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"Examining the Attitude and Perception of Stakeholders on Sustainable Urban Green Infrastructure Development in Addis Ababa."

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Examining Attitude and Perception of Stakeholders on Sustainable Urban Green Infrastructure Development in Addis Ababa

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DECLARATION

I, Manaye Mageso hereby declare that I am the sole author of this thesis entitled "***Examining attitude and perception of stakeholders on sustainable urban green infrastructure development in Addis Ababa"*** is the product of my original research work. To the best of my knowledge this thesis contains no material previously published by any other person except where due acknowledgement has been made. This thesis contains no material which has been accepted as part of the requirements of any other academic degree or non-degree program. I solemnly declare that the information in this resume is true to the best of my knowledge and believe. The research procedures do imitate the expected standards and regulations of Addis Ababa University.

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EXAMINING ATTITUDE AND PERCEPTION OF STAKEHOLDERS ON SUSTAINABLE URBAN GREEN INFRASTRUCTURE DEVELOPMENT IN ADDIS ABABA

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LIST OF ACRONYMS/ABBREVIATIONS

AACUBGDB	Addis Ababa City Urban Beautification and Green Development Bureau
ANOVA	Analysis Of Variance
ASDEPO	Action for Social Development and Environmental Protection organ
CAP	Concept, Attitude and Perception
ECRC	Environment and Climate Research Center
EIA	Environmental Impact Assessment
ES	Ecosystems Services
FFE	Forum for Environment
GI	Green Infrastructure
HNCT	Human Nature Connection Theory
GIS	Geographic Information System
IBM	International Business Machine
NDVI	Normalized Difference Vegetation Index
SEA	Social Environmental Assessment
SPSS	Statistical Package for Social Science
SUDS	Sustainable Urban Drainage Systems
UGI	Urban Green Infrastructure
UP	Urban Parks
UN	united nations
URT	Urban Resilience Theory
USEPA	United States Environmental Protection Authority

ABSTRACT

Urban green infrastructure development is a strategic approach that requires the harmonious concept, attitude and perception of stakeholders to footprint sustainability. However, the urban green infrastructure (UGI) faces challenges in implementation either knowingly or unknowingly. This study aimed to examine the concept, attitude and perception of stakeholders towards sustainable urban green infrastructure development in Addis Ababa. Pertinent data gathered using survey questionnaire from 121 respondents were processed through SPSS version 29 and analyzed with the help of descriptive statistics. Moreover, qualitative data collected from 26 key informant interviews were analyzed using thematic analysis. The results reveal that respondents stimulate principles of UGI and perceive the existence and benefits with low level incorporation in current practices. The current urban planning process failed to consider stakeholder perspectives when developing or expanding urban green infrastructure projects. Furthermore, most of the stakeholders have positive attitude towards UGI Multi-functionalities of UGI especially green accessibility is incorporated in low level in current practices. The study also found that the major challenges associated with UGI are limited public education about the benefits of urban green infrastructure followed by lack of funding/resources, technical difficulties in implementation, lack of political will/support for such initiatives and resistance from local communities or stakeholders in the implementation. To curb these problems, research recommends respective authorities or responsible organs to advance the information/communication to the public regarding the main principles to increase the concept/ knowledge of urban green infrastructure to enhance from stimulation level to determination and internalization.

Keywords: - attitude, ecosystem services, perception, principles, urban green infrastructure

CHAPTER ONE

INTRODUCTION

1.1 Background

Urban Green Infrastructure (UGI) development is a strategic approach to develop interconnected and multifunctional networks of blue and green spaces that potentially provide a wide range of environmental, social and economic benefits and simultaneously enhance the climate resilience of cities. Green infrastructure (GI) is increasingly acknowledged as fundamental for the adaptation of cities to climate change (Ramyar, Ackerman, & Johnston, 2021). The study of green infrastructure is based on concept development and evolution and focuses on the research trends of a certain branch of green infrastructure or certain region. Its elements include a variety of green spaces such as parks, open spaces, playing fields, pocket spaces, small incidental green space and neighborhood gardens that are linked by tree-lined streets and waterways, around and between urban areas (Said &Mansor, 2011).

Green infrastructure is a crucial node in the exploration of "harmonious coexistence between human and nature," and its formation has experienced lengthy concept preparation and accumulation (Benedict & McMahon, 2002). UGI design, provision, maintenance, conservation and restoration are being more recognized as critical components of any holistic and realistic strategy for urban sustainability (Rusche, K.; Reimer, M.; Stichmann, R., 2019).Urban green spaces in Addis Ababa include public and private green areas or belts which include urban forest, urban agriculture, gardens, squares, roadside and road median tree plantation, trees and gardens within individual households, shade trees, windbreaks and shelterbelts, churchyards and buffer zones (to provide separation between conflicting land uses or to protect vulnerable areas), natural reserves (protected areas), etc (Addis Ababa Urban Age Task Force, 2022).Currently, data indicate that of the total area of Addis Ababa (52,292 Area/ha), urban green area covers 16262.8Area/ha. More specifically, urban forest accounted for 19.7% followed by river and river buffer green (7.7%), urban agriculture (1.9%), and urban parks (1.8%) (Azagew.S & Worku.H., 2020).

MacKay (1994) states, "Just as we carefully plan the infrastructure our communities need to support the people who live there the roads, water and electricity so must we begin to plan and manage Florida's green infrastructure. Shang Dynasty (1600–1046 BC), were designed to allow native plant species to thrive in their natural conditions and appear untouched by humans. This created ecological havens within the city. In 2009, the burst word "sustainabil-

ity" appeared, and the study mainly explored sustainable development. In 2010, the burst words "urban area," "storm water management" and "ecological network" appeared. In 2011, the burst words "energy" and "urban ecosystem" occurred. The research is in the stage of "explosive exploration." A series of problems brought by rapid urbanization has become the bottleneck of urban sustainable development (Votinovet al., 2020), and the "sustainable development concept" contained in green infrastructure has been widely recognized. In 2009, the theme of the International Federation of Landscape Architects (IFLA) was "Green Infrastructure."

In the transitional stage (2013-2014), the research on green infrastructure was continuously developed and deepened. For example, the concept of green infrastructure has attracted continuous attention in the field of "landscape architecture" and reflected in "park" design. Meanwhile, substantial focus was attached to "water quality."Keywords in this (2015–2019) stage included "urban green infrastructure," "restoration," and "green roof." In 2015, the 6th International Conference on Restoration Ecology was held in Manchester, with the theme "Improving the Rapid Restoration Ability of Ecosystem: Restoring Cities, Villages and Countryside (Peng&Wu, 2015)." Roof greening and green building became emerging hot spots.

It can be seen from the evolution of the research that the practice of green infrastructure has been widely applied in three scales: site, city and region. Site scale is the micro scale of green infrastructure research, which refers to a kind of ecological cycle of storm water control and rainwater utilization facilities. The city level (Macro-scale) regional green infrastructure refers to the natural continuous green network structure, which can maintain spatial stability, protect species diversity and have overall ecological benefits. "Urban area," "park," and "restoration" have considerably higher burst intensity than other keywords, thereby indicating that urban ecological restoration is one of the core objectives of green infrastructure research on city scale (Wu et al., Citation2019).The urban scale, as the meso-scale of green infrastructure, is essentially the natural system which can be relied upon to maintain the sustainable development of urban environment. Many studies have been conducted on the factors that contributed to the inaccessibility and undersupply of UGI in cities of developed countries. Development of accessible UGI remains a major challenge of the capital city Addis Ababa as well.

1.2 Statement of the Problem

The concept of urban green infrastructure development is the relative construct of the knowledge of the different disciplines as such landscape architecture, greenery, water management, climate change adaptations and mitigations measures and etc…there are acknowledged principles of UGI Multifunctionality, connectivity, inclusiveness and consideration of urban environmental factors. Attitude towards the principles of urban green infrastructure and the public perceptions are the major issues in shaping the supports and the contributions as such whether initiative is successful or not. However, there are the major challenges associated with the implementation of urban green infrastructure developments both in global level and in Ethiopia especially in Addis Ababa in which the society living in various of social diversity, economical difference, and many environmental factors in line with the needs.

There are a number of factors that contributed to the degradation and inaccessibility of UGI in the city. Some of the major driving factors responsible for the current state of UGI may include; built up area expansion and density, insufficient operation of urban planning regulations, and lack of priority and attention given for UGI development (Azagew and Worku, 2020). Moreover, limited awareness and understanding of the benefits provided by UGI components among the communities and decision makers are also factors for inadequate provision of high-quality UGI components (Lamson-Hall, P, 2019). Beside these, there is limited literature on the knowledge, attitude and perception of stakeholders towards UGI in Ethiopia. The available literature is focused on issues such as adaptation to climate change (Lindley et al., 2015) and conditions and opportunities of green infrastructure in relation to water resilient cities (Herslund et al., 2017).

Nevertheless, the results of previous studies did not fully address how the current urban green infrastructure implementations consider the main principles of urban green infrastructure development. Therefore, this study will contribute to bridging these gaps through examining the stakeholders' concept, attitude and perception towards UGI development principles (connectivity, multi-functionality, consideration of urban environmental factors and cooperation with local stakeholders (Monteiro and Ferreira, 2020).

A study conducted by Gelan.E & Girma.Y (2021) on sustainable urban green infrastructure development and management system in rapidly urbanized cities of Ethiopia indicated that strategic approaches which improve the quantitative, qualitative, and accessibility standards on the provision of urban green infrastructure is needed for sustained development. Moreo-

ver, advanced development in budget allocation, capacity building, legal and institutional framework, awareness creation, and stakeholder's involvement are also needed to promote a sustainable development and management system of urban green infrastructure in the urban centers of Ethiopia in general and emerging towns in particular.

Another study by Azagaw.S&Worku.H (2020) assessed the status, accessibility and constraints of UGI in rapidly urbanizing city Addis Ababa, Ethiopia and examined the challenges behind the current states of UGI based on document review, expert interview and field observation. They assessed the status of UGI in Addis Ababa city and examined the land use condition of UGI for the last 13 years from 2003 to 2016 through Normalized Difference Vegetation Index (NDVI).The study used the land use map that was extracted from the structural plan of the city for quantifying different components of UGI in Arc GIS tool. The results revealed a dramatic decline of urban agriculture and forest land uses in the city during the last thirteen years. They recommended the accessibility of UPs is generalized in terms of objective measurement, and the needs, preference, and perception of different population segments were not considered**.** Furthermore, Yirga.B, Lika.T&Yeshitela.K, (2021) studied the governance of green infrastructure planning in Addis Ababa. The study reported that relying on an authoritarian model of output-legitimacy, sect oral approach, and uncoordinated land-use led to weak governance of UGI.

Moreover, Yared Girma, et al (2018)studied urban green infrastructure planning in Ethiopia in the case of emerging towns of Oromia special zone surrounding Finfinne, evaluated the integration of urban green infrastructure planning principles in the current green space planning practices in an urban center of Ethiopia. This study employed a documents analysis, which was underpinned by interviews and observation. The study result indicate that lack of awareness, financial constraints, insufficient professional knowledge, absence of collaboration and poor public involvement are the most influential factors hindering the integration of green infrastructure planning principles into urban development.

Molla, et al (2017) also analyzed the pattern of utilization of urban green infrastructure in Southern Ethiopia. Data were collected using structured questionnaires, key informant interview and focus group discussion and analyzed using descriptive statistics and ANOVA. The pattern of utilization of green infrastructure types varies significantly among the three urban centers.

The above empirical studies focused on urban green infrastructure planning, challenges, status, services and some opportunities. Some of the results show lack of awareness and insufficient professional knowledge. Significantly they recommended future researches on opportunities of existing UGI program and strategic approaches, perception of different population segments, awareness creation and stakeholder's involvement those are not considered in their work. Unfortunately, there is knowledge gap regarding the concept, attitude and perceptions of the stakeholders toward UGI in Addis Ababa city. Therefore, this study is conducted to fill this knowledge gap.

1.3 Research Questions

1 How do the stakeholders understand and perceive the current practices of sustainable urban green infrastructure development in Addis Ababa?

2 To what extent the main principles of sustainable urban green infrastructure have been incorporated in current green space planning practices in Ethiopia?

3 Do stakeholders have balanced/harmonious Attitude with the principles of UGI?

4 What are the challenges associated with sustainable urban green infrastructure development in Addis Ababa?

1.4 Research Objectives

1.4.1. General objective

The general objective of the study was to examine the concept, attitude and perception of selected stakeholders towards sustainable urban green infrastructure developing in Addis Ababa

1.4.2 Specific Objectives

1 To assess the understanding of stakeholders on the current practices of urban green infrastructure in Addis Ababa

2 To analyze the extent to which the main principles of urban green infrastructure are incorporated in current green space planning practices in Addis Ababa?

3 To assess the attitude level of the stakeholders toward selected UGI principles

4 To identify the major challenges associated with sustainable urban green infrastructure development in Addis Ababa

1.5 The Significance of the Study

Urban green infrastructure management, operation complexity and wide in scope to realize its multifunctional processes it needs the integration and also accepted common concepts and perceptions as well as attitude level should be balanced. Studying CAP helps to know where and what is the problem with the implementation of UGI. Well-designed urban green spaces, (parks, gardens, green roofs, allotment, etc.) can contribute to protecting biodiversity, while helping to tackle climate change, keeping cities cool, reducing flood risks and enhancing the health and well-being of urban residents. Urban planners and policymakers, however, face the challenge of identifying the magnitude of multi-functionality based on the trade-offs and synergies in services and functions (Korkou.M, Tarigan.Ari.K.M.,2023). Furthermore, the findings of the study will add new information to the urban green infrastructure literature in order to understand how the main principles of urban green infrastructure have been incorporated in current green space planning practices in Ethiopia. Moreover, the findings will inform policy makers in their decision making process on how to consider green infrastructure planning principles to sustain green spaces management in the physical landscape of Ethiopia in general and the study area in particular. It is could be a data source for research s interested in the further studying the CAP in relevant to urban green infrastructure development. And for practitioners is helpful to look at their mindset, skill, knowledge and evaluate themselves as well as the performance and in addition to assess the stakeholders' capacity toward principles.

1.6 The scope of the study

The scope of the study can be discussed in terms of the major issue under investigation (conceptual scope), geographical area, and the methodology adopted.

Conceptually, this study is delimited to analyze the concept, attitude and perception of stakeholders towards UGI principles namely connectivity, multi-functionality, consideration of urban environment and cooperation with local stakeholders or groups.

Geographically, the study is delimited to Addis Ababacity located at an elevation of 2,355 meters(7,726 ft) and is a grassland biome, located at 9°1′48″N 38°44′24″E. The city lies at the foot of Mount Entoto and forms part of the watershed for the Awash. The study will cover or uses data's only in the area.

Methodologically, the study applied mixed research approach, and quantitative data gathered using structured questionnaire substantiated with qualitative data collected using key informant interview, focus group discussion and physical observation.

Analytical scope, data were gathered from different stakeholders(experts, end-users, governmental officials, and political leaders and environmental organizations).The investigation area focused on the main principles of urban green infrastructure, assessment approaches of urban green infrastructure, ecosystem services and their benefits, sustainability and climate adaptation, and urban agriculture.

1.7 Organization of the study

This study is organized into five chapters. The first chapter discusses introduction to UGI, background of the problem, statement of the problem, purpose of the study, research questions, and significance of the study, definition of terms, limitations, and delimitations. The second chapter will review related literatures introduction, search description, conceptual or theoretical framework, organized by variable or themes. The third chapter discusses the research methodology including the research approach and design, setting, participants, data sources and collection methods, methods of data analysis. Chapter four deals with data presentation, analysis and interpretation of the research findings, finally, in chapter five, the student researcher discussed summary, conclusion and recommendation, suggestions for future research.

1.8 Operational definitions

Attitude: In this study, attitude is feeling about urban green infrastructures developments principles in accordance with current practices. Feeling or opinion about something or someone, or a way of behaving that is caused by this (Richards wood, 2017).

Concept: - is relative awareness about urban green infrastructure benefits by combining multiple particular knowledge's from different disciplines.

Development: is the practice or action of implementing the principles of urban green infrastructure development. The expansion of people's capabilities and freedoms to live lives they value (Sen., 1999).

Perception: is of the people's mental grasp of perceiving on sustainable urban green infrastructure developments whether or not the current practices are important or what could be done as to them.

Urban green infrastructure: is the interconnection of green areas with other built landscape architectures.

Sustainable urban green infrastructure: a strategically planned network of natural and semi-natural areas that are designed to provide needed ecological, social, and economic benefits within an urban context.

Multi-functionality: in this study, it indicates that the multiple functions of urban green infrastructures simultaneously providing to benefit people and the ecosystem.

Connectivity: is the extent, in which the current urban green infrastructure is integrated to other infrastructures such as gray, electric, urban plan and design and etc…

CHAPTER TWO

LITERATURE REVIEW

This chapter discusses the concept and principles of urban green infrastructure, sustainability of UGI, challenges as well as the trends and theories that are concerned to UGI and reviews literature related to the study. Overall, the chapter reviews conceptual, theoretical and empirical literature related to UGI.

2.1 Conceptual review

UGI is a tool that provides ecological, economic and social benefits through this type of solutions. In other words, UGI provides a network of urban interconnection with nature, semi-natural areas and green spaces, which provide ecosystem services that support human well-being and quality of life (Chuttersnap,2018).According to an IDB study, green infrastructure can be managed more adaptively than investments in gray infrastructure, which tend to be more expensive to modify after initial construction.

2.1.1 The concepts of urban green infrastructure

Urban Green Infrastructure (UGI) refers to the interconnected network of natural and semi-natural elements within urban areas that are designed or managed to provide multiple environmental, social, and economic benefits. It includes green spaces such as parks, gardens, street trees; blue-green features like rain gardens or bio swales; green roofs/walls; and other nature-based solutions integrated into urban planning processes. UGI aims to enhance ecosystem services provision (e.g., air purification), mitigate climate change impacts (e.g., temperature regulation), and support biodiversity conservation efforts in cities while promoting human health/wellbeing through increased access to nature.

Urban green infrastructure can be interpreted as a hybrid infrastructure of green spaces and built systems, e.g. forests, wetlands, parks, green roofs, and walls that together can contribute to ecosystem resilience and human benefits through ecosystem services (Marthe et al., 2016). urban infrastructure as the physical systems and networks that support the functioning of cities, including transportation, water supply, energy distribution, waste management, communication networks (such as telecommunications and internet), and social infrastructure like schools or healthcare facilities (Graham and Marvin,2001)..

2.1.2 Sustainable urban green infrastructure

The sustainable development of urban areas is crucial since more than 56% of the world's population lives in cities. Cities are in the lead of climate action, while being responsible for an estimated 75% of the world's carbon emissions (UN news 2019). The United States Environmental Protection Agency maintains that the planning process of sustainable design can lead to the development of a community that is ecologically, economically, and socially sustainable (US EPA, 2015).According to Ahern (2007): urban green infrastructure is defined as the interconnected network of green spaces, including parks, gardens, street trees, and natural areas within an urban environment. It serves multiple functions such as storm water management, biodiversity conservation, climate regulation and providing recreational opportunities for residents.

Cilliers et al. (2013): UGI refers to the planned integration of natural elements into the built environment to create multifunctional landscapes that enhance ecological sustainability while improving human well-being in cities. Tzoulas et al. (2007):UGI encompasses all types of vegetation in urban areas along with associated water bodies and open spaces that provide ecosystem services such as air purification, noise reduction or temperature regulation while enhancing social cohesion and cultural values (Pauleit et al.,2010). UGI includes both physical features like parks or green roofs but also non-physical aspects like policies or governance structures that promote sustainable land use planning practices integrating nature-based solutions into cities for environmental benefits alongside societal needs.

2.1.3. The principles of UGI

The basic principles for ensuring the sustainability of landscape and water features in urban and suburban environments are multi-functionality, interconnection, biodiversity, consideration of urban environment factors, and cooperation with local stakeholders or groups(Paulette et al., 2011;Ely and Pitman, 2014).

2.1.3.1. Multi-functionality

Multi-functionality is a key principle in the design and implementation of urban green infrastructure (UGI). It refers to the ability of UGI to serve multiple functions simultaneously, addressing various environmental, social, and economic needs within urban areas. According to Cilliers et al. (2013), Multi-functionality recognizes that UGI should not be limited to providing a single benefit but should aim for synergistic outcomes by integrating different functions into its design. For example, green spaces can provide recreational opportunities for residents

while also mitigating storm water runoff through their capacity for water absorption. Literature emphasizes that multifunctional UGI can contribute towards achieving sustainability goals in cities by optimizing resource use and enhancing overall resilience. A study by Haase et al. (2014) highlights how multifunctional green roofs can reduce energy consumption through insulation properties while also improving air quality and biodiversity conservation. Furthermore, Pataki et al. (2011) argue that considering multiple benefits helps justify investments in UGI as it demonstrates its value beyond individual objectives such as aesthetics or recreation alone. Overall, the principle of Multi-functionality underscores the importance of designing UGI systems with an integrated approach that maximizes their potential contributions across various dimensions including ecological health, human well-being, and socio-economic development within urban environments.

2.1.3.2. Interconnection

The principle of interconnection in urban green infrastructure (UGI) emphasizes the need for a connected and integrated network of green spaces within an urban context. It recognizes that individual UGI elements, such as parks or street trees, are more effective when they are part of a larger interconnected system. According to Tzoulas et al. (2007), interconnection refers to the physical and functional linkages between different UGI components, allowing for movement of species, flow of ecosystem services, and connectivity between human communities. Literature highlights several benefits associated with interconnecting UGI elements. For instance, interconnected green spaces can facilitate wildlife movement across urban areas by providing corridors for biodiversity conservation (Ahern 2007). This promotes ecological resilience by maintaining gene flow among populations and supporting diverse ecosystems. Interconnected UGI also enhances accessibility and usability for residents by creating continuous pathways or networks that encourage walking or cycling while improving social cohesion within neighborhoods (Paulette et al., 2010).

Moreover, research suggests that interconnected storm water management systems incorporating features like bios ales or rain gardens can effectively manage runoff at multiple scales while reducing flood risks through distributed infiltration strategies (Benedict & McMahon 2006). By promoting connectivity both ecologically and socially, Urban Green Infrastructure contributes towards creating sustainable cities where nature is seamlessly integrated into the built environment.

2.1.3.3. Biodiversity

Biodiversity is a crucial principle in the design and implementation of urban green infrastructure (UGI). It refers to the variety of plant and animal species, their genetic diversity, and the ecosystems they form within urban areas. The inclusion of biodiversity in UGI planning recognizes its importance for ecological functioning, resilience, and overall sustainability. Research has shown that incorporating diverse native plant species into UGI can support local wildlife populations by providing food sources, nesting habitats, and shelter (Cilliers et al., 2013). By creating suitable habitats for various organisms, Urban Green Infrastructure contributes to maintaining biodiversity within cities while also promoting ecosystem services such as pollination or pest control (Tzoulas et al., 2007).

Furthermore, bio diverse UGI elements enhance aesthetic value by introducing seasonal variations through flowering plants or attracting colorful bird species (Paulette et al., 2010). This not only improves residents' quality of life but also fosters a sense of connection with nature. To ensure effective integration of biodiversity in UGI, it is important to consider factors like habitat connectivity, suitable planting techniques, and maintenance practices that support long-term survival and growth of native flora and fauna (Ahern 2007). Overall, the principle of biodiversity highlights the need for urban green infrastructure to be designed as a living system that supports diverse ecosystems while providing benefits for both humans and the natural worlds.

2.1.3.4. Consideration of urban environment factors,

Consideration of urban environment factors is a crucial principle in the planning and implementation of urban green infrastructure (UGI). It involves understanding and addressing the specific characteristics, challenges, and opportunities presented by urban areas. Here are some key considerations under this principle:

Land Availability: Urban environments often have limited available land for UGI implementation. Therefore, it is important to optimize space utilization through innovative design approaches such as vertical gardens or rooftop greening (Cilliers et al., 2013). This allows for maximizing green coverage within constrained areas while providing multiple benefits.

Pollution Levels: Urban areas can experience high levels of air pollution from vehicular emissions, industrial activities, or other sources. UGI should be designed to mitigate these environmental issues by incorporating vegetation that helps improve air quality through pol-

lutant absorption and filtration (Paulette et al., 2010). Noise Reduction: Cities are characterized by high noise levels due to traffic, construction activities, and other human-related factors. Taking in to account noise reduction measures when designing UGI can help create quieter spaces within the city scale, such as using vegetation buffers or sound-absorbing materials (Paulette et al., 2010).

Water Management: Effective water management is essential in urban environments where storm water runoff can lead to flooding and strain on existing drainage systems. Urban Green Infrastructure should incorporate features like rain gardens, bio swales, and permeable surfaces that promote infiltration, reducing the burden on storm water infrastructure (Benedict & McMahon2006).

Social Equity: The consideration of social equity is important in UGI planning to ensure that all residents have equal access and benefits from green infrastructures. Research has shown that disadvantaged communities often face disparities in access to green spaces (Tzoulasetal, 2007). Therefore, it's crucial to prioritize equitable distribution of UGI across neighborhoods with lower socio-economic status, identifying areas with inadequate green space provision.

Cultural Sensitivity: Urban environments are diverse culturally, and it is important to incorporate cultural considerations into UGI designs to reflect the values and preferences of different communities (Paulette et al., 2010).This may include incorporating elements like community gardens or culturally significant plant species that resonate with local traditions and practices. This fosters a sense of ownership and social cohesion while promoting cultural diversity with in urban areas.

Governance and Participation: The involvement of local communities in the planning process is crucial for the successful implementation of UGI. Research has emphasized the need for good governance structures, inclusive participatory approaches, and collaboration between stakeholders (Ahern2007).This ensures community engagement, support sustainable management practices, and enhances long-term maintenance efforts for urban green infrastructure projects. By considering these urban environment factors in UGI planning and implementation, cities can create inclusive, resilient, and sustainable green infrastructure that addresses unique needs, challenges, and opportunities within urban areas while improving quality of life for all residents.

2.1.3.5. Cooperation with local stakeholders or groups

Cooperation with local stakeholders or groups is a critical aspect of the planning and implementation of urban green infrastructure (UGI). It involves actively engaging and collaborating with individuals, organizations, community groups, and residents who have a vested interest in UGI projects. Here are some key considerations related to cooperation with local stakeholders.

Community Engagement: Effective engagement of local communities is essential for the success and long-term sustainability of UGI initiatives. This can be achieved through various methods such as public consultations, workshops, focus group discussions, and participatory design processes (Ahern 2007). By involving residents from the early stages of planning and design, stakeholders can provide valuable insights, integrate their needs and preferences, and foster a sense of ownership over the UGI project.

Partnerships with Local Organizations: Collaborating with local organizations, such as nonprofit groups, civic associations, businesses, and educational institutions, is important for leveraging resources, knowledge sharing, and ensuring the long-term success of sustainable green infrastructure projects (Pauleitet. al.,2010).These partnerships can bring expertise, funding opportunities, volunteer engagement and support networks that enhance the implementation process.

Knowledge Exchange and Capacity Building: cooperating with local stakeholders also involves knowledge exchange and capacity building efforts. These can include providing training programs or workshops for resident's or community groups on topics related to UGI such as gardening techniques, native plant selection; water sustainability practices (Benedict&McMahon, 2006).

Maintenance Responsibilities: A crucial specs of cooperation is to develop clear communication channels between all parties involved in the maintenance and supervision of the UGI sites. This includes establishing responsibilities, duties, timelines, and maintenance protocols, to ensure that these green infrastructures are properly cared for and remain functional over the long-term (Cilliers, etal., 2013).

Monitoring and Evaluation: Cooperation with local stakeholders also involves ongoing monitoring and evaluation of UGI projects to assess their effectiveness, identify areas for improvement, and incorporate feedback from residents and users (Tzoulasetal., 2007). This pro-

cess can help inform future planning decisions, adaptation strategies, and ensure sustainability of UGI initiatives. By actively cooperating with local stakeholders or groups in the planning, implementation, maintenance, and evaluation of UGI projects, cities can benefit from diverse perspectives, knowledge's haring, social cohesion and support that lead to the creation of sustainable, genuinely inclusive green infrastructure that meets local needs and improves quality of life for all residents.

2.1.4 The challenges of UGI

There are challenges in urban green infrastructure that emanate from different factors. The following are some of those that UGI faces, Lack of collaboration and communication, lack of knowledge regarding green spaces and qualities; and the inefficient use of Environmental impact assessment tools (Sara et al., 2015).

2.1.4.1. Collaboration and Communication

Weak collaboration and communication were found for creating professional barriers as well as hindering the exchange of knowledge between them. As stated by Håkansson (2000), "a municipal public administration is not a unified organization, but is instead populated by a number of different professional groups, each an expert in its own field. Experts belong to various municipal administrative units, all of which have developed their own traditions and procedures, which influence their work." This separation amongst the municipal departments was quite evident in the municipalities. Each department was focused on their specific specialization, often overlooking and not showing interest in issues outside of their professional knowledge, such as green qualities. With improved communication and collaboration the different municipal departments could share and develop knowledge and thereby bring their professional expertise to bear on integrating green qualities. However, even with the understanding and acceptance of the importance of collaboration and communication, methods for collaboration were not well developed (Sara et al., 2015).

2.1.4.2. Lack of knowledge

Another challenge is lack of knowledge regarding the value of existing urban green spaces, as well as the qualities associated with them. This problem led to many other challenges. The lack of knowledge on green qualities of cities or urban regions leads to land use planning and management decisions based on inadequate information on the benefits that humans can derive (Niemelä et al., 2010). As stated by Sara et al. (2015), lack of knowledge regarding the

value of certain green spaces led to challenges in decision-making regarding where to develop for human benefits rather than biodiversity and vice versa. Moreover, it was difficult for the municipal planners to decide which urban green spaces to enhance, preserve, or integrate in the municipal densification plans and projects. Furthermore, this lack of knowledge led to a conflict of views between the developers and planners. This was mostly due to developers not being aware of the long-term benefits of enhancing, preserving, or integrating green qualities simultaneously with the development. The planners revealed that in most cases the developers were more concerned for the short term-economic benefits, rather than the long-term environmental and social benefits.

2.1.4.3. Limited use of Policy and Tools

Policies and tools are not well developed for green space planning (Paulette et al., 2003). Baker et al. (2013) also mention that IA tools are being viewed more as a hurdle rather than a useful tool for decision-making. When the municipalities were asked specifically about the role of SEA and EIA for the integration of green qualities into their densification plans and projects, many revealed the limited use of these tools. In most cases, the proposed development projects were foreseen to not have negative impacts, overlooking the potential impacts on surrounding urban green spaces; and so they were screened out at a very early stage. Also, most of the municipal comprehensive plans lacked focus on green qualities. In the instances when EIA or SEA was used, they were limited to the assessment of impacts while poorly addressing mitigation and compensation measures, as well as monitoring plans

2.2 Theoretical literature

There are relevant theories that are helpful to conceptualize urban green infrastructure development. The major theories in relation to urban green infrastructure development are urban resilience theory (URT), human nature connection theory (HNCT), Biophilic Design, Ecological Urbanism, Landscape Urbanism, Sustainable Urban Drainage Systems (SUDS), Social-Ecological Systems Theory, Transition Towns Movement and etc.

2.2.1. Urban Resilience Theory (URT)

Measurable ability of any urban system, with its inhabitants, to maintain continuity through all shocks and stresses, while positively adapting and transforming towards sustainability. This theory was developed in the late 20th century and early 21st century by various scholars and researchers in the fields of urban planning, geography, environmental studies, and sustainability. As to While it is difficult to attribute its development to a single person or group, several influential figures have contributed significantly to shaping this theory. One notable contributor is C.S. Hollings, an ecologist who introduced the concept of "resilience" in ecological systems during the 1970s. His work on ecosystem dynamics laid some foundational ideas for understanding resilience within urban contexts.

Another key figure is Brian Walker, who expanded upon Hollings's ideas and applied them specifically to social-ecological systems. He emphasized that cities are complex adaptive systems that can adapt and transform themselves when faced with shocks or disturbances. Other prominent contributors include David Harvey (geographer), Peter Newman (urban planner), Timon McPhearson (environmental scientist), Thomas Elmqvist (ecologist), among many others who have further refined our understanding of urban resilience through their research contributions. It's important to note that while these individuals played significant roles in developing concepts related to urban resilience theory over time; it has been a collaborative effort involving numerous scholars from different disciplines working together towards advancing our knowledge on this topic.

The theory of urban resilience is closely related to Urban Green Infrastructure (UGI) as both concepts aim to enhance the sustainability and adaptability of cities. Urban Green Infrastructure refers to a network of green spaces, such as parks, gardens, street trees, wetlands, and green roofs within an urban area. These natural elements provide multiple benefits including improved air quality, reduced heat island effect, storm water management through absorption and filtration capabilities. UGI also supports biodiversity conservation by providing habitats for various species. The integration of UGI into urban planning aligns with the principles of urban resilience theory. Resilient cities are those that can withstand shocks or disturbances while maintaining their essential functions and adapting to change effectively. By incorporating UGI into city design and development processes:

1. Climate Adaptation: Urban green spaces help mitigate climate change impacts by reducing temperatures through shading effects or evaporative cooling from vegetation transpiration.

2. Disaster Risk Reduction: Natural features like wetlands act as buffers against flooding events by absorbing excess water during heavy rainfall.

3. Environmental Sustainability: Incorporating UGI promotes sustainable practices such as rainwater harvesting systems or using recycled water for irrigation purposes.

4. Community Well-being: Accessible green spaces improve residents' physical health through opportunities for recreation activities while enhancing mental well-being by providing aesthetically pleasing environments. Furthermore, Urban Green Infrastructure contributes towards social cohesion in communities where people can gather together in shared public spaces fostering community engagement,resilience,and sense-of-place Overall, the integration between the theories on Urban Resilience &Urban Green infrastructure provides a holistic approach towards creating more sustainable, capable &livable cities capable enough not only tackle present challenges but also future uncertainties

2.2.2. Human Nature Connection Theory (HNCT)

The Rockefeller Foundation states that the Human Nature Connection Theory (HNCT):- humans' innate need to affiliate with other life such as plants and animals means that humans have a desire to be near nature. The environmentalism perspective suggests that humans traditionally had a relationship with nature being one of power and dominance (Hancock, T.1985, 8, 1–10). Green infrastructure is a strategically planned network of natural and semi-natural areas that are designed and managed to deliver a wide range of ecosystem services. It incorporates green and blue spaces and other physical features in terrestrial and marine areas.(Ferreira, J.C.; Monteiro, R.; Silva, V.R., 2021).This study is incorporate with the above theory that explores the ecosystem services with the urban system that along with the ability of the human to manage the services in sustainable way.

2.2.3. Biophilic Design:

This theory is based on the concept of biophilia, which suggests that humans have an innate connection and affinity for nature. It was popularized by biologist Edward O. Wilson in his book "Biophilia" (1984). The theory argues that incorporating natural elements into the built environment can improve human well-being, productivity, and overall quality of life.

2.2.4. Ecological Urbanism:

This theory draws from ecological principles and systems thinking to guide urban planning and design practices towards creating sustainable cities. It was developed by landscape architect Mohsen Most afaviin collaboration with various scholars through a series of conferences at Harvard University's Graduate School of Design starting in 2009.

2.2.5. Landscape Urbanism:

Landscape Urbanism emerged as a response to conventional approaches in urban planning that focused primarily on buildings rather than open spaces or landscapes within cities. The foundation lies in landscape architecture principles such as connectivity, resilience, and adaptability. It advocates for using landscape as a framework for organizing urban development while promoting sustainability through green infrastructure networks. This approach has been championed by Charles Waldheim, a prominent scholar who published "Landscape as Urbanism: A General Theory" (2016).

2.2.6. Sustainable Urban Drainage Systems (SUDS):

SUDS is rooted unsustainable water management practices aimed at reducing storm water runoff impacts on drainage networks while enhancing biodiversity within cities. The foundation lies in recognizing traditional engineering methods may not be sufficient enough hence integrating more natural techniques like permeable pavements, rain gardens etc., to mimic natural hydrological processes. Several researchers, such as David Butler and Richard Ashley among others, have contributed significantly to advancing this field.

2.2.7. Social-Ecological Systems Theory:

This interdisciplinary field recognizes the interdependence between social systems (such communities) and ecological system (such ecosystems), highlighting how they interact within an urban context. This theoretical framework acknowledges complex interactions among various components including people, nature, policies, governance structures etc., in shaping resilient, sustainable, and livable cities. The concept of social-ecological systems has been developed by scholars such as ElinorOstrom, CarlFolke, LanceGunderson,C.S.Holling and others.

2.2.9. Transition Towns Movement:

The Transition Towns movement originated from Rob Hopkins' book "The Transition Handbook"(2008).It focuses on community-led initiatives aimed at building resilience against climate change impacts by transitioning to more sustainable and self-reliant local economies.

The foundation lies in the belief that communities can come together to create positive changes through grassroots actions, including urban greening efforts. Rob Hopkins is a key figure associated with this movement. These theories have different foundations ranging from ecological principles, human-nature connections, sustainability goals, and community empowerment. They were developed or popularized by influential individuals who have contributed significantly to their respective fields.

2.3. Empirical Literature

Several studies have been conducted in relation to urban green infrastructure development, both in Ethiopia and abroad. Wang and Banzhaf (2018) summarized the evolution of green infrastructure by searching papers on green infrastructure in four databases, including Web of Science (WOS), as well as books and documents published by international organizations, government agencies, and research institutions as of 2016; and emphasized the importance of multifunction for the study and development of green infrastructure. In Ethiopia, urbanization is largely taking the place through unplanned urban growth which aggravates environmental problems (MUD, 2015).Addis Ababa proposes development of a green infrastructure based on principles such as integration and multi functionality; but, the proposal is rarely implemented (Herslund et al., 2017).

Alemaw Kefale (2017) assessed the challenges and Opportunities of Urban Green Infrastructures in inner sub cities of Addis Ababa. The study has revealed physical, management, technical, and environmental challenges are the challenges of street sides and medians trees, and cobblestone roads in the study areas. On the other hand the study has identified opportunities of UGIs such as UGI proclamations, standards, strategies, policies, and principles among other. Another study by Sileshi Zagew&HailuWorku (2020) examined the challenges behind the current states of UGI. And but these scholars didn't insight the CAP of stakeholders or public due to this study examines the current practices through assessing concept attitude and perception of stakeholders on urban green infrastructure.

The degradation and inaccessibility of urban green infrastructure (UGI) in the city can be attributed to factors such as expansion of built-up areas, inadequate urban planning regulations, and insufficient attention given to UGI development. Limited awareness and understanding of the benefits of UGI among communities and decision-makers also contribute to the inadequate provision of high-quality UGI components. Previous studies in Ethiopia have focused on climate change adaptation and water resilience, but there is a knowledge gap in under-

standing stakeholder attitudes and perceptions towards UGI development principles. This study aims to bridge these gaps by examining stakeholders' concept, attitude, and perception towards UGI development in Addis Ababa.

2.4 The Conceptual Framework of the Study

This study is mainly aimed to examine the concept, attitude and perception of stakeholders on developing urban green infrastructure development in Addis Ababa. More specifically it is aimed to assessing the conceptual perceptions on the current practices of urban green infrastructure, analyze the extent to which the main principles of urban green infrastructure are incorporated in current green space planning practices in Addis Ababa, to assess the attitude level of the stakeholders toward selected UGI principles, and to identify the major challenges associated with sustainable urban green infrastructure development in Addis Ababa

The concept of urban green infrastructure advocates the planning of multifunctional green networks which contribute to the sustainable development of urban areas by promoting biodiversity and providing essential ecosystem services (Paulette. S., 2021).Knowledge of stakeholder perception of ES in different UGI types could serve as a basis for improving the consideration of ES in urban planning processes and strategy development.

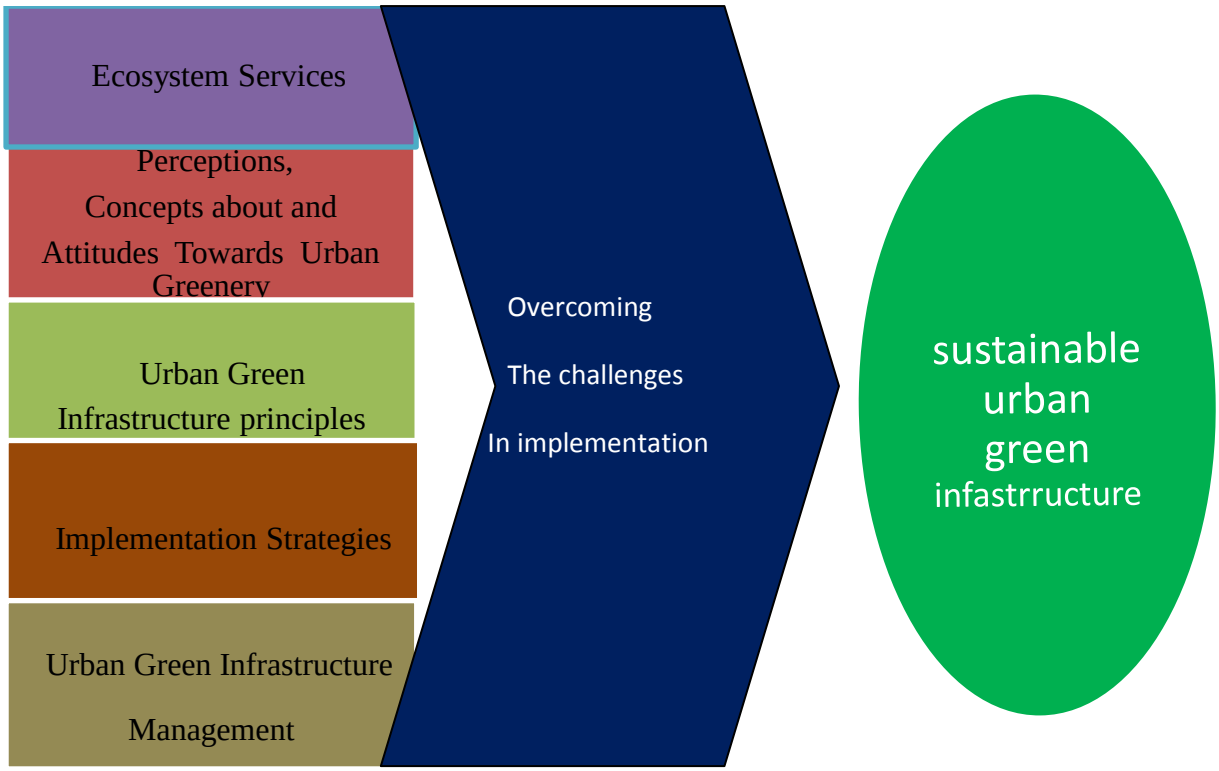

Figure 1 conceptual framework of the study. Source:-computed by researcher 2024.

The above framework illustrates, first there should be perception, relative knowledge and attitudes on benefits of ecosystem provided by urban green infrastructure and the implementation strategies should be based on principles in order to overcome the challenges in implementation for attaining sustainability. Thus, the concept development, enhancing perceptions and attitudinal changes on the benefits of ecosystems comes first followed by UGI development. Then, the implementation strategies should address the challenges through success management. Finally, the sustainability of urban green infrastructure development is realized. The variables are related to one another in the context of sustainable development and environmental planning.

Ecosystem Services: Ecosystem services refer to the benefits that humans derive from ecosystems such as clean air, water purification, climate regulation, biodiversity support, etc. Urban green infrastructure plays a crucial role in providing these ecosystem services within cities.

Principles of UGI: The principles of UGI guide the design and implementation strategies for creating effective green spaces within urban areas. The strategies consisting of holistic plan-

ning and design, community engagement and participation, integration with existing infrastructure, policy and governance support and long term maintenance and monitoring. These principles often include concepts like connectivity between different green spaces or habitats for wildlife conservation.

Urban Green Infrastructure Management: Urban Green Infrastructure Management involves planning and implementing strategies to maintain or enhance existing natural systems within an urban environment while considering factors like land use patterns; maintenance practices; stakeholder engagement; monitoring & evaluation techniques.

The Concept, Attitude and Perception: Attitude refers to individuals' opinions or feelings towards certain objects or ideas in this case towards sustainable development practices involving urban green infrastructures. Perception refers to how individuals interpret information about their surroundings including attitudes they hold regarding specific issues.

In relation with Sustainable Urban Green Infrastructures, attitudes can influence public acceptance, support, and participation in initiatives aimed at developing greener cities. There are challenges which retard the practices of sustainable urban green infrastructure development, they may as the results of less capability of interpretation of main principles in lack of concepts/knowledge, negative attitude and false perception etc. Sustainable Urban Green Infrastructure focuses on designing, governing and managing green spaces in urban areas in ways that are environmentally friendly, economically viable, and socially equitable. It aims at integrating nature-based solutions into city planning processes, to improve quality of life and resilience while addressing challenges like climate change, biodiversity loss, pollution mitigation etc.

Overall, the relationship among these variables lies in understanding how incorporating well-designed, Urban Green Infrastructures can contribute positively to the provision of ecosystem services with in cities, while considering the principles of UGI and managing them sustainably. Attitudes and perceptions play a role in shaping public support for such initiatives, which can influence their success or failure. In cause and effect relationship, the public perception and knowledge about the benefits of ecosystem and the attitudes toward UGI have magnitude to support the development initiatives. Implementing the principles of urban green infrastructure through strategies while the challenges are in considerations has effect on the sustainability of urban green infrastructure.

CHAPTER THREE

RESEARCH METHODOLOGY

This chapter includes different sub sections those were linked each other. More specifically, the chapter describes the study area, research design, research approach, population, sample size and sampling technique, data sources and data collection instruments , and methods of data analysis.

3.1Description of the study area

Addis Ababa is the capital city of Ethiopia, located in the geographic epicenter of the country, and surrounded by the regional state of Oromia. It is the largest city in the country and plays a central political, economic and symbolic role in Ethiopia. The current metro area population of Addis Ababa in 2024 is 5,704,000, a 4.45% increase from 2023(world population prospect, 2022).Addis Ababa, capital and largest city of Ethiopia. It is located on a well-watered plateau surrounded by hills and mountains in the geographic center of the country. The latitude of Addis Ababa, Ethiopia is 9.005401, and the longitude is 38.763611. Addis Ababa, Ethiopia is located at Ethiopia country in the Cities place category with the GPS coordinates of 9° 0' 19.4436" N and 38° 45' 48.9996" E. Addis's areas are subdivided in to 11 sub cities named; Addis Ketema, Akaki Kaliti, Arada, Bole, Gullele, Kirkos, KolfeKeranio, Ledeta, Nifas Silk Lafto, Yeka and the recently added LemiKura. Addis Ababa has a subtropical highland climate (Köppen: Cwb) with precipitation varying considerably by the month. The city has a complex mix of alpine climate zones, with temperature differences of up to 10 °C (18 °F), depending on elevation and prevailing wind patterns.

Urban green spaces in Addis Ababa include public and private green areas or belts which include urban forest, urban agriculture, gardens, squares, roadside and road median tree plantation, trees and gardens within individual households, shade trees, windbreaks and shelterbelts, churchyards and buffer zones (to provide separation between conflicting land uses or to protect vulnerable areas), natural reserves (protected areas), etc. Addis Ababa gets most of its water supply from reservoirs that are located some 20 km northwest and 10 km northeast of the city and from groundwater around the southern part of the city boundary. Addis Ababa needs to manage the problems of green area and water resource depletion, water pollution, and flooding associated with increased population growth and increased urbanization, industrialization, and development (BGI report, 2020).

Geographical Map of the Study Area

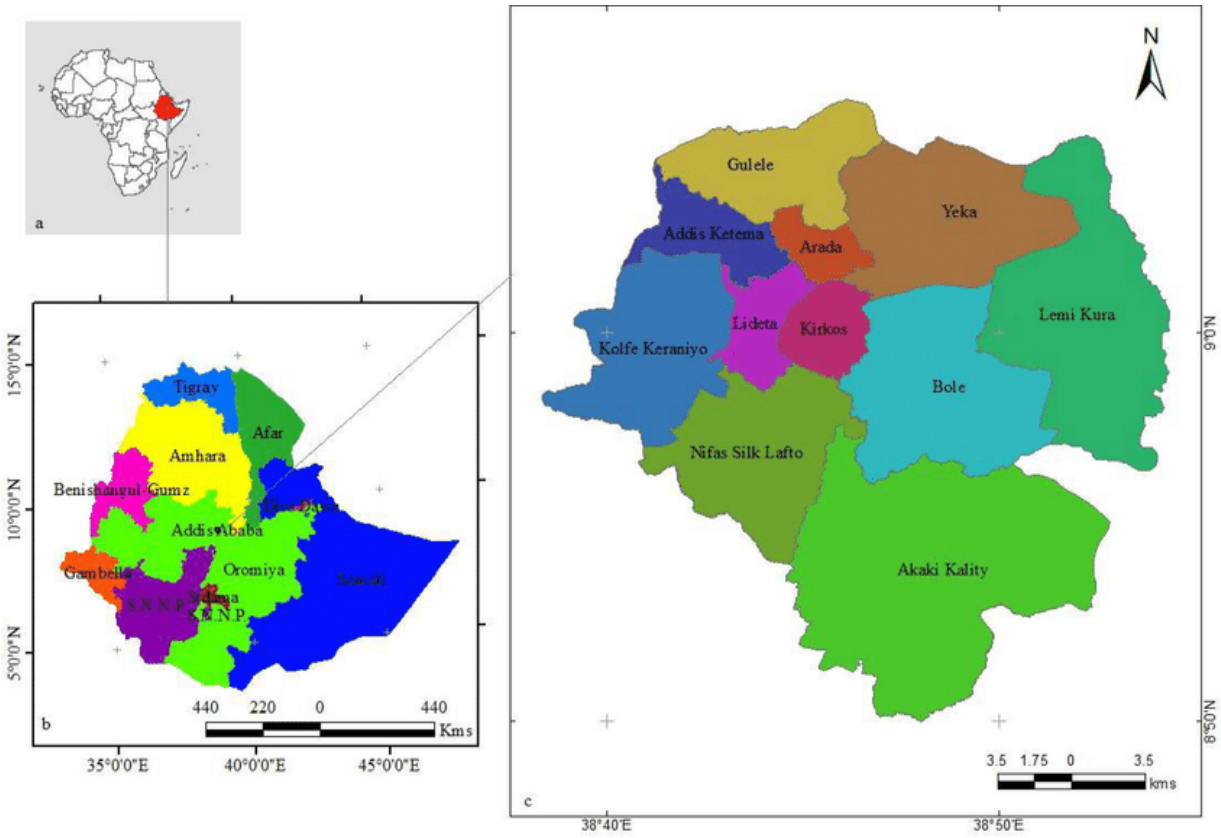

Figure 2 the map of Addis Ababa with sub cities Source: Ethio GIS, 2022)

3.2Research Approach and Design:

This study applied mixed research approach that allow using a diversity of methods, combining inductive and deductive thinking, and offsetting limitations of exclusively quantitative and qualitative research through a complementary approach that maximizes strengths of each data type and facilitates a more comprehensive. The data organized and arranged according the scientific, logical, theoretical and conceptual category of the research question. Moreover, the study followed descriptive research design to describe the concept, attitude and perception of stakeholders towards urban green infrastructure in Addis Ababa. It was useful because, there was insufficient knowledge about the topic or problem.

3.3 Population, Sample Size and Sampling Procedure

3.3.1. Target population

The target populations of this study include stakeholders (experts, governmental offices, key informants, environmental organizations, local businesses and end users or residents) in-

volved in developing urban green infrastructure in Addis Ababa city administration**.** These stakeholders are supposed to be more relevant and to have knowledge and experiences in providing information about the variables. The current metro area population of Addis Ababa in 2024 is 5,704,000(world population prospect, 2022).

There are above 820 experts and officers in Addis Ababa City Administration Urban Beautification and Green Development Bureau. Of these, the student researcher purposively selected 13 key informants from different categories/quotas were selected and joined for interviewee.

3.3.2. Sample size determination

For the objective of the study, research concentrated on experts, environmental protection organizations, local business and residents. A total of 180 samples (150 residents who are more close too, accessed urban green infrastructure and expected to be more knowledgeable were selected from the target population, fifteen government officials, those are currently in duty entirely one representative from each sub cities, Addis Ababa City Urban Beautification and Green Development Bureau, out of more than 68 concerned local businesses, eleven local businesses mainly associated with ecosystem services especially cultural service. furthermore, four environmental protection organizations were selected depending on their mission and contribution to UGI development).

The population were selected depending on how different the population is likely to be or represented. Up on this, the population size along with purposive selection, resources availability (experience, purpose of the study, knowledge of researcher) is basis for sample specification from those encountered stakeholders.

3.3.3. Sampling technique

Non probability sampling methods such as quota and judgment or purposive sampling technique were applied. Because, this strategy is used in situations where a researcher believes some respondents may be more knowledgeable than others, and requires an expert to use their judgment in selecting cases with that purpose in mind. Purposive sampling would seek out people that have each of those attributes. Quota sampling advances purposive sampling by identifying categories that are important to the study and for which there is likely to be some variation.

S. No	Stakeholders	Selection Method/Requirement	Quantity
1	Residents	-Access to UGI in nearby -Their practicing experience in compound.	11-13 residents from each sub cities
2	officers/leaders/experts	-The relevance and receptiveness' to the position within office.	one representative from each sub cities urban beatification and green development office
3	Local businesses	The accessibility of green projects for their business and peer interactions with green infrastructure.	One representative from each
4	Environmental organizations	Mission and responsibilities	One representative from each.

Table 1 sampling technique

3.4 Data Source and Data Collection Methods

3.4.1 Data sources

Pertinent data were gathered from both primary and secondary sources. Primary data sources were key informants 11 official (experts)one representative from each of the sub city, Addis Ababa city urban beautification and green development bureau, Addis Ababa urban plan authority, Addis Ababa environmental protection authority, physical audio and visual observations and questionnaire survey in which 11-13respondents participated from each sub city, 11 local businesses one representative from each sub city and 4 from different environmental organizations while secondary data sources were documents, scholarly journal articles, conference proceedings, books and statistical data and internet sources.

3.4.2 Data collection instruments

The data collection instruments used in this study were questionnaire that contains socio demographic/biographic data's(sex, age and education level), and variables such as concepts, attitudes and perceptions of the stakeholders about the main principles namely connectivity, multi-functionality, consideration of urban environment and cooperation with local stake-

holders of urban green infrastructure were collected, Key informant interview questions for different quotas/representatives about their professional or organizational experience in the regards to current practices of UGI, observation, document reviewed, researcher physical observations and insights in consideration of variables were also instruments.

3.5 Reliability and Validity of Data Collecting Instruments

"Data-collection instruments" used by Eshtu.G and Yared.G to study The Sustainable UGI Development and Management System were valid and reliable, in the same senses studying the concept, attitude and perception of stakeholders in developing UGI were reliable and valid which was tested via Cronbach alpha value with minimum acceptable value of 0.7 and above.

Variables	No of items or statements	Reliability coefficient Cronbachs alpha value	Name of the scholar/s who developed the scale, year)
Multi-functionality UGI	1o	0.74	*Richard A. Zeller, in Encyclopedia of Social Measurement, 2005*
Connectivity of UGI	10	0.74	
Urban environmental factors	10	0.74	
Cooperation with local stakeholders	9	0.76	
Perception on UGI	12	0.72	
Concepts on UGI	10	0.74	
Attitudes on UGI	13	0.71	

Table 2 the reliability of data collection instruments sources computed by researcher 2024

3.6 Methods of Data Analysis

In this study, both quantitative and qualitative data gathered to meet the research objectives. Quantitative data gathered using structured questionnaire was processed via SPSS version 29 software and analyzed using descriptive statistics (frequency, percentage, mean and standard deviation). Moreover, qualitative data collected with the help of interview and document re-

view was analyzed using thematic analysis. Qualitative data is non-numerical and unstructured. Qualitative research focuses on words, descriptions, concepts or ideas.

Narrative analysis, that is all about listening to people telling stories and analyzing what that means was applied. Since stories serve a functional purpose of helping us make sense of the world, we can gain insights into the ways that people deal with and make sense of reality by analyzing their stories and the ways they're told and Thematic analysis looks at patterns of meaning in a data set for example, a set of interviews or focus group transcripts. A thematic analysis takes bodies of data (which are often quite large) and groups them according to similarities in other words, themes. These themes help us make sense of the content and derive meaning from it (Rautenbach D. Tech, 2020).

3.7 Ethical Considerations

Principles such as voluntary participation, informed consent, anonymity, confidentiality, potential for harm, and results communication were checked and evaluated accordingly. Before collecting data, the student researcher got ethical clearance letter from the university. This letter then was shown to the concerned bodies during data collection stage. Moreover, the student researcher duly cited sources used in the study.

CHAPTER FOUR

RESULTS AND DISCUSSION

This chapter covers the presentation of data, analysis of the results, and interpretation of the study findings. The data collected using structured questionnaire were recorded and coded in excel work sheet and processed with the help of Statistical Package for Social Science (SPSS v. 29) and analyzed via descriptive analysis.

Out of 150 dispatched questionnaires, 121 were properly collected (80.6% response rate) and all questionnaires were checked for completeness in order to make the gathered data appropriate for analysis. Therefore, 121 questionnaires and 26 interviews were found to be valid and used for the final analysis. The information obtained from the observation was discussed to complement the quantitative data.

4.1. Profiles of the research participants

In this section the demographic characteristics of respondents, who are the selected stakeholders, are generally described in terms of the questionnaires and interview. These variables includes: sex, age of the respondents, their educational background and the type of business, the responsibility of environmental organization, name of governmental offices. The subsequent section focused on the concepts, attitudes and perception of stakeholders' towards UGI in Addis Ababa. The last section discusses profile of interviewees that was based on research objectives. The summaries of participants are described in detail on the next subsequent sections.

4.1.1 The socio demographic data of respondents

Sex	**Freq**	**%**	**Age**	**Freq**	**%**	**Education**	**Freq**	**%**
Male	53	43.8	18-28	42	34.7	Informal	25	20.7
Female	68	56.2	29-39	40	33.1	Elementary	33	27.3
			40-49	13	10.7	Preparatory	18	14.9
			50-59	16	13.2	First Degree	33	27.3
			60 and	10	8.3	Masters and	12	9.9

Table 3 the socio demographic data respondents Source: - computed by researcher 2024.

Out of the total 121 respondents, the relative majority was 56.2% (68) was female respondents With regard to the age; the relative majorities (34.7%) fall between 18-28 years

4.2 The main principles of urban green infrastructure and its incorporation in current practices

The perception of stakeholders towards UGI was measured using Likert scale items. The student researcher used descriptive statistics (mean and standard deviation) values to assess the conceptual perceptions of stakeholders towards the current practices of urban green infrastructure, analyze the extent to which the main principles of urban green infrastructure are incorporated in current green space planning practices in Addis Ababa, to assess the attitude level of the stakeholders toward selected UGI principles, and to identify the major challenges associated with sustainable urban green infrastructure development in Addis Ababa. The criteria by Ghazi (2016) was employed as the guidance that range from 1.00 to 1.80 (Strongly disagree), from 1.81 to 2.6 (Disagree), from 2.61 to 3.4(Neutral), from 3.41 to 4.20 (Agree), and from 4.21 to 5(Strongly agree). Moreover, for the attitude analysis the (range of mean values from 1-2.4 (negative attitude), 2.5-3.4 (neutral attitude) and 3.5-5 (positive attitude) guide by (Anthony M. Wanjohi and Purity S, 2021) was employed accordingly.

4.2.1 Describing the main principles of UGI

The basic principles for ensuring the sustainability of landscape and water features in urban and suburban environments are multi-functionality, interconnection, biodiversity, consideration of urban environment factors, and cooperation with local stakeholders or groups(Paulette et al., 2011;Ely and Pitman, 2014).

The relative awareness (concepts) and public perception regarding the sustainable urban green infrastructure is important for supporting the success. According to Molla.B (2020), the participation of all stakeholders and coordination between the institutions involved in the planning is the way to achieve success for expanding and sustaining the urban green area. City and town authorities are beginning to practice green space conservation and management in collaboration with education and health institutions, but in a context of lack of awareness of benefits of UGI in the urban environment.

4.2.2. Descriptive statistics for Perception towards UGI

S.No	Perception towards UGI	Mean	Std. Dev.
1	Effectiveness of urban green infrastructure (UGI) in enhancing the quality and livability of cities	3.97	1.103
2	UGI plays a significant role in mitigating climate change and reducing greenhouse gas emissions in Addis Ababa	4.07	1.050
3	UGI effectively improves air quality by filtering pollutants and providing oxygen.	4.20	.862
4	UGI contributes to biodiversity conservation within urban areas	3.94	1.113
5	UGI's ability to manage storm water runoff and reduce flooding risks	3.63	1.205
6	Transparency levels maintained by organizations responsible for implementing UGIs while dealing with stakeholder-related matters	2.54	1.225
7	I am well-informed about ongoing urban green infrastructure projects managed by relevant authorities in Addis Ababa	3.28	1.318
8	UGI generates economic benefits such as increased property values, job creation, and tourism opportunities	4.08	1.029
9	UGI promotes social cohesion and community engagement by providing spaces for interaction and cultural activities.	4.03	1.211
10	Local governments in Addis Ababa involve communities in shaping policies related to urban green infrastructure	3.13	1.224
11	Public awareness campaigns in the city are aimed at educating citizens about the importance of supporting sustainable practices through initiatives like Urban Green Infrastructure development.	2.97	1.316
12	Partnerships between government agencies, private organizations, NGOs (non-governmental organizations), etc., contribute positively towards successful implementation of Urban Green Infrastructure projects in Addis Ababa	2.80	.872

	Aggregate	3.55	1.05

Table 4 descriptive statistics for perception. Source:-computed by research 2024.

As seen in the above table 4, the respondents agrees on the statements with aggregate mean and standard deviation values 3.55 and 1.05 respectively, implying high variation among individual items. Furthermore, the results of the likert items shows the relative awareness (concepts) and the perception on the current UGI main principles, the respondents are aware about Effectiveness of urban green infrastructure (UGI) in enhancing the quality and livability of cities with (3.97 and 1.103), UGI plays a significant role in mitigating climate change and reducing greenhouse gas emissions (4.07 and 1.050), they have general notion about UGI effectively improves air quality by filtering pollutants and providing oxygen (4.2 and .862) in the same view they agree on UGIs contribution to biodiversity conservation within urban areas (3.94 and1.113) and UGI's ability to manage storm water runoff and reduce flooding risks (3.63 and 1.205).

The respondents disagree on transparency levels maintained by organizations responsible for implementing UGIs while dealing with stakeholder-related matters(2.54 and 1.225), they are neutral whether or not well-informed they feel about ongoing urban green infrastructure projects managed by relevant authorities with (3.28 and 1.318). however, the economic benefits generated by UGI, such as increased property values, job creation, and tourism opportunities perceived (4.08 and 1.029) with its mean and st.dev values respectively, UGI promotes social cohesion and community engagement by providing spaces for interaction and cultural activities (4.03 and 1.211).

In addition respondents have no idea/less awareness on the involvement of local communities in shaping policies related to urban green infrastructure (3.13 and 1.224), the disagree on public awareness campaigns aimed at educating citizens about the importance of supporting sustainable practices through initiatives like Urban Green Infrastructure development (2.97 and 1.316).Contrarily, partnerships between government agencies, private organizations, NGOs (non-governmental organizations), etc., contribute positively towards successful implementation of Urban Green Infrastructure projects (2.80 and .872) is not perceived by respondents.

4.2.3. Descriptive statistics for understandings about UGI

S.No	Respondents understanding about UGI	Mean	Std Dev.
1	Local communities are involved in the planning and implementation of urban green infrastructure projects in Addis Ababa	3.61	1.060
2	Urban green infrastructure can enhance biodiversity and support wildlife habitats in cities	3.80	1.030
3	I value having access to urban parks, gardens, or other forms of green spaces within my city	3.94	2.055
4	The current urban planning process in Addis Ababa considers stakeholder perspectives when developing or expanding urban green infrastructure projects	3.36	1.347
5	Urban green infrastructure can contribute positively to mental health by providing opportunities for relaxation and stress reduction	3.98	1.016
6	Urban green infrastructure projects should consider the needs and preferences of different age groups (children, adults, elderly)	4.00	1.147
7	Urban green infrastructure projects should address social equity and ensure equal access to green spaces for all members of the community	3.93	1.070
8	Urban green infrastructure can contribute to climate change mitigation and adaptation in cities	3.80	.945
9	The current maintenance and upkeep of existing urban green spaces are being managed in the city	3.46	1.025
10	Urban green infrastructure has the potential to increase property values within surrounding areas	3.90	.970
	Aggregate	3.7	1.167

Table 5 descriptive statistics for understandings. Source:-computed by researcher 2024.

As the results in above table reveals, the respondents agree it is important to involve local communities in the planning and implementation of urban green infrastructure projects (3.61

and 1.060). Urban green infrastructure can enhance biodiversity and support wildlife habitats in cities. Thus, they place value on having access to urban parks, gardens, or other forms of green spaces within city (3.80 and 1.030). But, there is disagreement on the statement, the current urban planning process considers stakeholder perspectives when developing or expanding urban green infrastructure projects (3.36 and 1.347).

Respondents agree on/have concept about Urban green infrastructure can contribute positively to mental health by providing opportunities for relaxation and stress reduction (3.98 and 1.016).Therefore it is expected that, urban green infrastructure projects to consider the needs and preferences of different age groups (children, adults, elderly)(4.00 and 1.147), projects to address social equity and ensure equal access to green spaces for all members of the community (3.93 and 1.070), its contribution to climate change mitigation and adaptation in cities and (3.80 and .945) also perceived.

There is reflection of more absenteeism on the current maintenance and upkeep of existing urban green spaces is being managed in their city with (3.46 and 1.025).But, agreement on urban green infrastructure has the potential to increase property values within surrounding areas with (3.90 and .970) with its respective mean value and standard deviation.

4.2.4. Descriptive statistics for Attitudes toward UGI

S. No	Likert items	Mean	Std. Dev
1	Urban green infrastructure enhances the aesthetic appeal of cities.	4.28	.868
2	Urban green infrastructure helps mitigate the effects of climate change	3.93	.950
3	Investing in urban green infrastructure is a cost-effective way to improve overall city well-being.	3.80	1.046
4	The presence of urban green spaces positively impacts mental health and well-being among residents.	4.06	.897

5	Local governments should prioritize investment in developing and maintaining urban parks and gardens	3.45	1.147
6	Urban agriculture initiatives should be encouraged as part of sustainable development strategies.	3.99	.871
7	The involvement of local communities is crucial for successful implementation and maintenance of urban greening projects.	4.13	.921
8	Educational programs on environmental awareness should be integrated into school curricula to promote understanding about the importance of preserving natural resources through initiatives like planting trees or creating community gardens.	4.08	.833
9	The presence of urban trees and vegetation reduces noise pollution in cities.	4.10	.987
10	Investing in urban green infrastructure attracts tourists, boosts local economies, and creates job opportunities	3.90	.961
11	Community engagement is essential for the successful planning, design, implementation, and maintenance of urban greening projects	3.92	.833
12	Urban planners should prioritize integrating nature-based solutions into city development plans to maximize the benefits of green infrastructure	3.92	.862
13	Public awareness campaigns are necessary to educate residents about the importance of preserving existing green spaces within cities	3.93	.920
Aggregates		3.96	0.93

Table 6 descriptive statistics for attitudes. Source:-computed by researcher 2024.

The respective results in the above table 6 shows, the residents have optimistic reaction on the items Urban green infrastructure enhances the aesthetic appeal of cities (4.28 and.868), its important in mitigating the effects of climate change (3.93 and.950), Investing in urban green infrastructure is a cost-effective way to improve overall city well-being (3.80 and 1.04), The positive impacts on mental health and well-being among residents (4.06 and .897) with strong agreement between mean and standard deviation.

But they don't react to the statement; local governments should prioritize investment in developing and maintaining urban parks and gardens with (3.45 and 1.14). Unlike priority, their reaction to the idea Urban agriculture initiatives should be encouraged as part of sustainable development strategies mean value (3.99 and.87), recognizing the involvement of local communities is crucial for successful implementation and maintenance of urban greening projects (4.13 and.921).

They inspire integrating educational programs on environmental awareness into school curricula to promote understanding about the importance of preserving natural resources through initiatives like planting trees or creating community gardens (4.08 and.833), The presence of urban trees and vegetation reduces noise pollution in cities (4.10 and .987), Investing in urban green infrastructure attracts tourists, boosts local economies, and creates job opportunities (3.90 and .961) Community engagement is essential for the successful planning, design, implementation, and maintenance of urban greening projects (3.92 and .833).

Furthermore, urban planners should prioritize integrating nature-based solutions into city development plans to maximize the benefits of green infrastructure (3.92 and .862) and Public awareness campaigns are necessary to educate residents about the importance of preserving existing green spaces within cities (3.93 and .920) with its mean and standard deviation values respectively.

Similarly, the government officials' adopts the attitude level of the different stakeholders towards urban green infrastructure developments is in compliance level and they insight the attitude changes are due to practical and real implementation of urban green infrastructure. For the past many years many of the stakeholders have cognitive level attitude that was highly affective and behavioral intension. Generally, they are expecting it to escape to high interaction levels i.e. identifying and internalizing the benefits of UGI development.

As this research reveals the experts and environmental organizations rates the CAP of different stakeholders, it is in affective /behavioral intention and compliance level as more informants agree.

4.2.5. Descriptive statistics for main principles of UGI

S. NO	Main principles of UGI	Mean	Std. Dev
1	Multi-functionalities of UGI and its incorporation	3.77	.468
2	connectivity of UGI and its incorporation in the current practices	3.69	.366
3	Consideration of urban environmental factors	3.83	.354
4	Local stakeholders cooperation	3.65	.424
	Aggregate	3.74	.403

Table 2 descriptive statistics for main principles. Source:-computed by researcher 2024.

As can be seen from the above table 8,the aggregate mean and standard deviation values for the principles of UGI are 3.74and .403, respectively. This implies that the respondents recognizes and agree on the incorporation of main principles in current green spaces practices. Item wise, the mean and standard deviation values for stakeholders' perception towards Multi-functionalities of UGI and its incorporation are 3.77 and 0.468, respectively implying Multi-functionality principle perceived by respondents or with high agreement with mean value.

Regarding the connectivity of UGI and its incorporation in the current practices, the mean and standard deviation values are 3.69 and 0.366, respectively. This implies that connecting urban green infrastructure through green component is perceived by respondents as the result reveals.

As far as the perception of stakeholders' perception towards the consideration of urban environmental factors, the mean and standard deviation values are 3.83 and 0.354 implying that respondents are aware about the environmental functions of urban green infrastructure with the closest value.

Regarding the perception of stakeholders towards cooperation in UGI, the mean and standard deviation values are 3.65 and 0.424, respectively. This indicates thatthe significance of the inclusiveness principle is acknowledged by respondents in high response rate.

4.2.5.1. Descriptive statistics for Multi-functionality of UGI

Likert Items on main principles	Mean	Std. Dev
Multi-functionality of urban green infrastructure is well recognized in Addis Ababa city.	2.99	1.399
Forests absorb carbon dioxide from the atmosphere, helping combat climate change.	3.75	1.227
Having diverse vegetation within cities contributes positively towards local biodiversity conservation	3.29	1.357
Parks should be easily accessible	3.96	1.060
Supporting community gardens or rooftop farming projects helps create local food systems with minimal environmental impact	3.67	1.300
Creating interconnected pathways lined with vegetation enhances both human mobility options as well as ecological connectivity	3.83	1.179
Implementing green infrastructure elements that capture and filter rainwater can help prevent water-related issues during heavy rainfall	3.83	1.276
Increasing vegetation in cities can help mitigate high temperatures during hot weather.	4.16	.983
Having well-maintained parks or green areas increases property values in surrounding neighborhoods.	4.08	.900
Parks or nature reserves should be utilized as educational resources to raise awareness about environmental issues within communities	4.17	.853
Aggregate	3.77	1.153

Table 8 descriptive statistics for multi-functionality. Source:-computed by researcher 2024.

As shown in table above 8, the Multi-functionality which described by items with high response rate of aggregate mean value of 3.77 and standard deviation of 1.153 implying the high variation among individual responses According to this research, Multi-functionality of urban green infrastructure in Addis Ababa city is under recognition with response rate of (2.99 and 1.399) mean and standard deviation respectively. They knew or agreed Forests absorb carbon dioxide from the atmosphere, helping combat climate change (3.75 and 1.227).

Contrarily, they don't have sufficient knowledge or information on contribution of having diverse vegetation within cities positively towards local biodiversity conservation (3.29 and 1.357).They agreed on parks accessibility (3.96 and 1.060) and in sighted Supporting community gardens or rooftop farming projects helps create local food systems with minimal environmental impact with response rate of (3.67 and 1.300) and Creating interconnected pathways lined with vegetation enhances both human mobility options as well as ecological connectivity with high response rate of (3.83 and 1.179).

The respondents agreed implementing green infrastructure elements that capture and filter rainwater can help prevent water-related issues during heavy rainfall (3.8and 1.276).shared their point of view on increasing vegetation in cities can help mitigate high temperatures during hot weather with high response rate of (4.16 and .983) mean and standard deviation. The same to that, having well-maintained parks or green areas increases property values in surrounding neighborhoods(4.08 and .900).They reflected Parks or nature reserves should be utilized as educational resources to raise awareness about environmental issues within communities (4.17 and .85) as well**.**

4.2.5.2. Descriptive statistics for Connectivity of UGI

S.No	Connectivity of UGI	Mean	Std dev.
1	I feel that the urban green infrastructure is well connected in Addis Ababa city	3.05	1.087
2	The connectivity of urban green spaces influence your decision to visit and spend time there	3.98	1.179
3	It is important for me that different parts of the city are interconnected through green corridors or pathways	4.32	.710
4	Improving connectivity between existing urban green spaces would enhance their overall value and benefits to residents	4.17	.879

/5	I support initiatives aimed at enhancing connectivity within the existing network of urban parks and gardens in your city	3.52	1.148
6	Barriers currently prevent effective connections between different parts/elements/components	4.14	.907
7	Current design and layout of urban green spaces in Addis Ababa support seamless movement and navigation throughout different areas	3.36	1.117
8	There should be dedicated pathways or trails connecting major parks or natural areas within Addis Ababa city's urban green infrastructure network	4.07	.993
9	Existing policies/regulations adequately address issues related to enhancing connectivity within an urban greening framework	3.30	1.188
10	Residents in Addis Ababa are aware about ongoing efforts/initiatives aimed at improving connectivity within their local area's network of parks/gardens/urban forests	2.98	1.176
	Aggregate	3.69	1.04

Table 9 descriptive statistics for connectivity. Source:-computed by research 2024.

As seen from above table 9, the respondents don't have idea on connectivity of urban green infrastructure in Addis Ababa city with response rate of (3.05 and 1.087) mean and st.dev values. They shares idea, the connectivity of UGI influences their decision to visit and spend time there (3.98 and 1.179).It is important for them that different parts of the city are interconnected through green corridors or pathways (4.32 and .710).Respondents agrees improving connectivity between existing urban green spaces would enhance their overall value and benefits to residents (4.17 and .87).They agreed supporting initiatives aimed at enhancing connectivity within the existing network of urban parks and gardens in your city (3.52 and 1.148).

Beside these, they believe there are barriers currently preventing effective connections between different parts/elements/components high response rate (4.14 and .907). As to the respondents, current design and layout of urban green spaces support seamless movement and navigation throughout different areas (3.36 and 1.117) is not well recognized. Even though,

they have idea on having dedicated pathways or trails connecting major parks or natural areas within your city's urban green infrastructure network (4.07 and .993).

The respondents stayed in reactive to existing policies/regulations adequately address issues related to enhancing connectivity within an urban greening framework with response rate of (3.30 and 1.188). There is lack of awareness/information about ongoing efforts/initiatives aimed at improving connectivity within their local area's network of parks/gardens/urban forests with (2.98 and 1.176) mean and st.dev values respectively.

4.2.5.3. Descriptive statistics for Consideration of urban Environmental factors

S.No	Consideration of urban Environmental factors	Mean	Std Dev.
1	It is important to optimize space utilization through innovative design approaches such as vertical gardens or rooftop greening	3.89	1.039
2	UGI should be designed to mitigate environmental issues by incorporating vegetation that helps improve air quality through pollutant absorption and filtration	4.15	.833
3	Taking into account noise reduction measures when designing UGI can help create quieter spaces within the city scale, such as using vegetation buffers or sound-absorbing materials	3.70	1.100
4	Urban Green Infrastructure should incorporate features like rain gardens, bio swales, and permeable surfaces that promote infiltration, reducing the burden on storm water infrastructure	3.94	.942
5	It's crucial to prioritize equitable distribution of UGI across neighborhoods with lower socio-economic status, identifying areas with inadequate greens pace provision.	3.78	1.107
6	It is important to incorporate cultural considerations into UGI designs to reflect the values and preferences of different communities	4.05	.965
7	By considering urban environment factors in UGI planning and implementation, cities can create inclusive, resilient, and	3.93	.883

	sustainable green infrastructure that addresses unique needs, challenges, and opportunities within urban areas while improving quality of life for all residents.		
8	Urban green infrastructure improves air quality in urban areas	3.99	.890
9	Urban green infrastructure improves water management by reducing storm water runoff and improving water quality	3.97	.921
10	Do you believe that the UGI in Addis Ababa city meets the above(1-9)in the current practices	2.88	1.163
	Aggregate	3.83	0.98

Table10descriptive statistics for urban Env'tal factors Source:-computed by researcher 2024.

As illustrated in the above table, Consideration of urban Environmental factors is described by aggregate mean and st.dev value with high response rate of 3.83 and 0.98 respectively. The respondents agreed optimizing space utilization through innovative design approaches such as vertical gardens or rooftop greening (3.89 and 1.039), UGI should be designed to mitigate environmental issues by incorporating vegetation that helps improve air quality through pollutant absorption and filtration (4.15 and .833).Taking into account noise reduction measures when designing UGI can help create quieter spaces within the city scale, such as using vegetation buffers or sound-absorbing materials (3.70 and 1.100). Urban Green Infrastructure should incorporate features like rain gardens, bio swales, and permeable surfaces that promote infiltration, reducing the burden on storm water infrastructure (3.94 and .942).

According to this study, It's crucial to prioritize equitable distribution of UGI across neighborhoods with lower socio-economic status, identifying areas with inadequate greens pace provision(3.78 and 1.107).The respondents agreed the importance of incorporating cultural considerations into UGI designs to reflect the values and preferences of different communities (4.05 and .965). Moreover, considering urban environment factors in UGI planning and implementation, cities can create inclusive, resilient, and sustainable green infrastructure that addresses unique needs, challenges and opportunities within urban areas while improving quality (3.93 and .88). Urban green infrastructure improves air quality in urban areas (3.99 and .890) and improves water management by reducing storm water runoff and improving water quality (3.97 and .921). However, they have central idea between agree and disagree on

the UGI in Addis Ababa city meets the environmental factors considerations in the current practices(2.88 and 1.163),

4.2.5.4. Descriptive statistics for Cooperation with local stakeholders

S.No	Cooperation with local stakeholders	Mean	Std. Dev.
1	By involving residents from the early stages of planning and design, stakeholders can provide valuable insights, integrate their needs and preferences, and foster a sense of ownership over the UGI project	3.99	.979
2	Partnerships can bring expertise, funding opportunities, volunteer engagement and support networks that enhance the implementation process.	3.80	.954
3	Providing training programs or workshops for residents or community group son topics related to UGI such as gardening techniques, native plant selection; water sustainability practices will help knowledge exchange and capacity building	4.09	.885
4	establishing responsibilities, duties, timelines, and maintenance protocols, to ensure that these green infrastructures are properly cared for and remain functional over the long term	4.07	1.074
5	Cooperation with local stakeholders also involves ongoing monitoring and evaluation of UGI projects to assess their effectiveness, identify areas for improvement, and incorporate feedback from residents and users	4.00	1.049
6	I have confidence in UGI's ability to provide equitable distribution of green spaces across different neighborhoods within cities?	3.91	1.252
7	I am confident that stakeholders' opinions are considered during decision-making processes related to planning and implementing UGIs	2.65	1.459
8	Collaboration between different stakeholders (government agencies, NGOs, residents) is vital for effective management and maintenance of urban greening initiatives	3.93	1.184

9	Do you agree, the UGI in Addis Ababa city meets the above (1-8) in the current practices?	2.42	1.181
	Aggregate	3.65	1.11

Table 11 descriptive statistics for cooperation. Source:-computed by research 2024.

The results in above table reveals as to respondents, by involving residents from the early stages of planning and design, stakeholders can provide valuable insights, integrate their needs and preferences, and foster a sense of ownership over the UGI project with (3.99 and .979)response rate. Partnerships can bring expertise, funding opportunities, volunteer engagement and support networks that enhance the implementation process (3.80 and .954). According to this study, Providing training programs or workshops for residents or community group son topics related to UGI such as gardening techniques, native plant selection and water sustainability practices will help knowledge exchange and capacity building (4.09 and .885).

Establishing responsibilities, duties, timelines, and maintenance protocols, to ensure that these green infrastructures are properly cared for and remain functional over the long term (4.07 and 1.074).Cooperation with local stakeholders also involves ongoing monitoring and evaluation of UGI projects to assess their effectiveness, identify areas for improvement, and incorporate feedback from residents and users (4.00 and 1.04). The respondents agreed on UGI's ability to provide equitable distribution of green spaces across different neighborhoods within cities (3.91 And 1.252). But, they are not enough confident that stakeholders' opinions are considered during decision-making processes related to planning and implementing UGIs (2.65 and 1.459).

Collaboration between different stakeholders (government agencies, NGOs, residents) is vital for effective management and maintenance of urban greening initiatives (3.93 and 1.184) as to the results of this study revealed. Furthermore, they disagree on the statement UGI in Addis Ababa city meets stakeholders' cooperation in the current practices with (2.42 and 1.181) mean and standard deviation values respectively.

4.2.6 The extent of incorporation in current green space planning practices in Addis Ababa.

Regarding the extent of incorporation of main principles in current green practices; the student researcher interviewed the selected representatives from the targeted populations. Re-

search deserves qualitative analysis as the adopted methodology in this study. Thus, the selected stakeholders perceptions, concepts and attitude on current UGI development practices assessed through interviewee guides, document reviews and physical observation accordingly.

To pass through thematic analysis steps, first, research familiarized and breakdown large data into simple and clear categories. Then, the initial codes generated, searched for themes, and reviewed the theme across the subsequent objectives and documents as well. Finally, the theme named and defined by the extent of implementation (low, medium and full), Incorporation in current practices (rarely, sometimes, always and often), stakeholders Involvement (pre attention, focal attention, comprehension and elaboration), Application level (planning and execution) Engagement (action, Inform, Consult and Collaborate) and the results reported.

According to the interviewee results, the extent of implementation of main principle of urban green infrastructure in the current practices is in medium level as to organizations. In their experience more of the key informants believe that the principles of urban green infrastructure incorporated some times in the current practices. Moreover, the key informants' share the same idea on involving residents/stakeholders from the early stages of planning and design.i.e. They agree on the level of involvement is in comprehension level followed by elaboration. Meaning that the current practices are not potentially in standard track, it lacks regulatory system and professional outlook. Rather committed to someone's will.

Nevertheless, the respondents are no confident enough/not perceive the stakeholders involvement in current practices of UGI development. As to environmental organizations, the principles of UGI are applied in the current practices in planning and execution in some. Implying that, the consideration of main principles is recorded and thought both in plan and implementation strategies as research confirmed during data collection process. And They rate engagement practices related to Urban Green Infrastructure projects as it is in consult level which means the two way information and communication among the rather than informing. Furthermore, the information of the key interviewee shows the rare incorporation. This implies the main principles of UGI are not fully practicing in current development initiatives. Hence, it challenges the process to attain sustainability.

With regard to the room for improvement in terms of stakeholder engagement practices employed during planning and implementation phases related to Urban Green Infrastructure projects is in Consultation stage. This implies the respective stakeholders are informed about the

ongoing projects and they have the opportunities to express their insight, the decision makers catch insights from them ass input, meaning two way communication. But, the stakeholders have no/less room for enforcing rather than inputting. As revealed in above theme, the stakeholders have idea on the existence and rarely incorporation of urban green infrastructure principles in the current practices.

4.2.6 Stakeholders conceptual perception on UGI

The stakeholder's perception and concepts on the current UGI practices assessed through thematic analysis in the same way as discussed above by defining the themes as follows Considerations (planning, imagination and creativity), perceptions (stimulation, organization, interpretation and memory and recall), relative awareness/concept (information, feedback/consultation, peer interaction/collaboration).

Most the environmental organizations consider the concepts, attitude and perceptions of different stakeholders in urban green infrastructure implementation only in the planning and rare in imagination and creativity manners. Regarding the accessibility and benefits of sustainable urban green infrastructure for their business, locals are perceived in organization and integration level which memory and recall is expected. More specifically, as to the (KI-8) in advance to this "stakeholders awareness is increasing and there is maturation of perceptions after the project."

Of course this research shows that the stakeholders' have idea/experience/participation in urban green infrastructure development. And especially, local businesses contribute with variety of aspects in feedback and consulting level that more of the interviewee believes. Environmental organizations considers the concepts, attitude and perceptions of different stakeholders in urban green infrastructure in planning phase only in the implementation, local businesses perceive the accessibility and benefits of sustainable urban green infrastructure for their business in organization level and they contribute in feedback and consultation level or two way communication.

4.3The challenges associated with sustainable urban green infrastructure development in Addis Ababa.

Based on the interview data, the finding of the study revealed that the following are the major barriers/challenges retard the effectiveness of urban green infrastructure in Addis Ababa city:

Responsibility matters regarding the ownership of public green spaces, the monitoring and controlling weakness, green land spaces holder's awareness limitations, malfunctioned of

built up area due to design and less capability, Lack of integration among users as well as respective experts and authorities, Limited awareness regarding benefits from green infrastructure, Problems in specifying plants for location and natural connectivity systems, Information's from government doesn't match with reality on the ground, Implementation without profession, Campaign based temporary practices missing the aims of urban green infrastructure, leading to false report.

The above lists of challenges in current UGI development can be systematically categorized under one of the underneath table in integration. For example Responsibility matters regarding the ownership of public green spaces, The monitoring and controlling weakness, malfunctioned of built up area due to design and less capability and Lack of integration among users as well as respective experts and authorities, are a technical difficult in implementation.

Green land spaces holder's awareness limitations, Limited awareness regarding benefits from green infrastructure, Problems in specifying plants for location and natural connectivity systems are consequences of Limited public awareness/education about the benefits of UGI. Whereas, Information's from government doesn't match with reality on the ground and Campaign based temporary practices missing the aims of urban green infrastructure, leading to false report are of the challenges that emanate from Lack of political will/support for such initiatives. So as to the research results revealed, the challenges are consistent while the case and effect relationship is under question. The main barriers or challenges from 1(most significant) to 5 (least significant) to implementing urban green infrastructure in cities as to their opinion and experience.

Challenges	**Priority as to officials and experts**													
	Informant -1	Informant -2	Informant -3	Informant -4	Informant -5	Informant -6	Informant -7	Informant -8	Informant -9	Informant -10	Informant -11	Informant-12	Informant -13	Mode
Lack of funding/resources	2	3	2	1	1	2	1	2	1	4	4	5	3	2

Limited public awareness/education about the benefits of UGI	1	1	1	4	3	1	4	1	2	1	3	1	2	1
Resistance from local communities or stakeholders	4	4	3	5	5	4	3	4	5	5	5	2	5	5
Lack of political will/support for such initiatives	5	5	5	2	4	5	2	5	4	3	2	3	1	4
Technical difficulties in implementation	3	2	4	3	2	3	5	3	3	2	1	4	4	3

Table 12 ranked challenges as to experts. Source:-computed by researcher 2024.

The above table demonstrates, Limited public awareness/education about the benefits of UGI is most significant challenge, followed by Lack of funding/resources ,Technical difficulties in implementation and while Lack of political will/support for such initiatives and Resistance from local communities or stakeholders are the least significant challenges according to this study.

As to this study, Weak collaboration and communication were found for creating professional barriers as well as hindering the exchange of knowledge between them. As stated by Håkansson (2000), "a municipal public administration is not a unified organization, but is instead populated by a number of different professional groups, each an expert in its own field. Experts belong to various municipal administrative units, all of which have developed their own traditions and procedures, which influence their work." This separation amongst the municipal departments was quite evident in the municipalities.

Furthermore, each department was focused on their specific specialization, often overlooking and not showing interest in issues outside of their professional knowledge, such as green qualities. With improved communication and collaboration the different municipal departments could share and develop knowledge and thereby bring their professional expertise to bear on integrating green qualities. However, even with the understanding and acceptance of the importance of collaboration and communication, methods for collaboration were not well developed (Sara et al., 2015)

4.4 Discussion

The widely known principles of UGI **(**Multi-functionality, connectivity, inclusiveness and its incorporation in the current UGI practices) are reinforced by consideration of urban environmental factors in recognition as the study result shows. The high response rate (92%) is because of the respondents interests and volunteer (ethics) were considered during the dispatch time. Similar to the study reported by (Yeshitila.K, 2020), more female (56.2%) than male respondents, The high proportion of respondents in the age group 18–28 (34.7%) corresponds to the proportion of individuals in the same age category in the city as a whole (65%). the higher number of respondents in this study have a relatively joined elementary (27.3%) and have degree (27.3%) level of education.

4.4.1Incorporating Principles of urban green infrastructure development and green space practices

Urban green infrastructure development is strategic tool to provide ecosystem services in sustained way through its pertinent principles such as multi-functionality that is the main conceptual ideas underpinning green infrastructure. Through the development of Greenways, urban forestry, and urban greening, multi-functionality has become broadly accepted as one of the main tenets of green infrastructure planning (Little, 1990; Ahern, 1995; Beatley, 2000; Konijnendijk, 2003). The study results imply that, even the respondents have concepts on the multi-functionality principle of UGI means there is agreement between ideas on the likert items, but there is no agreement on the statement Multi-functionality of urban green infrastructure is well recognized in Addis Ababa city rather they are neutral. Physical connectivity of green spaces was highlighted by authors (Benedict and McMahon, 2002) as a central principle of green infrastructure.

The development of an integrated systems approach to capital flow states that a process of movement is fundamental to the maintenance of ecological, economic and social systems; green infrastructure enables people to locate, use, and move through accessible multi-functional landscapes (Blackman, 2008). Forests absorb carbon dioxide from the atmosphere, helping combat climate change and having diverse vegetation within cities positively towards local biodiversity conservation (Kumar Singh A, Singh H and Singh J, 2018). Research in the field of ecology suggests that two main strategies, corridors and stepping-stones, can enhance urban habitat connectivity according to Lynch, A. J. (2019).

Creating Effective Urban Greenways and Stepping-stones: Creating interconnected pathways lined with vegetation enhances both human mobility options as well as ecological connectivity. Trees can help mitigate urban heat, but more detailed understanding of cooling effects of green infrastructure are needed to guide management decisions and deploy trees as effective and equitable climate adaptation infrastructure (Ettinger, A.K., Bratman, G.N., Carey, M. *et al, 2024*). A study emphasizes the correlation between green spaces and property values. According to a study by the Trust for Public Land, properties adjacent to naturalistic parks and recreational greenways often see a price increase of up to 20%.

The concept of environmental education can also be made clear through its aims objectives and principles. Parks or nature reserves should be utilized as educational resources to raise awareness about environmental issues within communities (Delphine. I, Liberty. Mandkaiko.M, 2022). Supporting initiatives aimed at enhancing connectivity within the existing network of urban parks and gardens. There are barriers currently prevent effective connections between different components. The current design and layout of urban green spaces in Addis Ababa is in able to support seamless movement and navigation throughout different areas. Policy monitoring and evaluation are important elements of the policy cycle; this help to initiate policy-makers to assess the proper implementation and adjust it as appropriate(Molla.B * ,†,§, C. O. Ikporukpo† and C. O. Olatubara,2019),the results of this study reveals existing policies/regulations not adequately address issues related to enhancing connectivity within an urban greening framework and there is lack of awareness or information about ongoing efforts/initiatives aimed at improving connectivity within their local area's network of parks/gardens/urban forests. Optimizing space utilization through innovative design approaches mitigates environmental issues, prioritize equitable distribution, and incorporate cultural considerations, respondents in the study.

Regarding urban environment factors they have neutral idea between agree and disagree on the UGI in Addis Ababa city considers the environmental factors in the current practices, involving residents, Partnerships, establishing responsibilities, Cooperation with local stakeholders also involves ongoing monitoring and evaluation of UGI projects to assess their effectiveness, identify areas for improvement, and incorporate feedback from residents and users are the mains in urban green infrastructure development practices which influences the attitude and perception of stakeholders that is relevant for the public participation in which supporting systems employed leads to failure or success. They are not enough confident that

stakeholders' opinions are considered during decision-making processes related to planning and implementing UGIs, Collaboration between different stakeholders (government agencies, NGOs, residents) is vital for effective management and maintenance of urban greening initiatives and but the current practices lack these principles and also the showed respondents disagree on the statement, the UGI in Addis Ababa city meets stakeholders cooperation in the current practices.

Among the principle of urban green infrastructure governmental institutions implement Multi-functionality in medium extent mostly accessing green or realizing green coverage in the current practices, there is strong agreement among the informants on it. In their experience they believe the principles of urban green infrastructure incorporated some times in current practices, Sharing the same idea on involving residents/stakeholders from the early stages of planning and design in focal attention and comprehension level, in planning and execution level the principles applied in the current practices as to their organization. There is consulting level room for improvement in terms of stakeholder engagement practices employed during planning and implementation phases related to Urban Green Infrastructure projects as the results showed thematically. The existence and incorporation of urban green infrastructure principles in the current practices is rare that requires further practices.

4.4.2 Conceptual development of urban green infrastructure and public perceptions.

The concepts of urban green infrastructure has been emerged as a pivotal paradigm in the pursuit of sustainable urban development (Rayan et al., 2022). Furthermore, the study by Ian C. Mell, (2010) stated providing an insight into how different user groups, academics and practitioners address and interact with green infrastructure as a concept and as elements of a given landscape. The contemporary nature of the concept can be assessed by examining principles in interpretations of green infrastructure and the rise in academic and practitioner research relating to it. The results of the likert items reveals the relative awareness (concepts) and public perception of respondents on the current UGI main principles, Effectiveness of urban green infrastructure (UGI) in enhancing the quality and livability of cities with and UGI plays a significant role in mitigating climate change and reducing greenhouse gas emissions. Green infrastructure offer a process for developing better places to live through the creation of more appropriate environmental and social design incorporating a ‘greener’ or sustainable ethos and also this study examined sustainability is still not viewed by some as a necessity, meaning there is confusion among the stakeholders.

A further aim of this thesis is to examine outlining how different stakeholders develop their perceptions and values of green infrastructure in order to assess how these interpretations are being translated into planning policy, UGI practices and the use of these landscape resources. According to (Ian C. and Mell, 2010) these are comparisons that will be explored to examine how, and why, landscapes are developed in different ways in different locations. In this study, the respondents have general notion about UGI effectively improves air quality by filtering pollutants and providing oxygen, in the same view they perceive UGIs contribution to biodiversity conservation within urban areas, UGI's ability to manage storm water runoff and reduce flooding risks.

The respondents disagree on transparency levels maintained by organizations responsible for implementing UGIs while dealing with stakeholder-related matters and they not well-informed they feel about ongoing urban green infrastructure projects managed by relevant authorities, the economic benefits generated by UGI, such as increased property values, job creation, and tourism opportunities and UGI promotes social cohesion and community engagement by providing spaces for interaction and cultural activities, respondents. This study's result prevails the respondents have no idea on local governments involve communities in shaping policies related to urban green infrastructure similar to another study Judy Bush (2020), and disagree on public awareness campaigns aimed at educating citizens about the importance of supporting sustainable practices through initiatives like Urban Green Infrastructure development, partnerships between government agencies, private organizations, NGOs (non-governmental organizations), etc., contribute positively towards successful implementation of Urban Green Infrastructure projects , the respondents agrees it is important to involve local communities in the planning and implementation of urban green infrastructure projects supported by ideas' i.e. means urban green infrastructure can enhance biodiversity and support wildlife habitats in cities

Research by Davies C, Hansen R, Rall E, et al., (2015) outlines Green Infrastructure concept With respect to prior principles connectivity and multi-functionality, and these planning principles showed a high degree of uptake across the cases, with little regional variation. They place value on having access to urban parks, gardens, or other forms of green spaces within city, Uncomplimentary with the statement, the current urban planning process considers stakeholder perspectives when developing or expanding urban green infrastructure projects, respondents agree on Urban green infrastructure can contribute positively to mental health by providing opportunities for relaxation and stress reduction and urban green infrastructure pro-

jects to consider the needs and preferences of different age groups (children, adults, elderly), to address social equity and ensure equal access to green spaces for all members of the community, they perceive urban green infrastructure can contribute to climate change mitigation and adaptation in cities and, the respondents are neutral on the current maintenance and upkeep of existing urban green spaces are being managed in their city with and they agree on Urban green infrastructure has the potential to increase property values within surrounding areas.

The discourse by other researchers (Derkzen M, van TeeffelenA, Verburg P, 2017) reveals Respondents had a notion of and concerns about climate impacts, but did not necessarily acknowledge that GI may help tackle these issues. Yet, when residents were informed about the adaptation capacity of different GI measures, their preferences shifted towards the most effective options. Organization believes or considers the concepts, attitude and perceptions of different stakeholders in planning, imagination and creativity level in urban green infrastructure implementation, even if the locals recognizing peer interaction, but their participation in urban green infrastructure development is one way information system and their contribution is they asked to give feedback and consult some times. The accessibility and benefits of sustainable urban green infrastructure development perceived by local businesses in organization and implementation level, there was confusion whether or not principles existence and incorporation in the current practices.

4.4.3 Stakeholders attitude towards the current practices of sustainable urban green infrastructure

Thematically analysis by authors (Jim C, Chen W 2006) on Perception and Attitude of Residents towards Urban Green Spaces in china has reported more positive attitude than negative attitude towards UGI. The results of this study shows the residents have positive attitude towards Urban green infrastructure enhances the aesthetic appeal of cities, Urban green infrastructure helps mitigate the effects of climate change, investing in urban green infrastructure is a cost-effective way to improve overall city well-being, the presence of urban green spaces positively impacts mental health and well-being among residents.

But they have neutral attitude towards Local governments should prioritize investment in developing and maintaining urban parks and gardens with unlikely to the study by (KaczynskiA, Crompton J, 2006).Unlike priority, the positively accepts the idea Urban agriculture initiatives should be encouraged as part of sustainable development strategies mean value,

The involvement of local communities is crucial for successful implementation and maintenance of urban greening projects, Educational programs on environmental awareness should be integrated into school curricula to promote understanding about the importance of preserving natural resources through initiatives like planting trees or creating community gardens, The presence of urban trees and vegetation reduces noise pollution in cities, Investing in urban green infrastructure attracts tourists, boosts local economies, and creates job opportunities, Community engagement is essential for the successful planning and design has strong agreement with study results (AshinzeU, Edeigba B , Umoh A et al.,2024)Urban green infrastructure and its role in sustainable cities that comprehensively reviewed the functions of urban green infrastructure.

Regarding implementation, and maintenance of urban greening projects, Urban planners should prioritize integrating nature-based solutions into city development plans to maximize the benefits of green infrastructure and Public awareness campaigns are necessary to educate residents about the importance of preserving existing green spaces within cities. The study, Integrating green infrastructure, ecosystem services and nature-based solutions for urban sustainability by (FangX,LiJ,Ma Q, 2023) highlighted literature review upholds the protocols as to the examining attitudes towards strategic tool development. as similar to this study, the another scholars (Olivero-Lora S, Melendez-Ackerman E, Santiago L et al., 2020) explored positive attitudes and expressed preference toward trees might be more influential in tree abundance than expressed negative attitudes.

It was seen from the results that the stronger agreement between respondents on principles, roles and functions of urban green infrastructure positive attitudes than negative attitude. The attitude level of the different stakeholders on urban green infrastructure developments rated from cognitive to internalization and currently reached or is between affective and behavioral intention and highly in compliance level that has to be at identification and internalization level.

4.4.4 The challenges and sustainability of urban green infrastructure.

It was found that population change is having an effect on strategic green space planning. Cities with stagnant or declining populations have more difficulties with implementation (i.e. ensuring continuing green space development and quality) than those in growing cities. However growing cities have more acute pressure especially surrounding the loss of green space

to development. It was also noted that the largest cities were more inclined towards a strategic approach; this was attributed to these cities having the critical mass and finance to employ strategic green space professionals and that in some cases they were seeking to portray themselves as 'world class cities' with green space offered as part of their wider plans to be cultural destinations (Davies C, Hansen R, Rall E, et al., 2015).

The study by Azagew and Worku (2020) stated there are many factors that contributed to the degradation and inaccessibility of UGI in the city as mentioned above in problem statement. The another research also advocated Limited awareness and understanding of the benefits provided by UGI components among the communities and decision makers are also factors for inadequate provision of high-quality UGI components (Lamson-Hall, P, 2019).in this study the researcher caught the associated challenges from qualitative data and discussions with respective, the followings are those prioritized challenges: - Limited public awareness/education about the benefits of urban green infrastructure, Lack of funding/resources , Technical difficulties in implementation, Lack of political will/support for such initiatives and Resistance from local communities or stakeholders from least significant challenge to most significant respectively.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

This chapter briefly discusses the findings of the study and concludes the findings based on the general and specific objectives of the research. The study was aimed at examining the concept, attitude and perception of selected stakeholders towards sustainable urban green infrastructure developing, and assessing the conceptual perceptions of stakeholders on the current practices of urban green infrastructure, analyzing the extent to which the main principles of urban green infrastructure are incorporated in current green space planning practices, assessing the attitude level of the stakeholders toward selected UGI principles, identifying the major challenges associated with sustainable urban green infrastructure development in Addis Ababa. At lasts, the recommendation part that was constructed from all chapters including further research directions were overlooked as whole. To meet the above research objectives, relevant data were gathered from stakeholders using questionnaire and interview.

5.1 The study findings

According to the purpose of this study, which was concentrated in selected stakeholders in Addis Ababa, the general objective of this research was to examine concept attitude and perception of selected stakeholders on UGI development. The subsequent objectives was; to assess the conceptual perceptions of stakeholders on the current practices of urban green infrastructure, To analyze the extent to which the main principles of urban green infrastructure are incorporated in current green space planning practices, to assess the attitude level of the stakeholders towards selected UGI principle and to identify the major challenges associated with sustainable urban green infrastructure development. Instruments used by research for data collection were questionnaires at 92% return rate, key interview informants, and personal observation. The Major findings of this research were the followings: -

5.1.1 Concepts and Perceptions on the Main Principles of UGI

There is a cognitive level concept of stakeholders towards main principles of UGI. According to the research findings, the existence of Multi-functionalities of UGI and its incorporation, connectivity of UGI and its incorporation in the current practices, consideration of urban environmental factors and Local stakeholder's cooperation was recognized by respondents, Multi-functionality of urban green infrastructure is not well recognized in Addis Ababa city, the respondents didn't feel connected the urban green infrastructure is in Addis Ababa city,

residents are not aware about ongoing efforts/initiatives aimed at improving connectivity within their local area's network of parks/gardens/urban forests, respondents disagree or neutral on the current UGI development practices considers urban environmental factor and also stakeholders cooperation in the practices. The respondents have concept on Effectiveness of urban green infrastructure (UGI) in enhancing the quality and livability of cities, its significant role in mitigating climate change and reducing greenhouse gas emissions, improves air quality by filtering pollutants and providing oxygen, UGI contributes to biodiversity conservation within urban areas.

They understand there is no transparency maintained by organizations responsible for implementing UGIs while dealing with stakeholder-related matters are not well-informed they feel about ongoing urban green infrastructure projects managed by relevant authorities, local governments does not involve communities in shaping policies related to urban green infrastructure, there is less public awareness campaigns aimed at educating citizens about the importance of supporting sustainable practices through initiatives like Urban Green Infrastructure development, partnerships between government agencies, private organizations, NGOs (non-governmental organizations), etc., contribution is not fully positive towards successful implementation of Urban Green Infrastructure projects, The current urban planning process failed to consider stakeholder perspectives when developing or expanding urban green infrastructure projects, the unremarkable maintenance and upkeep of existing urban green spaces in the city.

5.1.2 The Extent of Incorporation of Main Principles in Current Practices

From the research findings, Multi-functionality principle of urban green infrastructure especially green accessibility is implementing at medium level in the current practices, Stakeholders believed sometimes the principles of urban green infrastructure incorporated in current practices, stakeholders involved in comprehension level from the early stages of planning and design, the extent of UGI development principles application in the current practices is in planning and execution level, Room for improvement in terms of stakeholder engagement practices employed during planning and implementation phases related to Urban Green Infrastructure projects is in consulting level followed by informing.

The incorporation of urban green infrastructure principles is rare in the current practices according to the study. According to the thematic findings of this research, Local businesses

perceive the accessibility and benefits of sustainable urban green infrastructure for their business in organization and interpretation level.

5.1.3 Stakeholders Attitudes towards UGI

As the result of this research reveals the respondents have positive attitude towards the statement: - Urban green infrastructure enhances the aesthetic appeal of cities, it helps mitigate the effects of climate change, Investing in urban green infrastructure is a cost-effective way to improve overall city well-being, the presence of urban green spaces positively impacts mental health and well-being among residents, Urban agriculture initiatives should be encouraged as part of sustainable development strategies, The involvement of local communities is crucial for successful implementation and maintenance of urban greening projects, Educational programs on environmental awareness should be integrated into school curricula to promote understanding about the importance of preserving natural resources through initiatives like planting trees or creating community gardens.

Moreover, the presence of urban trees and vegetation reduces noise pollution in cities, Investing in urban green infrastructure attracts tourists, boosts local economies, and creates job opportunities, Community engagement is essential for the successful planning, design, implementation, and maintenance of urban greening projects, Urban planners should prioritize integrating nature-based solutions into city development plans to maximize the benefits of green infrastructure, Public awareness campaigns are necessary to educate residents about the importance of preserving existing green spaces within cities.

While they have neutral attitude on the statement: - Local governments should prioritize investment in developing and maintaining urban parks and gardens. According to this research results the attitude level of the different stakeholders on urban green infrastructure developments rated compliance level.

5.1.4 Challenges Associated with UGI Development

The effectiveness of urban green infrastructure is retarded by the barriers and challenges: - Responsibility matters regarding the ownership of public green spaces, the monitoring and controlling weakness, green land spaces holders awareness limitations, malfunctioned of built up area due to design and less capability, Lack of integration among users as well as respective experts and authorities, Limited awareness regarding benefits from green infrastructure, Problems in specifying plants for location and natural connectivity systems, Information’s

from government doesn't match with reality on the ground, Implementation without profession and Campaign based temporary practices missing the aims of urban green infrastructure, leading to false report.

In general this study shows there are most significant barriers or challenges to least significant to implementing urban green infrastructure in cities, Limited public awareness/education about the benefits of UGI, Lack of funding/resources, Technical difficulties in implementation, Lack of political will/support for such initiatives and Resistance from local communities or stakeholders respectively.

5.2 Conclusion

Sustainable Urban green infrastructure development is the new and lengthy concept to tackle the environmental related problems. UGI is strategic tool to provide ecosystems services in socially equitable, environmentally friendly and economically viable way. There are acknowledged main principles that guide the UGI development to foot print the sustainability. Multi-functionality, connectivity, consideration of urban environmental factors and cooperation of local stakeholders or inclusiveness are among the main principles. The relative knowledge (concept), attitudes level towards and public perceptions play a role in shaping public support for such initiatives, which can influence their success or failure.

In this study research used different techniques and referred studies, theoretical concepts related to urban green infrastructure development to analysis the data collected through instruments discussed above in chapter 3 in order to answer the research questions and to meet its main and subsequent objectives. To meet subsequent objectives: - assessing the conceptual perceptions of stakeholders on the current practices of urban green infrastructure research attempt was through questionnaire containing ten concept items or statements and twelve statements about perception and interviewee guide consisting three open ended questions to express their feeling on UGI development. the extent to which the main principles of urban green infrastructure are incorporated in current green space planning practices are analyzed through assessing concept, idea, experiences and document review by help of questionnaires and interviewing, the same technique is applied to assessing the attitude level of the stakeholders toward selected UGI principles and to identifying the major challenges associated with sustainable urban green infrastructure development.

According to the study finds the respondents, local businesses, environmental organizations and governmental officials or experts have stimulation level of concept on main principles of UGI, the existence of Multi-functionalities of UGI and its incorporation, connectivity of UGI and its incorporation in the current practices, consideration of urban environmental factors and Local stakeholder's cooperation that has to be upgrade to memory and recall level. The extent to which main principles incorporated in current practices is in low level as to the respondents.

The research results of this study reveal the stakeholders have positive attitude towards UGI developments which is in between cognitive and compliance level that has to escape to identification and internalization level. Regarding the last objectives, Limited public awareness/education about the benefits of UGI (the most significant) and Resistance from local communities or stakeholders (least significant) are among challenges associated with the implementation in the current green spaces practices.

The study answering the research questions rose, how do the stakeholders conceptually perceive the current practices of sustainable urban green infrastructure development in Addis Ababa? The stakeholders have immature which is in stimulation level concepts about the UGI benefits as well as the existence and incorporation of main principles in the current practices consequently they perceive there is no transparency levels maintained by organizations responsible for implementing UGIs while dealing with stakeholder-related matters and no well-informed they feel about ongoing urban green infrastructure projects managed by relevant authorities.

To what extent the main principles of sustainable urban green infrastructure have been incorporated in current green space planning practices in Ethiopia? Multi-functionalities of UGI especially green accessibility is incorporated in low level, connectivity principle of UGI in the current practices not well at all, consideration of urban environmental factor is incorporated in medium level in indirect way as the results of the research shows and the inclusiveness or Local stakeholders cooperation in urban green infrastructure projects is failed to meet its objective according to this research result reveals.

Do stakeholders have balanced/harmonious Attitude with the principles of UGI? To Most of the statements regarding the attitudes towards urban green infrastructure development, the respondents have positive attitude as well the key informants do share the same and agrees on the existence and need of main principles which has to enhance the level.

What are the challenges associated with sustainable urban green infrastructure development in Addis Ababa? According to the study, limited public awareness/education about the benefits of UGI, most significant and Resistance from local communities or stakeholders is least significant challenge associated with implementation.

5.3 Recommendations

Based on the results, findings and conclusion research intended to recommend so as tackling the challenges/ barriers related to implementing urban green infrastructure development and attaining sustainability, the followings are research recommendations:- Urban Beautification and Green Development Bureau should advance the information/communication to the public regarding the main principles to increase the concept/ knowledge of urban green infrastructure to enhance from stimulation level to determination and internalization level understanding. Involving residents/stakeholders from the early stages of planning and design should escape to Elaboration level which is currently in comprehension level. Government should prioritize building the professional capacity of the respective officials/experts who are the monitor for the implementations and right person at the right position. Urban Beautification and Green Development Bureau leaders should fix the technical difficulties on the implementation caused by weak or no integration among the disciplines, top down communication and subjective report that doesn't really shows the ground level situations.

Establishing responsibilities, duties, timelines, and maintenance protocols, to ensure that these green infrastructures are properly cared for and remain functional over the long term, By considering urban environment factors in UGI planning and implementation, cities can create inclusive, resilient, and sustainable green infrastructure that addresses unique needs, challenges, and opportunities within urban areas while improving quality. In order to realize the sustainability of urban green infrastructure development, principles should clearly list and incorporated well in the practices. For different sectors the mandates should be clear with no internal and external overlapping due the regulations in integration to assign specific and respective responsibilities.

5.5 suggestions for further researches

This study focused on some selected stakeholders concepts attitude and perception on current practices of sustainable urban green infrastructure in Addis Ababa city and used data's collected from some selected respondents and key informants. In the future further research should be done on the area for different strategic projects by increasing the units of analysis. The same research may preferable in the other cities in the country to see whether or not results show the same.

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APPENDIX

ADDIS ABABA UNIVERSITY

COLLEGE OF DEVELOPMENT STUDIES

CENTER FOR ENVIRONMENT AND DEVELOPMENT STUDIES

MA PROGRAM OF ENVIRONMENT AND SUSTAINABLE DEVELOPMENT

Survey to be completed by **stakeholders**

Dear survey participants,

This study entitled "Examining the concept, attitude and perception of stakeholders on sustainable urban green infrastructure development in Addis Ababa" is conducted in partial fulfillment for the requirement of Master of Arts Degree in Environment and Sustainable Development from Addis Ababa University. The information you provide will only be used for study purpose. Your identity will not be disclosed in any part of the study. Moreover, your participation is voluntary-based and you may withdraw at any time during the data collection phase. The survey will last some 15 to 20 minutes. There is no right or wrong answer; hence feel free to provide answer to the questions below. Thank you very much in advance for your willingness to spare your precious time to participate in this study.

Part I: Biographic information about residents

Sex --- Male ☐ Female ☐

Age 18-28 ☐ 29-39 ☐ 40-49 ☐ 50-59 ☐ 60 and above ☐

Education level informal ☐ elementary ☐ preparatory ☐ degree ☐ master and above ☐

Current address sub city ----------

Part II: Knowledge, Perception and Attitude towards UGI

The followings are the statements please! Indicate your level of agreement by selecting the appropriate response on a scale from 1 to 5, Where: 1 = strongly Disagree 2 = Disagree 3 = Neutral 4 = Agree 5 = strongly Agree

N.B urban green infrastructure (UGI)

No	Likert items/Statements	1	2	3	4	5
A	Multifunctionality of UGI					
1	Multifunctionality of urban green infrastructure is well recognized in Addis Ababa					
2	Forests absorb carbon dioxide from the atmosphere, helping combat climate change.					
3	Having diverse vegetation within cities contributes positively towards local biodiversity conservation					
4	Parks should be easily accessible					
5	Supporting community gardens or rooftop farming projects helps create local food systems with minimal environmental impact					
6	Creating interconnected pathways lined with vegetation enhances both human mobility options as well as ecological connectivity					
7	Implementing green infrastructure elements that capture and filter rainwater can help prevent water-related issues during heavy rainfall					
8	Increasing vegetation in cities can help mitigate high temperatures during hot weather.					
9	Having well-maintained parks or green areas increases property val-					

	ues in surrounding neighborhoods.					
10	Parks or nature reserves should be utilized as educational resources to raise awareness about environmental issues within communities					
B	Connectivity of UGI					
1	I feel that the urban green infrastructure is well connected in Addis Ababa city					
2	The connectivity of urban green spaces influence your decision to visit and spend time there					
3	It is important for me that different parts of the city are interconnected through green corridors or pathways					
4	Improving connectivity between existing urban green spaces would enhance their overall value and benefits to residents					
5	I support initiatives aimed at enhancing connectivity within the existing network of urban parks and gardens in your city					
6	Barriers currently prevent effective connections between different parts/elements/components					
7	Current design and layout of urban green spaces in Addis Ababa support seamless movement and navigation throughout different areas					
8	There should be dedicated pathways or trails connecting major parks or natural areas within Addis Ababa city's urban green infrastructure network					
9	Existing policies/regulations adequately address issues related to enhancing connectivity within an urban greening framework					
10	Residents in Addis Ababa are aware about ongoing efforts/initiatives aimed at improving connectivity within their local area's network of parks/gardens/urban forests					
C	Consideration of urban Environmental factors					
1	It is important to optimize space utilization through innovative design approaches such as vertical gardens or rooftop greening					
2	UGI should be designed to mitigate environmental issues by incorporating vegetation that helps improve air quality through pollutant absorption and filtration					

3	Taking into account noise reduction measures when designing UGI can help create quieter spaces within the city scale, such as using vegetation buffers or sound-absorbing materials					
4	Urban Green Infrastructure should incorporate features like rain gardens, bio swales, and permeable surfaces that promote infiltration, reducing the burden on storm water infrastructure					
5	It's crucial to prioritize equitable distribution of UGI across neighborhoods with lower socio-economic status, identifying areas with inadequate greens pace provision.					
6	It is important to incorporate cultural considerations into UGI designs to reflect the values and preferences of different communities					
7	By considering urban environment factors in UGI planning and implementation, cities can create inclusive, resilient, and sustainable green infrastructure that addresses unique needs, challenges, and opportunities within urban areas while improving quality of life for all residents.					
8	Urban green infrastructure improves air quality in urban areas					
9	Urban green infrastructure improves water management by reducing storm water runoff and improving water quality					
10	Do you believe that the UGI in Addis Ababa city meets the above(1-9)in the current practices					
D	Cooperation with local stakeholders					
1	By involving residents from the early stages of planning and design, stakeholders can provide valuable insights, integrate their needs and preferences, and foster a sense of ownership over the UGI project					
2	Partnerships can bring expertise, funding opportunities, volunteer engagement and support networks that enhance the implementation process.					
3	Providing training programs or workshops for residents or community group son topics related to UGI such as gardening techniques, native plant selection; water sustainability practices will help knowledge exchange and capacity building					
4	establishing responsibilities, duties, timelines, and maintenance pro-					

	tocols, to ensure that these green infrastructures are properly cared for and remain functional over the long term					
5	Cooperation with local stakeholders also involves ongoing monitoring and evaluation of UGI projects to assess their effectiveness, identify areas for improvement, and incorporate feedback from residents and users					
6	I have confidence in UGI's ability to provide equitable distribution of green spaces across different neighborhoods within cities?					
7	I am confident that stakeholders' opinions are considered during decision-making processes related to planning and implementing UGIs					
8	Collaboration between different stakeholders (government agencies, NGOs, residents) is vital for effective management and maintenance of urban greening initiatives					
9	Do you agree, the UGI in Addis Ababa city meets the above (1-8) in the current practices?					
E	Perception towards UGI					
1	Effectiveness of urban green infrastructure (UGI) in enhancing the quality and livability of cities					
2	UGI plays a significant role in mitigating climate change and reducing greenhouse gas emissions in Addis Ababa					
3	UGI effectively improves air quality by filtering pollutants and providing oxygen.					
4	UGI contributes to biodiversity conservation within urban areas					
5	UGI's ability to manage storm water runoff and reduce flooding risks					
6	Transparency levels maintained by organizations responsible for implementing UGIs while dealing with stakeholder-related matters					
7	I am well-informed about ongoing urban green infrastructure projects managed by relevant authorities in Addis Ababa					
8	UGI generates economic benefits such as increased property values, job creation, and tourism opportunities					
9	UGI promotes social cohesion and community engagement by providing spaces for interaction and cultural activities.					

10	Local governments in Addis Ababa involve communities in shaping policies related to urban green infrastructure					
11	Public awareness campaigns in the city are aimed at educating citizens about the importance of supporting sustainable practices through initiatives like Urban Green Infrastructure development.					
12	Partnerships between government agencies, private organizations, NGOs (non-governmental organizations), etc., contribute positively towards successful implementation of Urban Green Infrastructure projects in Addis Ababa					
F	UGI Concepts about UGI					
1	Local communities are involved in the planning and implementation of urban green infrastructure projects in Addis Ababa					
2	Urban green infrastructure can enhance biodiversity and support wildlife habitats in cities					
3	I value having access to urban parks, gardens, or other forms of green spaces within my city					
4	The current urban planning process in Addis Ababa considers stakeholder perspectives when developing or expanding urban green infrastructure projects					
5	Urban green infrastructure can contribute positively to mental health by providing opportunities for relaxation and stress reduction					
6	Urban green infrastructure projects should consider the needs and preferences of different age groups (children, adults, elderly)					
7	Urban green infrastructure projects should address social equity and ensure equal access to green spaces for all members of the community					
8	Urban green infrastructure can contribute to climate change mitigation and adaptation in cities					
9	The current maintenance and upkeep of existing urban green spaces are being managed in the city					
10	Urban green infrastructure has the potential to increase property values within surrounding areas					
G	Attitudes toward UGI					

1	Urban green infrastructure enhances the aesthetic appeal of cities.					
2	Urban green infrastructure helps mitigate the effects of climate change					
3	Investing in urban green infrastructure is a cost-effective way to improve overall city well-being.					
4	The presence of urban green spaces positively impacts mental health and well-being among residents.					
5	Local governments should prioritize investment in developing and maintaining urban parks and gardens					
6	Urban agriculture initiatives should be encouraged as part of sustainable development strategies					
7	The involvement of local communities is crucial for successful implementation and maintenance of urban greening projects.					
8	Educational programs on environmental awareness should be integrated into school curricula to promote understanding about the importance of preserving natural resources through initiatives like planting trees or creating community gardens.					
9	The presence of urban trees and vegetation reduces noise pollution in cities.					
10	Investing in urban green infrastructure attracts tourists, boosts local economies, and creates job opportunities					
11	Community engagement is essential for the successful planning, design, implementation, and maintenance of urban greening projects					
12	Urban planners should prioritize integrating nature-based solutions into city development plans to maximize the benefits of green infrastructure					
13	Public awareness campaigns are necessary to educate residents about the importance of preserving existing green spaces within cities.					

Interview guide for local businesses

Type or name of business----------

Main services ----------

1 What is your idea/experience/participation in urban green infrastructure development? If yes what was your contributions?

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2 How do perceive the accessibility and benefits of sustainable urban green infrastructure development for your business? ----------

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3 Share your idea on the existence and incorporation of urban green infrastructure principles in the current practices.----------

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4 What barriers/challenges do you think retard the effectiveness of urban green infrastructure?

1----------

2----------

3----------

4----------

Interview guide for Environmental organizations

Name of organization ----------

Main Responsibility----------

Informant current position ----------

1 How your organization does consider the concepts, attitude and perceptions of different stakeholders in urban green infrastructure development implementation?----------
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2 To what extent and which principles do you think is applied in the current practices as to your organization?----------
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3 Please share your opinion and your organization experience on whether there is room for improvement in terms of stakeholder engagement practices employed during planning and implementation phases related to Urban Green Infrastructure projects.----------
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4 In your opinion, what are the main barriers or challenges to implementing urban green infrastructure in cities? Please rank the following options from 1 (most significant) to 5 (least significant):

- Lack of funding/resources.
– Limited public awareness/education about the benefits of urban green infrastructure.
- Resistance from local communities or stakeholders.
- Lack of political will/support for such initiatives.
- Technical difficulties in implementation

Interview guide for Government officials and experts

Name ---------- Sex Male ☐ Female ☐

Education level Elementary ☐ Preparatory ☐ Degree ☐ Master's degree and above ☐

Current position Expert ☐ Team leader ☐ Office manager ☐

1 What/which principle of urban green infrastructure does your organization implement in the current practices?----------

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2 How do you rate the attitude level of the different stakeholders on urban green infrastructure developments?----------

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3 In your experience do you believe the principles of urban green infrastructure incorporated in current practices?----------

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4 Share your idea on involving residents/stakeholders from the early stages of planning and design.----------

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5 In your opinion, what are the main barriers or challenges to implementing urban green infrastructure in cities? Please rank the following options from 1 (most significant) to 5 (least significant):

- Lack of funding/resources.
– Limited public awareness/education about the benefits of urban green infrastructure.

- Resistance from local communities or stakeholders.
- Lack of political will/support for such initiatives.
- Technical difficulties in implementation.

ANNEX

S. No	Name of officials/ business/ organization	Informant/s Current position	Education level of informant/s	code
1	AAEPA	Advisory	Masters	KI-1
2	FFE	Director	First Degree	KI-2
3	ASDEPO	Expert	Masters	KI-3
4	ECRC/EFD	Director	Masters	KI-4
5	Kolfe Sub City	Team Leader	First Degree	KI-5
6	Lideta Sub City	Team Leader	First Degree	KI-6
7	Bole Sub City	Expert	First Degree	KI-7
8	Yeka Sub City	Expert	First Degree	KI-8
9	Kirkos Sub City	Expert	First Degree	KI-9
10	Lafto Sub City	COE	First Degree	KI-10
11	AACUBGDB	Team Leader	First Degree	KI-11
12	Lemikura Sub City	COE	First Degree	KI-12
13	Gulele Sub City	Team Leader	Masters	KI-13
14	AAPDCA	Expert	First Degree	KI-14
15	Kality Sub City	Team Leaders	First Degree	KI-15
16	Asche Fast Food	Waiter	Elementary	KI-16
17	Tigist Buna	Steward	High School	KI-17
18	Land Beautifier Bole	Manager	Diploma	KI-18
19	Nati Photo	Cameraman	Certificate	KI-19
20	Marti Restaurant	Owner	Certificate	KI-20
21	Jembero Real State	Site Manager	First Degree	KI-21
22	Strivers Academy	Teacher	First Degree	KI-22
23	Lafto Restaurant	Steward	Degree	KI-23
24	Siyamrbsh Ethiopia res…	Owner	High School	KI-24

25	Sami Resturant	Manager	Certificate	KI-25
26	Lete-mariyam M Clinic	Nurse	First Degree	KI-26