community participation					
3	Poor implementation of government policies					
4	Lack of budget					
5	Lack of skilled human power					
6	Shortage of land in urban areas					
7	Illegal Settlement					
8	Lack of regular follow-up					
9	Problem of pollution from different Sources					

10	Lack of coordination among different stake holders					
F	**Quality of life and wellbeing of the people**					
1	UGS can improve wellbeing in a wider sense					
2	UGS have Health benefits					
3	UGS have social benefits that links people to participate in communal or group activities in urban parks					
4	UGS enhance Aesthetic value of the city					
5	UGS help to enjoy the weather and get fresh air					
6	UGS to reduce stress, relax					
7	For beautification and recreation					
8	Psychological satisfaction					
9	Carrying out different ceremony					
10	Combating climate change					
11	Create job opportunity					
12	Education					
13	UGS are beneficial to the specific health concerns affecting lower-income urban communities.					
14	Exposure to green space reduces stress and increases sense of wellness and belonging.					
15	UGS improve the urban environment and					

	life satisfaction					
16	A daily base interaction with green landscapes is needed for physical well-being and other health benefits,					
17	A weekly visit can enhance human wellbeing and mental growth,					
18	Green environment improves work performance in office and prevent mental stress effects					

THANK YOU

APPENDIX II: Publishable manuscript

ASSESSING THE CONTRIBUTIONS OF URBAN GREEN SPACES FOR ECOSYSTEM SERVICE IN LIDETA SUB-CITY, ADDIS ABABA, ETHIOPIA

Adinew Mecha

Abstract

Green infrastructures are vital for sustainable and continuous urban development, as they contribute to environmental preservation and wellbeing of human life in general for ecosystem services. However, the challenges faced by raped growth of urbanization and makes these infrastructures, leading to the degradation of urban landscapes and ecosystems. Enhancing ecological benefits, pollution control, and UGS biodiversity contributes to a higher quality of life and long-term sustainability. The objective of this study is to assess the contributions of urban green space for ecosystem service in Lideta Sub-City, Addis Ababa, Ethiopia. The researcher used both qualitative and quantitative research approaches were used in the study. The researcher determined the sample size 400 respondent from the sub city's, total population of 214,768 people, by using the Yamane's (1967) formula. In analyzing data SPSS software version 26 (Statistical System for Statistical Analysis) was used which provides descriptive and statistical analysis for analyzing quantitative data. Employing descriptive statistics, correlation, and regression analysis, the study examines variables such as ecological benefits, pollution control, and UGS biodiversity, assessing their influence on quality of life and wellbeing. The analysis reveals a positive and significant correlation between ecological benefits, pollution control, UGS biodiversity, and the overall wellbeing of individuals. The validity and sufficiency of the links between the independent and dependent variables are demonstrated by the suggested model. Further research and the implementation of inclusive and safety measures ensure the of green infrastructures. The study concludes by offering insightful information about the vital role that green infrastructures play in sustainable development as well as useful suggestions for legislators and urban planners looking to improve people's quality of life and wellbeing while successfully protecting and optimizing the advantages of urban green spaces.

Keywords: Ecological benefits, green infrastructures, pollution control, quality of life, sustainable development, wellbeing.

Introduction

The 20th century witnessed the development of major cities in many parts of the world. Rapid urbanization has affected urban microclimates that continue to this day. Gianna (2001) believes that of particular importance in the construction of the urban microclimate is the location and geometry of urban canyons.

Over the past few decades it has become more urbanized than ever before, with more than 50% of the world's population now living in cities. By 2050, the global urban population is expected to reach 6.3 billion, almost doubling the 3.5 billion in 2010. Rapid urban growth is placing greater pressure on natural resources and the environment, including land and development (Gelan, 2021).

For this reason, the urban environment in developed countries of the world has fallen below the danger level. Therefore, many people in cities and towns around the world face environmental problems in their lives. Urban green spaces have become an important part of protecting the urban environment due to their important role in providing space for many ecosystem services for human health. Despite the many benefits of urban green spaces, they are under pressure, especially in the fast-growing cities of sub-Saharan Africa. Scholars such as ecologists, economists, social scientists, and planners unanimously define urban green spaces as “public and private open spaces in cities, especially those that are covered with vegetation and can be used directly or indirectly by users” (Byrne et al., 2015).

In other words, soil is land that has most of the open, permeable, "soft" surface, such as grass, shrubs, and trees. It is an umbrella for all these fields, whether applied or public administration. It includes all parks, playgrounds and other green spaces designed for recreation, water buffers and other green spaces of history. Urban green space refers to land used by natural or man-made plants in built and planned areas. The importance of green spaces has evolved with the development of urban theory, which often includes horticultural, ecological and spatial influences.

The effect of urban green spaces has attracted great interest in many scientific and political fields, especially in the design and development of cities in the world, and the benefits it

provides to human health and protection of the environment. Many studies of larger green spaces have shown that they interact with people's physical, mental and emotional health. At the environmental and ecological level, they perform many functions such as improving air, soil and water quality, reducing noise, reducing thermal amplitude changes, preventing wind, reducing erosion processes, managing spills, improving storm infiltration and flow, reducing floods. and promoting biodiversity (Quintas, no date). However, in some parts of the world large green space is a limitation and many people live in cities, the distance to large green spaces will reduce frequency of use. Citizens in urban green spaces in dense cities can meet the needs of open spaces, but there is little research on this topic, so this study focuses on the Addis Ababa lideta sub-city.

Green spaces help reduce the thermal impact of buildings, provide shade for pedestrians and the ground, and have the potential to improve air quality and the environment. Developing urban green infrastructure planning and management requires important knowledge from LULCC research (Konijnendijk et al., 2013). Previous studies have shown that urban environmental studies do not consider GIs (Standish, Hobbs, & Miller, 2013). However, urban green infrastructure allows city dwellers to experience the outdoors both visually and dynamically. Green space in an urban area is important as it seeks to provide the best experience for the city dwellers and overcomes the negative effects of urban life on the built environment. (Gashu and Gebre-Egziabher, 2018).

Urban green spaces in and around densely populated neighborhoods can provide many local benefits and play an important role in improving urban life. By providing a variety of goods and services, urban green resources can help provide health, reduce urban air pollution, protect biodiversity and contribute to public health.

These benefits include reducing air pollution and noise, improving the microclimate, and improving visibility. Green spaces can also provide habitat for wildlife, control erosion, and protect urban water supplies for municipal water supplies.

Open spaces are one of the habitable conditions essential for human growth, and as a result, it is essential to define the forms, dimensions and geographical distribution of these environments, which, according to Faria (2009), have direct implications for individuals, society and nature.

• The implications for individuals are associated with biological and physiological needs, such as the importance of receiving solar energy, clean air, and refreshing wind, among others. Open

spaces are directly associated with the daily lives of individuals and they serve as places of contact with the elements of nature.

• The social implications involve the dynamics of the reproduction of social relations and society; most of the time, these spaces are the scenes of family gatherings, meeting friends, etc.

Objective of the Study

The objective of this study is to assess the environmental contributions of urban green space in Lideta Sub-City, Addis Ababa, Ethiopia, and propose viable strategies to address the environmental challenges it faces.

Literature Review

Relevance of urban green spaces

As the world experiences rapid development and climate change, access to nature is decreasing, resulting in environmental hazards such as hot and cold weather, urban climate (CSR) impacts, heat waves, snow and floods. Governments around the world are looking for effective strategies to reduce these environmental problems. An important measure to solve these problems is the use of urban green areas (UGS). Forests, parks, plants, meadows and public gardens are considered important to the health and well-being of the environment as they provide many opportunities in terms of UGS, quality, financial and environmental aspects. Benefits include:

- Increase habitat and biodiversity,
- Reduce urban heat loss through shading and evaporation,
- Reduce hot and cold temperatures,
- Reduce noise,
- Provide carbon monoxide, br
- Control or reduce floods,
- Increase village resilience and promote sustainable lifestyles,
- Improve physical and mental health,
- Promote social cohesion and integration by providing a place for residents to gather together,
- Reduce spending on public works,
- Create better opportunities for business recovery and savings on healthcare expenses, as well as providing health, environmental and social benefits that play an important role.

Depending on its spatial location, composition and configuration. (Woldesemayat and Ceneviz, 2021)

Sadeghian and Vardanyan (2013), Georgi and Dimitriou (2010) and Rakhshandehroo et al. (2017) demonstrated their role in the environment and health benefits. In some countries, urban green spaces are thought to be an environment that helps reduce stress and improve mood. Research results show that urban green infrastructure lands in Addis Ababa experienced rapid change and destruction from 2003 to 2016. Existing urban green infrastructure (such as recreational facilities) is inadequate and inaccessible to most urban residents (Azagew & Worku, 2020)

Urban green infrastructure plays an important role in any plan and can be linked to urban or local water management plans. Now, at a time when land is valuable and the city has its greatest challenges, the importance of green space cannot be denied and the aim should be to ensure the multifunctionality of the area. One change that is ongoing but still needs to be implemented is to increase green construction in spatial planning and see it as part of the wider urban area (Molla, 2015).

Ecosystem Service of Green Spaces

Parks and other green spaces play an important role in making people's lives sustainable. The main reason for this is the various benefits provided by nature, including ecosystem services. Parks and green spaces are important elements of human adaptation that need to be planned carefully as they provide opportunities to create sustainable and supportive environments. Therefore, ecosystem services are the benefits that people receive directly or indirectly through ecosystem activities (Cilliers, 2015). The variety of benefits that urban green spaces provide to city residents, including environmental, social, and economic benefits, are often referred to as "ecosystem services." According to the Annual Ecosystem Assessment, ecosystem services are divided into four categories: (Jastra, 2014) Providing green space (including food and water) protects streams, rivers and water resources, supports biodiversity, wetlands, fish and wildlife habitat, and improves the environmental, social and overall health and quality of life of citizens improves (Kasai, 2016).

- Management (e.g. temperature, precipitation regulation) by controlling air quality or providing services for flood and disease control. Examples include wastewater treatment, erosion control, and local climate control. (Cilliers, 2015)

- **cultural (e.g. recreation)** The main role of urban green spaces is to provide open spaces for recreational, social and ecological purposes; they are also important for the natural environment, biodiversity and air quality (https://www.sciencedirect.com/science/article/ pii/ S0169204611001587)
- Habitat or support (e.g. land formation). Ecosystems provide habitat for plants and animals and can support different populations of plants and animals. (Cilliers, 2015)

Environmental values

Urban green spaces fulfill many functions in the urban environment and help improve people's quality of life. Therefore, there is a general consensus on the importance and value of urban green spaces for the planning and construction of sustainable cities or ecological cities in the 21st century. Especially in developing countries, increasing traffic and urbanization not only harm the environment but also increase health and labor costs (Haq, 2011).

Pollution controlling benefits

Urban pollution refers to pollution such as chemicals, small particles and biological substances in solid, liquid or gaseous form. Wind and noise are common in the city. There are many cars in the city, which cause noise and pollution such as carbon dioxide, carbon monoxide. Sulfur dioxide and nitrogen oxide emissions from factories are very toxic to humans and the environment. Children, the elderly and people with respiratory problems are often affected by these pollutants. When dust clouds are associated with plants, urban planting can reduce pollution. Research shows that an average of 85% of pollutants in parks can be filtered (Bolund and Sven, 1999). Noise from traffic and other sources can cause stress and health problems for city residents. Urban green spaces in crowded cities can reduce noise in terms of quantity, quality and proximity to noise. Air pollution is considered a major urban problem and a significant contributor to the global burden. For example, particulate matter (PM) is often associated with death and disease in cities. Population of the city. Kavanagh et al. (2009) highlighted the unique role of urban trees in reducing air pollution, citing their role in influencing air quality and absorbing various pollutants. Trees also cool air through transpiration, which affects ozone photochemistry and reduces ozone production. Parks that often have a lot of tree cover also have features such as stunted trees, which cause problems as pollution levels in the forest are often higher (Rakhshandehroo, Mohd Yusof, Arabi et al., 2017).

Biodiversity and Nature Conservation

Green spaces are protected areas for raising and raising animals and managing soil and water quality. Urban green spaces provide a connection between urban and rural areas. They provide perspective, seasonal change, and connection to the natural world (Haq, 2011). Green business networks are important for the management of urban conditions and include the cultivation and use of plants suitable for local conditions, as well as a limited visual inspection that is itself sufficient and stable (Rakhshandehroo, Mohd Yusof, Parva, et al., 2017).

Cooling effect of greenspace

In addition to actually cooling the area, urban green spaces can also have an impact on the environment. This phenomenon is called cooling of urban green spaces. The most important issues related to cooling urban green spaces are density and cooling, which play an important role in urban heating and urban planning. The air temperature is compared to a control point outside the specific area. It is generally accepted that the area affected by green space is equal to the width of the green space (Aram et al. 2019). Air conditioning costs are influenced by the size, structure and design of green spaces, the design and structure of the urban environment, and weather conditions. However, it is unclear how cooling rates vary with distance from green space and how they change over time. After identifying green spaces for urban cooling, it was concluded that in order for future research on urban green space planning to be effective, it was necessary to explore the role of prioritizing the distance between green spaces and the abundance and distribution of green spaces.

Conceptual Framework

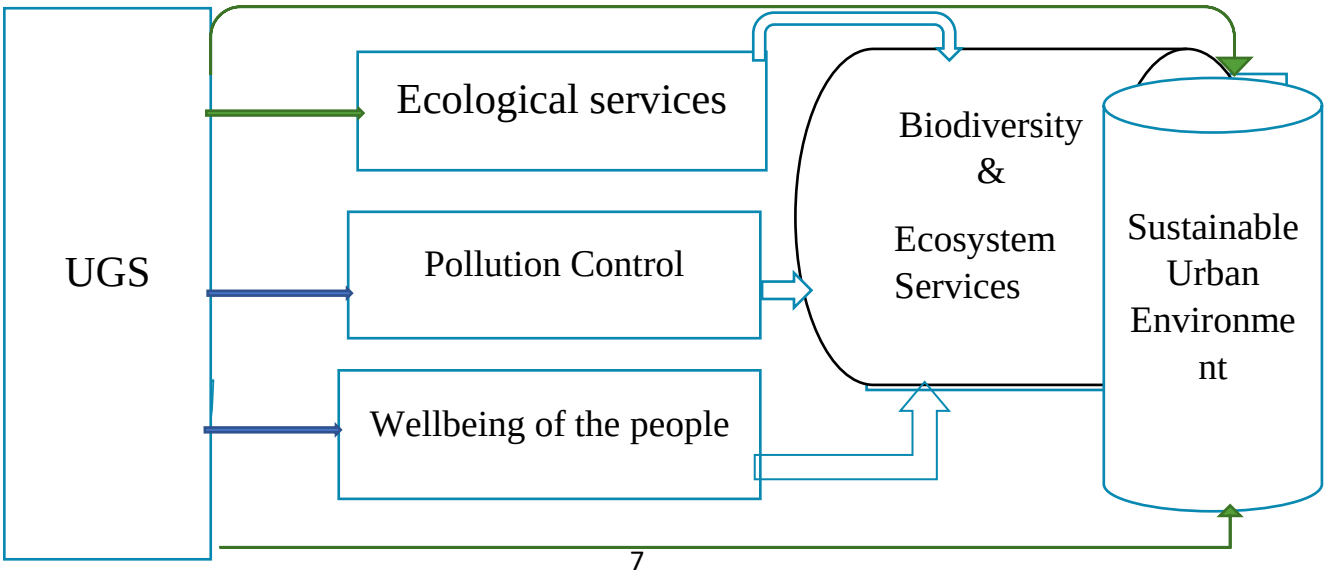

Fig 1: Conceptual Framework

Source: Own Author Compilation (2025)

Methodology

Description of the study area

This study was conducted in the sub-city of Lideta, a sub-city of Addis Ababa, the capital city of Ethiopia. Addis Ababa is of social, economic and political importance as the center of the country. Geographically, Addis Ababa is located in the heart of Ethiopia at latitude 8°55' to 9°5' and longitude 38°40' to 38°50'. Its history dates back to 1887, when there were several huts and scattered huts. Over time, the city underwent an expansion covering an area of about 530 square kilometers. Its altitude is 2,400 meters and the annual average temperature is 16°C.

Research Approach and Design

In this study, both descriptive and explanatory research designs were used. Explanatory research is more concerned with understanding, explaining, predicting and managing the relationships between variables. Descriptive research is appropriate when the question is clearly formulated, but the purpose is not to examine the relationship between cause and effect. In addition, descriptive research includes behavioral assessments, hypotheses, demographic data, events and methods (Creswell, 2012). Therefore, this study is explained and explained because it is suitable for the purpose of this study. It includes collecting and interpreting information from participants and understanding the contribution of IGS and its impact on human health.

The study employed combined qualitative and quantitative studies. The purpose of quantitative research is to use mathematical models for measurement to make an important link between the empirical analysis of the relationship between objects, diversity and freedom and its mathematical expression. Quantitative research is about objectively evaluating research questions, seeking out factual information, and building relationships using statistical tools. As explained by Creswell (2014), many studies involve testing the objective hypothesis by examining the link between variables, which are measurable and usually written tools, and analyzing phone data using statistical methods. Qualitative research, on the other hand, provides a "subjective" analysis of the research question by taking thoughts, feelings, thoughts, or

scientific views. Unlike quantitative research, qualitative research focuses on discovering and understanding experiences and interpretations. Depending on the nature of the research, both qualitative and quantitative methods are used to provide a comprehensive and balanced analysis. The research aims to gain a broader view and a deeper understanding of the research topic, using two methods, including both the words objective assessment and subjective assessment. This approach enables a more comprehensive analysis of the problem and increases the validity and reliability of research findings.

Population of the Study

The target population for this study comprises the residents of Lideta sub-city, which consists of a total of 10 woredas (districts). To ensure representative information, the study included all of the woredas within the sub-city. Based on data obtained from the Addis Ababa Mayor's Office, the estimated population of Lideta sub-city in 2022 is 214,768.

Sample Size determination and Sampling Techniques

The researcher determined the sample size from the sub city, which has a total population of 214,768 people, according to the formula developed by Yamane (1967). The formula is as follows:

$n= N/(1+N(e)^2)$

Where:

N=Size of population

n=sample size

e=level of statistical significance (0.05 or 5%)

Substituting the values, the calculation becomes:

n = 214,768 / (1 + 214,768(0.05))^2

= 399.25, approximately 400 respondents

Thus, using this formula at a 95% confidence level and a 5% level of statistical significance, the sample size is determined to be 400.

To ensure fair representation of all woredas within the sub-city, the researcher employed the proportionate stratified sampling technique. This technique is chosen to give equal opportunities for all woredas to be included in the sample. By implementing this sampling approach, the researcher aims to capture a comprehensive understanding of the sub-city by considering the unique characteristics and perspectives of each woreda.

Data sources and Type

This research primarily utilized primary data sources, which involved collecting data directly from the respondents. The primary data collection methods employed were questionnaires and interviews.

The questionnaire consists of two parts. The first part focused on collecting participants' demographic information such as gender, age, marital status, and education. The second part of the survey includes a 5-point Likert scale that allows participants to express their feelings and thoughts regarding the research topic. A survey was created and distributed to all 400 green space users. Accordingly, 381 surveys were completed appropriately and the response rate was 95.25%. In total, responses from 381 participants were processed and used for analysis.

By utilizing these primary data collection methods, the research aimed to gather firsthand information directly from the target population and key stakeholders, ensuring a comprehensive understanding of the research topic.

Method of Data Analysis

Qualitative data from key questions and images were analyzed by combining short descriptions, narratives, and narratives. In this process, researchers gain important insights and observations by better understanding and interpreting the data obtained. SPSS software version 26 (Statistical System for Statistical Analysis) provides descriptive and statistical analysis to analyze quantitative data from research. Statistics such as frequency distributions, percentages, means, and standard deviations are used to collect and describe data. Inferential statistics, such as correlation and regression analysis, are used to analyze relationships and make inferences about data. Explanations and statistics are supported by graphical representations and diagrams to improve the clarity and visual presentation of the data. These visual aids help you find better information and better understand patterns and trends. The research combines qualitative and

quantitative observations to analyze and harmonize collected data for deeper scientific understanding.

Econometric Analysis

In this study, a multiple linear regression model was used to investigate the relationship between urban green space (UGS) and human health. Regression analysis is a technique used to determine the relationship between two or more variables (Kothari, 2004). This helps us understand how well the independent variables explain the variance in the variables. According to Kothari (2004), simple linear regression is performed to estimate the relationship between a dependent variable (denoted by Y) and an explanatory variable (denoted by x), using data from a given population that varies in time when analyzed. The variance of a set of independent variables (x) can be found using the equation Yi = β0 β1xi ei. Here β0 represents the intercept and β1 represents the downward direction. Simple linear regression evaluates the relationship between y and x.

In the case of multiple linear regression, there are p explanatory variables and the relationship between the dependent variable and the explanatory variable is represented by the following equation:

$$Yi = \beta0 + \beta1X1i + \beta2X2i + \beta3X3i + ... + \betapXpi + ei$$

Here β0 is a constant and β1 through βp are the coefficients associated with p that describe the variance of the variable of interest. Multiple horizontal lines extend the concept of repeated lines by taking into account multiple descriptions, while simple horizontal lines can be considered a special feature of multiple horizontal lines with p = 1. The term "linear" is used because many linear regression models assume that y is directly related to the combination of variables. Multiple linear regression analysis is based on a set of p explanatory variables (x1, x2, ..., xp). Therefore, this study uses multiple regression analysis to test the independent variables and the relationship between variables to investigate the impact of UGS on human happiness.

Result and Discussion

Correlation Analysis

Correlation analysis was used to evaluate and confirm the relationship between dependent and independent variables. The strength of the relationship between these variables was assessed using the Pearson product moment correlation coefficient as a statistical test. The coefficient

ranges from -1.00 to 1.00, and the sign (or -) indicates a positive relationship. A positive correlation indicates a direct relationship between variables, while a negative correlation indicates a negative relationship (Ruud et al., 2012). The table below details the strength of relationships between variables categorized as negligible, low, moderate, important or very strong.

Table 0-1: Correlation Analysis between Independent variables and Dependent Variable

Correlations					
		Ecological Benefits of UGS	**Pollution Control**	**UGS Biodiversity and Nature Conservation**	**Quality of life and wellbeing of the people**
Ecological Benefits of UGS	Pearson Correlation	1	.795**	.684**	.758**
	Sig. (2-tailed)		.000	.000	.000
	N	381	381	381	381
Pollution Control	Pearson Correlation	.795**	1	.700**	.737**
	Sig. (2-tailed)	.000		.000	.000
	N	381	381	381	381
UGS Biodiversity and Nature Conservation	Pearson Correlation	.684**	.700**	1	.726**
	Sig. (2-tailed)	.000	.000		.000
	N	381	381	381	381
Quality of life and wellbeing of the people	Pearson Correlation	.758**	.737**	.726**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	381	381	381	381
**. Correlation is significant at the 0.01 level (2-tailed).					

Correlation Analysis between Ecological Benefits of UGS and Quality of life and wellbeing of the people

As can be seen from the table above, the ecological value of UGS ($r = 0.758$, $p<0.01$) has a positive correlation with the quality of life and health of the people of Lideta sb City. This means that there is a moderate and statistical relationship between the ecological benefits of UGS and the health of people in Ledeta Vice City. Changes in ecological values can also lead to changes in human health.

The studies provide evidence of the ecological benefits of Urban Green Spaces (UGS) as discussed. Richard, Mitchell & Popham (2007) found that access to green spaces in urban areas is associated with improved mental health and well-being. People living closer to UGS tend to have lower levels of stress, anxiety, and depression. Sugiyama et al. (2008) conducted a study that showed that exposure to green spaces is linked to increased physical activity levels among residents. UGS provides opportunities for recreational activities such as walking, jogging, and cycling, which can promote a healthier lifestyle. Maas et al. (2009) explored the impact of green spaces on overall health and found that living near UGS is associated with lower rates of chronic diseases such as cardiovascular disease and diabetes. Access to green spaces encourages physical activity and social interactions, which are beneficial for health. Hunter et al. (2015) investigated the role of UGS in improving air quality and reducing pollution in urban areas. Green spaces act as natural filters, absorbing pollutants and particulate matter from the air, thereby contributing to cleaner and healthier air quality.

The review by Martin Ely and Sheryn Pitman (2013) on the benefits of green infrastructure for the Botanic Gardens of Adelaide and the Department of Environment, Water, and Natural Resources in South Australia likely highlights the importance of UGS in providing ecological benefits such as biodiversity support, climate regulation, and stormwater management. These findings underscore the significance of UGS in promoting environmental sustainability and human well-being in urban settings. Ecosystem services are crucial for human well-being, as they encompass the benefits derived from ecosystem functions that support and enhance our quality of life (Costanza et al., 1997). Bolund and Hunhammar (1999) identified six major categories of ecosystem services that are particularly relevant in urban areas, including air filtering, microclimate regulation, noise reduction, rainwater drainage, sewage treatment, and recreational/cultural values. Additionally, food production and erosion control are also potentially important in urban settings. In Australian cities, two key ecosystem services provided by urban green spaces are cooling and air quality improvement. Green spaces help mitigate the urban heat island effect by providing shade and cooling effects, while also acting as natural filters that absorb pollutants and enhance air quality.

Correlation Analysis between pollution control and quality of life and wellbeing of people

As can be seen from the table above, good pollution control is associated with quality of life and happiness in life ($r = 0.737$, $p<0.01$) and there is a statistically significant effect. This means that strengthening pollution control will improve people's lives and health.

Pollution control is a critical aspect of maintaining a sustainable and healthy urban environment, and green spaces play a significant role in mitigating air pollution. Ecosystem services provided by urban green spaces, such as cooling and air pollution reduction, are essential for improving air quality and human well-being. Bolund and Hunhammar (1999) highlighted the importance of these ecosystem services in urban areas, emphasizing the role of green spaces in filtering pollutants and enhancing air quality. Additionally, research by Zupancic et al. (2015) further supports the positive impact of green spaces on reducing air pollution and cooling urban environments. By acting as natural filters that absorb pollutants and providing cooling effects, green spaces help alleviate the negative effects of air pollution and contribute to creating a healthier and more sustainable urban environment. Therefore, promoting and preserving green spaces in cities is crucial for pollution control and enhancing the quality of life for urban residents.

Correlation Analysis between UGS biodiversity and nature conservation and quality of life and wellbeing of people

As can be seen from the table above, UGS biodiversity and nature conservation has a positive relationship with quality of life and happiness ($r = 0.726$, $p<0.01$), this relationship is positive, moderate and significant. This means that increasing biodiversity and protecting nature in UGS will improve people's lives and health.

Recent research has delved into the multifaceted effects of urban green spaces on urban environments and the various inhabitants within them. One significant aspect that has garnered attention is the role of urban green spaces in maintaining biodiversity and conserving native species. Studies by Sadler et al. (2010) have highlighted the importance of urban green spaces in supporting species richness and providing vital habitats for native flora and fauna. Kendal et al. (2012) found that urban green spaces can exhibit higher species richness compared to native vegetation outside cities, emphasizing their role in biodiversity conservation.

Furthermore, urban areas have been identified as crucial habitats for certain native species like flying foxes (Williams et al., 2006) and can also serve as important refuges for threatened species (Ives et al., 2016). Nielsen et al. (2014) noted that parks harbor a high diversity of plants and animals, including exotic species, while residential gardens contribute significantly to plant species diversity (Smith et al., 2006). In Australia, residential gardens have been found to have higher levels of species diversity than native vegetation (Kendal et al., 2012).

The presence of green spaces in urban environments not only supports biodiversity but also plays a vital role in sustaining various animal populations within cities. While some species, like the Peregrine falcon, can adapt to the built environment as habitat (Chace and Walsh, 2006), many others heavily rely on green spaces for survival in urban settings. Sadler et al. (2010) emphasized the importance of local habitat structure in supporting diverse taxonomic groups, noting that increased resource availability and reduced predation in urban green spaces can lead to higher population densities of certain animal species compared to their counterparts outside cities (Shochat et al., 2006; Williams et al., 2006). Overall, the research underscores the critical role of urban green spaces in fostering biodiversity and providing essential habitats for native species within urban environments.

Multiple Linear Regression Analysis

Table 0-2: Multiple Linear Regression Model Summary

Model	R	R Square	Adjusted R Square	Durbin-Watson		
				df1	df2	Sig. F Change
1	.820[a]	.673	.670	3	377	.000

As shown in the table above, the total product of three independent variables, including ecological benefits, pollution control, UGS biodiversity and nature conservation, explains 67.3% of the difference between people's life and health (R2 = 0.673 per.). This shows that 45.4% of the quality of life and health of urban residents clearly depends on independent variables, while the remaining 32.70% is determined by other factors.

Table 0-3:Anova

ANOVA[a]						
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	38.505	3	12.835	258.148	.000[b]
	Residual	18.744	377	.050		
	Total	57.250	380			
a. Dependent Variable: Quality of life and wellbeing of the people						
b. Predictors: (Constant), UGS Biodiversity and Nature Conservation, Ecological Benefits of UGS, Pollution Control						

As shown in the table above, the result is F=258.148, greater than 1, P<0.01, it can be concluded that the product combination has an impact on people's lives and health and is very important. Therefore, all values are closely interrelated and have an impact on people's lives and health.

Table 0-4: Multiple regression coefficients

Coefficients[a]								
Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	1.951	.090		21.574	.000		
	Ecological Benefits of UGS	.263	.038	.356	7.009	.000	.337	2.969
	Pollution Control	.132	.030	.229	4.406	.000	.323	3.099
	UGS Biodiversity and Nature Conservation	.169	.023	.323	7.479	.000	.466	2.145
a. Dependent Variable: Quality of life and wellbeing of the people								

The above table allows for a straightforward comparison of the relative contributions of different variables by examining the beta values in the unstandardized coefficients. The beta value indicates the strength of each variable's contribution. In this regard, the Ecological benefits of Urban Green Spaces (UGS) (Beta = 0.263, P = 0.000) stands out as the most influential factor in explaining the dependent variable. The findings demonstrate that a positive change or a one-unit increase in "Ecological benefits of UGS" leads to a 0.263-unit increase in the level of

quality of life and well-being experienced by individuals. Following closely is UGS Biodiversity and Nature Conservation (B = 0.169, P = 0.000), and pollution control (B = 0.132, P = 0.000). These independent variables also exert a significant impact on the quality of life and well-being of individuals. The statistical significance of each variable, as indicated by the coefficients table, demonstrates that all variables have a significance level of less than 0.01, indicating their substantial influence on the quality of life and well-being of individuals.

The study highlighted in the provided text emphasizes the importance of ecological benefits of Urban Green Spaces (UGS) as the most influential factor in explaining the quality of life and well-being experienced by individuals. The statistical analysis revealed a positive relationship between the ecological benefits of UGS and the level of quality of life, with a one-unit increase in ecological benefits leading to a 0.263-unit increase in well-being.

This finding aligns with previous research by Schebella et al. (2012) and Azagew and Worku (2020), which also indicated that ecological benefits of UGS have a significant impact on the quality of life and well-being of individuals. The presence of green spaces with ecological benefits such as biodiversity, ecosystem services, and natural beauty can enhance the overall experience of urban residents and contribute to their physical and mental health.

Additionally, the study identified UGS biodiversity and nature conservation, as well as pollution control, as important factors that influence the quality of life and well-being of individuals. The statistical analysis showed that these independent variables have a significant impact on well-being, with coefficients of 0.169 and 0.132 respectively. The significance level of less than 0.01 for all variables indicates their substantial influence on the quality of life and well-being of individuals.

Supporting evidence from studies by Sileshi and Hailu (2020) and Shibre et al. (2021) further reinforces the idea that biodiversity and nature conservation in UGS play a crucial role in enhancing the quality of life and well-being of urban residents. These studies provide additional validation for the positive impact of green spaces on physical and mental health, social cohesion, and overall urban livability.

In conclusion, the findings from the study underscore the importance of ecological benefits, biodiversity, and nature conservation in UGS for promoting quality of life and well-being in

urban environments. By recognizing the significant influence of these factors and incorporating them into urban planning and management strategies, cities can create more sustainable, healthy, and vibrant spaces for their residents.

Green Space and Stress: Evidence from Cortisol Measures in Deprived Urban Communities" by Alcock et al. (2014): This study investigated the impact of green spaces on stress levels in urban communities. The researchers found that access to green spaces was associated with lower cortisol levels, indicating reduced stress among residents living in areas with more greenery.

2. The Influence of Urban Green Spaces on Well-being" by Gascon et al. (2015): This study examined the relationship between UGS and well-being in urban populations. The researchers found that exposure to green spaces were positively correlated with improved mental health, physical activity levels, and overall well-being among residents.

3. The Benefits of Green Spaces: A Meta-Analysis of the Relationship between Green Areas and Health by Twohig-Bennett and Jones (2018): This meta-analysis synthesized findings from multiple studies on the health benefits of green spaces. The researchers found that exposure to green areas were associated with reduced risk of various health conditions, including cardiovascular disease, obesity, and mental health disorders.

4. Urban Green Spaces and Health: A Review of Evidence by Shanahan et al. (2016): This review article summarized existing research on the health benefits of urban green spaces. The authors highlighted the positive effects of green areas on physical health, mental well-being, social interactions, and community cohesion.

These studies, along with the one mentioned earlier, contribute to a growing body of evidence supporting the importance of UGS in enhancing quality of life, promoting well-being, and improving overall health outcomes in urban populations.

Regression Mathematical Model (Estimation of Multiple Regression equation)

The equation of this research generally depends on two sets of variables; these are the differences between people (people's quality of life and health) and the free exchange of changes. The main purpose of using numerical equations in this research is to enable the researcher to explain, understand, predict and control changes more effectively.

QWBP= F (EBU, PC, UBNC,)

Where

QWBP……. Quality of life and wellbeing of the people

EBU …… ecological benefits of UGS

PC…… Pollution control

UBNC…… UGS Biodiversity and Nature Conservation

$QWBP= \beta_1+ \beta_2*EBU+ \beta_3 *PC+ \beta_4*UBNC$

Mathematically, $Yi = \beta1 + \beta2X2 + \beta3 X3$

Among them, Y is a variable - people's quality of life and health; X1 is the average value of Y when the independent variable is set to zero. β2, β3 and β4 represent the coefficients of the independent variables and measure the change in Y value when the independent variable changes by 1 unit.

Therefore, based on the result in the regression coefficient Table above and according to the above general mathematical equation, the estimated regression model of this study for QWBP is presented below.

$$\mathrm{QWBP} = 0.1951 + 0.263 * \mathrm{EBU} + 0.123 * \mathrm{PC} + 0.169 * \mathrm{UBNC}$$

Conclusion

The research results show that green infrastructure plays an important role in supporting sustainable development through environmental management and control. However, rapid urbanization and unplanned urban development put urban greenery under pressure, leading to the loss of urban landscapes and ecosystems.

The data analysis conducted in this study using descriptive statistics, correlation, and regression revealed several important findings. Firstly, there is a positive and significant relationship between ecological benefits and the quality of life and wellbeing of the people, as hypothesized. This was supported by the Pearson correlation coefficient and regression results. Similarly, pollution control and UGS Biodiversity and Nature Conservation also showed positive and significant relationships and contributions to the dependent variable of quality of life and wellbeing.

Collectively, the bundle of training practices including ecological benefits of UGS, pollution control, and UGS Biodiversity and Nature Conservation accounted for 67.3% of the variation in the quality of life and wellbeing of the people in Lideta sub-city, as indicated by the significant F-value.

Hence, this study confirms the significant impact of these factors on the quality of life and wellbeing of the people to varying degrees. The proposed model was found to be adequate, and all hypotheses were strongly supported, demonstrating a positive and significant relationship between the independent and dependent variables. These findings align with the existing literature and provide evidence for the direct effects of the determinant factors on the quality of life and wellbeing of the people.

Overall, this study highlights the importance of considering ecological benefits, pollution control, and UGS Biodiversity and Nature Conservation in promoting the quality of life and wellbeing of the people. By understanding and addressing these factors, policymakers and urban planners can work towards creating sustainable and thriving communities.

Recommendation

Based on the conclusions drawn from the study, the following planning recommendations are forwarded:

1. **Enhance Ecological Benefits of UGS**: Given the significant impact of ecological benefits on the quality of life and wellbeing of the people in Lideta sub-city, it is recommended that responsible parties, including the government and the community, prioritize and invest more attention in preserving and maximizing the ecological benefits of urban green spaces. This can be achieved through effective management and conservation strategies.
2. **Improve Pollution Control**: Considering the positive relationship between pollution control and the quality of life and wellbeing of the people, it is essential to further enhance the existing level of pollution control. Implementing alternative approaches such as increasing the number of green areas within the city can significantly contribute to pollution reduction. Planting more trees and creating green buffers can help mitigate the negative effects of pollution.
3. **Conduct Further Investigation**: The study suggests that further research should be conducted in larger sample sizes to measure user expectations and identify additional determinant factors affecting the quality of life and wellbeing of the people. This would

enable policymakers and planners to make informed decisions and improve existing practices to meet the needs of the community effectively.

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