Governance, Planning and Management of Green Infrastructure in Addis Ababa

This Dissertation is Submitted in fulfillment of the requirements for the Degree of Doctor of Philosophy in Urban and Regional Planning at Addis Ababa University

Author: Bosena Yirga

Supervisors:

Kumelachew Yeshetela (Prof.)

Tebarek Lika (Ph.D.)

Addis Ababa, Ethiopia

December, 2022

EiABC, Addis Ababa University

This is to certify that the dissertation prepared by Bosena Yirga, entitled. **Governance Approaches for Green Infrastructure Planning and Management in Selected Ethiopian Urban Areas and** submitted in fulfillment of the requirement for the degree of doctor of philosophy in Urban and Regional planning compiles with the regulations of the university and meets the accepted standard.

Signed by Examining committee

Professor Kumelachew Yeshetela	________________	__________
Supervisor	**signature**	**Date**
Professor Tegegne Gebre-Egziabher	____________	___________
Internal examiner	**signature**	**Date**
Dr. Mesele Negash (Ass.prof)	__________________	__________
External examiner	**signature**	**Date**
Dr Abunu Arega	__________________	______________
Chair person	**signature**	**Date**
Dr.Dagnachew Adugna	______________	___________
Post graduate office director	**signature**	**Date**

Declaration

I, the undersigned,declared that this thesis is is my own and original work and has not been submitted for a degree in any other university and that all sourcesof material used for the thesis have been duly acknoweledged following the scientific guideline of the university.

PhD candidates name: Bosena Yirga

Signiture________________

Cofirmation

This thesis can be submitted for examination with my approval as an institute's supervisor

Supervisor's Name: Kumelachew Yeshetela (Prof.)

Signiture________________

Governance, Planning and Management of Green Infrastructure in Addis Ababa

Bosena Yirga

Addis Ababa University, 2022

Abstract

Green infrastructure is a strategically planned network of natural and semi-natural areas aimed to achieve sustainable development. This infrastructure is shaped by governance approaches, planning, and management of natural resources. Many studies on green infrastructure have been conducted before, while research gaps remain on the governance of planning and management using evaluation criteria for spatial planning, green infrastructure planning principles, green space management models and governance principle, forest management policy approach, governance approaches, and green space fragmentation. The main objective of this thesis is to investigate governance, planning, and management of green infrastructure. The study, therefore, employed a mixed-method approach, quantitative and qualitative research methods. Empirical data were gathered using surveys, interviews, expert panel discussion, document analysis, and observation. Probability and non-probability sampling were used. The Probablity sampling was used to select household respondents and the non-probability sampling used to select experts, park users, park staffs, park service contractors, key informants, and expert panel discussants. The data sources were primary and secondary. Using survey method, the primary data were collected from 74 experts, 70 park users, 15 park staff, 5 park service contracors, and 570 household respondents. In addition, 20 key informant interviews and one expert panel discussion were conducted. The secondary data were obtained from documents literature and web sources.

The findings of this thesis revealed that green infrastructure has been at the initial stage of planning and there are gaps in the way spatial planning includes GI concepts, components, functions,and principles;relying on an authoritarian model of output-legitimacy, sectoral approach, and uncoordinated land-use led to weak governance of UGI planning; the conversion of green spaces, fragmentation, and governance process challenges; the evolution of forest policy characterized by a focus on different kinds of the forest, from production forest, plantation of trees, and to the inclusion of multi-functional forests in the plan; unclear and sometimes blurred division of power contributed to deforestation; the shift in the country's forest policy was embedded in the political economy of the country and emphasized a dominantly elitist approach; changes in planning and environmental policies; significant association between age and environmental knowledge, green space uses, and recognition of ecosystem services, income are the best predictors of government policy,and respondents are more willing to the management of green spaces.

Besides,the shift from the master plan approach to the structure plan help to incorporate ecosystem services and some of GI principles, and the increasing proportion of green structures in the present structure plan can be due to some changes in the role of the government; there is no comprehensive GI policy that can provide a strategic vision for embedding GI in spatial plans; the first, third, and fourth principles were poorly integrated into the plan. While the second principle is being moderately integrated into the plan; the interference of politicians and limited regional and national policy of GI shows little attention is given to the development of UGI; poor park governance practices, however, there is a tendency towards the application of governance by local communities using the User-Centered Model whereby community green spaces are managed by urban communities; changes in forest management show the move from government to governance by the government; the absence of a specific legal framework and policy on GI management and urban forest and recognizing, supporting the activities, and using the potential and preferences of residents will be important.

Therefore,incorporating green infrastructure planning principles, adapting park management models that incorporate three levels of governance, long-term design for additional recreational areas; a governance arrangement that includes participation and inter and cross-sectoral policy approaches; developing zoning regulations, land use plans in a participatory and transparent manner,and the shift from government to governance are needed for sustainable green infrastructure development. the need to focus on a long-term design that encompasses additional recreational areas and to establish integrated green space management. Adapting the strategic park management and park-organization-user model that incorporates three governance levels is also important. Besides, applying a policy arrangement approach is a useful analytical tool to understand and explain the role of actors and policy ch angesin forest managements. Resident's input is necessary for policies and plans. In Ethiopian urban areas, green infrastructure planningand management governance could be improved by using a framework developed for the governance of green infrastructure planning and management to address the future green infrastructure development based on three pillars.

***Keywords**:* Green Space Management; Park Management Models; Policy Approach: Spatial plans; Urban Planning

Acknowledgment

First, I thank Almighty God for empowering me to finish my Ph.D. research. There are many others without whom this dissertation would not exist. My appreciation and deepest gratitude is to my main supervisor, Professor Kumelachew Yeshetela, for having read through all my chapters amidst his busy schedule and guiding me with intelligent questions, comments, and ideas over the years. His guidance was most useful, and his assistance was immeasurable. I want to extend deep gratitude to my co-supervisor, Dr. Tebarek Lika, for guiding me with intelligent questions, comments, and ideas over the years.

I am thankful to Swedish International Development Agency (SIDA) and Addis Ababa University for providing financial support. I also greatly appreciate the technical support of my EiABC staff member, Dr. Aramde Fetene, Dr.Mulugta Maru, and Dr. Efrem G/Mariam. I am grateful to all survey respondents and interviewees for their contributions. Thanks to the officials at the city, sub-city, and local levels for their cooperation in giving me the required data. Also, I am very grateful to my children, Biniyam Mulugeta and Bethel Mulugeta, brother, Zemed Zewdu, sisters, Askal Zewdu, Gonderit Zewdu, and Hanna Zewdu, and friends,Tesfaye Wolde, and others for their encouragement through out my study.

Table of Contents

List of Figures and Tables

List of Figures

List of Tables

List of abbreviations

AACPPO:	Addis Ababa City Plan Project Office
AAOIDPP:	Addis Ababa and Surrounding Oromia Special Zone Integrated Development Plan Project
ACM:	Adaptive Co-Management
ADB:	African Development Bank
CLUVA:	Climate Change and Urban Vulnerability in Africa
CSA:	Central Statistical Agency
GS	Green Space
CGS	Community Green Space
EC:	European Commission
EDRI:	Ethiopian Development Research Institute
FA:	Factor Analysis
FAO:	Food and Agriculture Organization
FDRE:	Federal Democratic Republic of Ethiopia
GGGI:	Global Green Growth Institute
GI:	Green Infrastructure
GIS:	Geographic Information System
LULC:	Land Use and Land Cover
MEA:	Millennium Ecosystem Assessment
MOUDH:	Ministry of Urban Development and Housing
MUDC:	Ministry of Urban Development and Construction
PAA:	Policy Arrangement Approach
PCA:	Principal Component Analysis
UGI:	Urban Green Infrastructure

UN-Habitat:	United Nations Human Settlements Program
UN-ECE:	United Nations Economic Commission for Europe
UTM:	Universal Transverse Mercator
WB:	World Bank
WHO:	World Health Organization
WRGA:	Water Resilient Green Infrastructure in Africa

CHAPTER ONE : INTRODUCTION

1.1. Background to the study

The concept of green infrastructure emerged as a way to secure ecosystem services that depend on appropriate urban planning (Colding, 2011). Green infrastructure (GI) is an interconnected network of multifunctional green spaces that are strategically planned and managed to provide a range of ecological, social, and economic benefits (Kambites and Owen, 2006; Tzoulas et al. 2007) and is a key element in sustainable urban planning (Baro et al. 2015). GI has gained rapid attention in planning theory and policy (Newell et al.2013). Interpretations depend on different contexts of green infrastructure theory and policy (Wright, 2011). GI is defined as ‘‘an interconnected network of green space that conserves natural ecosystem values and functions and provides associated benefits to human populations’’ (Benedict and McMahon, 2002, p.12). Urban Green Infrastructure (UGI) planning is a strategic approach designed and managed to deliver a wide range of ecosystem services (Pauleit et al. 2017, p.5). GI constitutes biodiversity, network, spatial scale, connectivity, multi-functionality, resource management, and sustainability (Williamson, 2003; Davies et al. 2006).

Green infrastructure is gaining more attention as more of the world’s population is becoming urban and as the challenges of maintaining a high quality of life and adapting to climate change are occupying political agendas due to the loss of ecosystems and biodiversity (Davies and Lafortezza, 2017). This, in turn, led to a new urban agenda that promotes environmental sustainability to create a critical connection between the environment, urban planning, and governance (UN-Habitat, 2016). These issues require interdisciplinary studies. Langemeyer (2015), for example, underlined the importance of gaining a better understanding of the combination of nature-based solutions with technical-engineering solutions and governance. Besides, Ostrom (2012) stressed the failure of one-size-fits-all recommendations to impose particular policy solutions. Further, Davies and Lafortezza (2017) indicated the strong link between planning, policy, and governance.

UGI planning aims to develop networks of green spaces in urbanized environments (Davies and Lafortezza, 2017). It creates a multifunctional network on different spatial levels, from a parcel, neighborhood, and city, to regional and national planning (Ahern, 2007; Pauleit et al. 2017). Furthermore, it addresses planning and implementing green space-related policy goals (Hansen et al. 2017). GI planning represents a strategic approach to conservation planning and practices (McDonald, 2005) and transdisciplinary and participatory planning processes (Kambites and Owen, 2006). GI planning also includes an integrative and multifunctional approach that contributes to a broad range of policy objectives related to green space functions (Hansen et al.2016) and contributes to the bottom-up planning processes (Gashu and Gebre-Egziabher, 2020). GI in spatial planning is also gaining more attention since climate change and environmental pressures in urban areas have created a need for new concepts and tools for managing urban development to protect natural and cultural resources and enhances urban resilience (Ahern, 2007; Pozoukidou, 2020).

UGI development is additionally important for city development because it provides multiple benefits, such as biodiversity conservation (Elmqvist et al. 2013), mitigating temperatures and global climate change adaptation (Gargiulo et al.2017; Gill et al. 2007), human well-being improvement (Tzoulas et al. 2007), improving ecological processes, enhance disaster prevention, support sustainability (Gargiulo et al.2017), create social cohesion, and strengthen the process of integration and interacting within current governance and planning structures (Selman, 2009). Its multiple benefits are important, particularly for Africa, because the continent is more vulnerable to global climate change (Hope, 2009), which exerts a devastating impact on socio-economic development.

Studies show the worldwide interest in green infrastructure research from Europe (Benedict and McMahon, 2002; Ahern, 2003; Mell, 2009); Global South (Pauleit et al.2021); Asia (Byrne et al. 2015), and Africa (Schaffler and Swilling,2013). In cities of the Global South, research on UGI and ecosystem services is limited (Haase et al. 2014; Pauleit et al. 2021; Fluhrer and Hack, 2021). These cities lack public or private green spaces (Fluhrer et al. 2021) and weak local governance of GI in Latin America and other countries within the Global South (Breen et al.2020). Compared to the Global North, the Global South, on average, experiences inequities in green space proximity, quantity, and quality (Rigolon et al.2018). The Greening of cities based on green infrastructure and nature-based solutions is further advanced in the context of the Global North and is still in its initial stages in the Global South (de Souza and Torres, 2021). Accordingly, the Global South needs more strategic planning and collaborative governance of UGI (Pauleit et al. 2021).

Chi et al. (2015) found the mean vegetation cover in US cities is 2.2 times that found in Chinese urban areas. Among some of the European cities, the green space coverage ranges from Reggio di Calabria, Italy 18.6% to Ferrol, Spain 46% (Fuller and Gaston, 2009). Giuliani et al. (2021) also indicate the high population density in Geneva, Barcelona, and Goetborg have access to the nearest public green space within 15 min travel time. Besides, Northern and Central European cities constitute 20–40% of urban greens (Fuller and Gaston, 2009). The proportion of urban green spaces is high in the cities of Europe and North America (Kuang, 2019) as compared with developing and underdeveloped countries and cities in high-income countries had higher coverage and better accessibility than cities in low-income countries (Huang et al.2021).

In an African context, studies such as (Schaffler and Swilling, 2013; Van der Walt et al. 2015; Cilliers et al. 2017; Shackleton et al. 2017; Abo-El-Wafa et al. 2017) adopted the concept of green infrastructure for urban areas and only scattered publications refer to the concept of GI (Hansen and Pauleit, 2014). According to Mensah (2014), urban GI is disappearing at an alarming rate in African cities. Cilliers (2010) also stated the value of green spaces is neglected in third-world countries (Cilliers, 2010). GI is also infrequently prioritized in planning and development processes and poorly planned in underdeveloped countries (Mensah, 2014; Cheshmehzangi et al. 2021). Urban ecological studies are also not yet regarded as an important field of research (Cilliers et al. 2013) and lack in-depth studies on ecosystem services (Du Toit et al.2018). Besides, studies mentioning green space or GI are few compared to those mentioning ecosystem services (Du Toit et al.2018). Lindley et al. (2015) and Abo-El-Wafa et al. (2018) considered farmland and vegetated areas to be critical components of GI that reduce the vulnerability of the rapidly developing cities in sub-Saharan Africa. Likewise, there has been little research in developing countries, particularly on the perception of GI (Willemse, 2010).

Ethiopia is one of the most rapidly urbanizing countries in Sub-Saharan Africa (Larsen et al.2019). However, the concept of green infrastructure is new. Only a few studies have been conducted on GI, Gashu, and Gebregziabher (2018) studied the effect of urban land use/land cover on UGI in Hawassa and Bahirdar; Molla et al. (2017; 2020) showed the utilization patterns of UGI and the role of stakeholders in the management of UGI in selected Southern Ethiopia; Girma et al. (2019) investigated the green space supply and UGI planning of the Oromia special zone of Sebeta town in central Ethiopia.

Studies in Addis Ababa show the need to create a large urban green infrastructure network (Yeshitela, 2015). Woldegerma (2016) explained the implications of the urban environment and ecosystem services. Abo-El-Waf et al. (2017) identified a strategic planning tool, and Azagew and Worku (2020) studied the accessibility of UGI and accessibility of public recreational parks (Seifu and Stellmacher, 2021). Studies on urban forests are also limited. Horst (2006) studied the rehabilitation of urban forests; Fetene and Worku (2013) investigated the sustainable use of urban forestry. Deribew (2020) studied the spatiotemporal analysis of urban growth on forest and agricultural land. The loss of green spaces in Addis Ababa was also reported by (Horst, 2006; Fetene and Hailu, 2013; AACPPO 2017; Yeshitela, 2019). Gashu, and Gebre-Egziabher (2018) and Yeshitela (2020) studied the local community's perceptions on the use of UGI in Bahir Dar and Hawassa cities and the attitude and perception of residents on neighborhood parks in Addis Ababa. Eshetu et.al (2021) also show urban green space policies and implementation in Addis Ababa.While a study on governance approaches for green infrastructure planning and management is limited. This research aims to investigate governance approaches for urban green infrastructure planning and management. The context in which investigating governance approaches in implementing urban green infrastructure planning principles, green space management, policies and strategies, urban resident's perception of the role of local government in the management of green spaces, and ecosystem benefits of GI are important to suggest alternative strategies and policy options for integrated development of governance of green infrastructure planning and management in urban centers of Ethiopia.

1.2. Statement of the problem

The world is increasingly urban. The UN (2012) report predicts that the global urban population will reach a total of 121 million people by 2050 (UN, 2012). In developing countries, the urban population will be 5.3 billion by 2050 (UN-Habitat, 2008). The increasing population will be accompanied by Asia and Africa. This growing population in Africa is confronted with addressing the scale of the policy, infrastructure, and service delivery challenges (Resnick, 2021).

The level of urbanization in the most urbanized regions in 2018 ranges from Northern America (82 %), Latin America and the Caribbean (81 %), Europe (74 %), Oceania (68%), and Asia (50 %). While in Africa, about 43 % of its population lives in urban areas (UN,2019). Although the urbanization levels of African countries are relatively low, the proportion of urban is expected to continue (UN,2019). Urbanization has positive and negative impacts on the development of cities. The negative effect is related to the overexploitation of natural resources in and around cities. Consequently, cities require green infrastructure planning and management and ecosystem benefits/services that the urban population used GI for the global threats of climate change.

In Africa, the increasing size of the population is accompanied by unplanned urban growth (Zeluel et al. 2011) and ineffective urban plans (Lall et al.2017). African cities are characterized by fragmented expansion (Lall et al.2017),, which may have led to pervasive urban sprawl across African cities (Koroso et al.2021, affecting Urbanization in less developed countries also led to the overexploitation of natural resources in and around urban areas (FAO, 2018). The depletion of green spaces has been increasing in urban areas of less developed countries, and there is a lack of proper management of green spaces in less developed countries (Darkhani et al.2019). The driving factors that have led to the depletion of green spaces include rapid urbanization (FAO, 2018; UN-Habitat, 2008; Mensah, 2014; Mensah, 2016); and weak institutions for urban development planning, management, and limited municipal budgets (Okpala, 2009).

About 40% of Africa is urban, growing at 1.27% per annum. The country's rate of urbanization is 5 percent a year, making it among the top 10 most rapidly urbanizing countries in the world (World Bank, 2015). In Ethiopia, the urban population is estimated to increase from about 11.9 million in 2007 to 42.4 million in 2037 (CSA, 2012). Ethiopia's urbanization rate is even greater than the annual growth rate of 3.9 % of Africa's urbanization (African Development Bank (ADB, 2005). The urban population will also grow from 15.6% in 2003 to 28.7% in 2030 (UN-Habitat, 2011).

Addis Ababa, the capital city of Ethiopia, rate of urbanization is 8% per annum (Un-Habitat, 2016), with a population size of 3.041 million (CSA, 2012). With an annual urbanization rate of 8%(UN-Habitat, 2016), the city's total population is projected to reach 8,939,000 by 2037(UN, 2018). Rapid urbanization has resulted in natural resource depletion and the degradation of urban green spaces in Addis Ababa (Mpofu, 2013).

In addition, according to Abebe and Megento (2016, p. 259), in the period 2000–2015, green spaces such as plantation forests, forestland, grassland and cultivated land in Addis Ababa shrunken with a net change value of 15.6%, 24.4%, 13% and 16.7% of the total area. Addis Ababa and the Surrounding Oromia Special Zone Integrated Development Plan Project (AAOIDPP, 2013). The land cover rates of loss in Addis Ababa from 2006 to 2011 also constituted 16% of field crops; 33% of grasses; 31% of eucalyptus trees; and 9% shrubs (Woldegerima, 2016, p. 113). Similarly, due to the conversion of field crop and wetlands into built-up land, green space has decreased by 20% between 2011 and 2014 and 32% in 2019 (Yeshitela, 2015;2019). Likewise, natural forests remain only in small pockets around churches and on embassy compounds, covering an estimated area of about 250 hectares only (Horst 2006, p.110). Addis Ababa City Plan Project Office (AACPPO, 2017) also shows the current per-capita available green space is less than 1m2 per person, which is very low compared with the standard set by the World Health Organization (WHO) for Africans, which is 7 m2. To meet the WHO standard, Addis needs an additional 2430 ha of publicly accessible green area.

Regarding forest loss, Fetene and Hailu (2013) indicate the failure of a strict conservationist approach to forest management to protect the existing forest in the upper catchment of Addis Ababa. Similarly, the lack of urban forest policy and forest law and its implementation affects forestry management in Addis Ababa (Horst, 2006).

The depletion of green infrastructure also related to governance issues, such include lack of good land governance, limited participation in the preparation of land use plans, unpublicized plans, poor management of public land, and an urban planning process failing to cope with urban growth, ambiguities and vertical overlap of roles of various levels of government in Addis Ababa (Deininger et al. 2010). Likewise, Plammer (2012) found out corruption risks in Ethiopia are increasing because of weak policy and regulatory framework surrounding land allocation, titling, and management. Chene (2014) explains corruption in the land sector in Ethiopia is a significant problem. For example, most of the green areas and some of the land allocated for road development in the master plan have been transformed into private use (Deininger et al. 2012). Similarly, the lack of legal enforcement by the city land administration (Sisay, 2012) led to illegal land invasion and squatter settlement expansion.

Many global studies on green infrastructure are skewed towards the European sub-region (Mensah 2014), Asia (Said and Mansor, 2011; Kato, 2011), and Global South (Pauleit et al.2021). While African cities lack empirical studies on the status, availability, and accessibility of UGI (Azagew and Worku, 2020), policymakers and administrators in developing countries tend to view GI as a luxury good (Mansor et al. 2017). In Ethiopia, there are few studies on urban green infrastructure. In Addis Ababa (Yeshitela 2015;2019 Woldegerma, 2016; Azagew and Worku, 2020; Seifu and Stellmacher, 2021) the conversion of green spaces, implications of the urban environment, and ecosystem services on urban green space planning, access to public recreational parks, and accessibility of UGI in Addis Ababa. Gashu and Gebre-Egziabher, (2018;2019) focus on the effect of urban land use/land cover and barriers to green infrastructure development and planning in Hawassa and Bahirdar; Admassie (2015) on land-use dynamics in Hawassa; Molla et al.(2017;2020) show the utilization patterns of urban green infrastructure in Southern Ethiopia; and Girma et al., (2019) on green space supply and urban green infrastructure planning of special zone of Oromia region. Apart from these few studies, research on the governance of green infrastructure is scant, and literature has little discussed the theoretical link between governance approaches and green infrastructure. Further, the gap is even more evident when it comes to cities and towns.

Therefore, the main motivation of this dissertation was to bridge the scientific knowledge gap using evaluation criteria, content analysis, analyzing the applicability of green space management models and governance principles; views on green infrastructure planning principles, roles of city government in the management of community green spaces, and the ecosystem service benefits of green infrastructure; policy and institutional gaps on UGI management and plannig; and green space fragmentaions. This research is the first attempt to explore the link between green infrastructure and governance and intends to fill such a gap through a detailed investigation.

1.3. Objectives of the study

1.3.1. General objective

The major objective of the study is to investigate the governance approaches for urban green infrastructure planning and management in urban areas of Ethiopia.

1.3.2. Specific objectives

The specific objectives of the study are to:

1. Evaluate the implementation of urban green infrastructure planning principles in green space plans?
2. Assess urban green infrastructure management and governance; and
3. Examine resident's perception of the roles of city government in the management of community green spaces and the ecosystem service benefits of green infrastructure.

1.4. Research questions

Research questions and their specific objectives:

Specific objective one:

Evaluate the implementation of urban green infrastructure planning principles in green space plans?

1. To what extent green infrastructure planning principles are implemented green space plans of the city?

Specific objective two:

Assess urban green infrastructure management.

1. What are the management models and governance principles applied in the management of green spaces in Addis Ababa?
2. How the policy arrangements influence forest management?

3. How do legal frameworks, policies, institutions, and organizational arrangements influence urban green infrastructure planning and management?
4. To what extent has green space has been fragmented?

Specific objective three:

Examine resident's perception of the roles of city government in the management of community green spaces and the ecosystem service benefits of green infrastructure

1. How residents perceive the roles of city government in the management of community green spaces and the ecosystem service benefits of green infrastructure?

1.5. Scope of the study

This research is delimited thematically from urban environmental governance to green infrastructure governance. From environmental planning, it is delimited to GI planning and management; and from urban infrastructure, to green infrastructure, the focus is on governance approaches relevant to GI and is limited to integrating governance with green infrastructure planning and management. Spatially, this research cover Addis Ababa, the capital city of the country.

1.6. Significance of the study

By planning and implementing green infrastructure planning principles, cities can achieve sustainable development in terms of human well-being, economic, social, cultural, and political development, and climate change adaptation as well. Given the current gaps in incorporating green infrastructure planning in spatial plans, this research contributes to increasing the understanding of planners towards the implementation and development of GI spatial planning; other researchers can use the evaluation criteria used in this research.

Residents' input, green infrastructure planning principles, and management models can also guide future GI development efforts.

This research also sheds light on knowledge gaps, contributes to the urban planning literature and adds knowledge insights into the links between governance approaches and green infrastructure; management models; for planning practices and policy-making; scientific publication; and useful for policy change towards the sustainable long-term governance of green infrastructure planning and management in urbanizing cities.This study also provides valuable insights into literature in urban planning and the social science field of studies.

1.7. Organization of the dissertation

This dissertation is organized into five chapters. The first is an introduction chapter comprising the background of the study, a statement of the problem, objectives, research questions, significance, scope, and organization. The second chapter explains the theoretical framework and conceptual underpinning. Such include concepts, typologies, origin and historical development, the contribution of green infrastructure, urban green infrastructure planning principles, urban planning, governance concepts, theories, approaches, and models. The third chapter describes the study areas and methodology. The fourth chapter explores the results, and the fifth chapter, the discussion part, comprises an analysis and discussions of specific objectives, synthesis of major findings, conclusion, and recommendations.

CHAPTER TWO :LITERATURE REVIEW

This part of the research discusses the definition of concepts, origin and benefits of green infrastructure, green infrastructure planning principles, governance approaches, experience of some cities in the implementation of green infrastructure principles and policies

2.1. Nature and definitions of green infrastructure

There are many definitions of green infrastructure (Wright, 2011). From the conservation perspective, Benedict and McMahon (2002) defined green infrastructure as the ecological framework needed for environmental, social, and economic sustainability (Benedict and McMahon 2002). From the view of planning, green infrastructure is defined as ‘‘a strategically planned and delivered network comprising the broadest range of high-quality green spaces and other environmental features (Natural England 2009). GI design and management should also respect and enhance the character and distinctiveness of an area concerning habitats and landscape types (Natural England 2009, p. 5). In terms of urban-rural connections, Natural England's (2009) defined “Green Infrastructure as established green spaces and new sites thread through and surround the built environment and connect the urban area to its wider rural hinterland’’.

The multifunctional benefits of green infrastructure are viewed from its ability to encompass a connected network of predominantly un-built space that support ecological and social activities and processes (Kambites and Owen 2006). Green infrastructure comprises the provision of planned networks of linked multifunctional green spaces that contribute to protecting natural habitats and biodiversity that respond to climate change and other biosphere changes, and support in improving the long-term planning and maintenance of green spaces and corridors (Countryside Agency in Mell 2009, p.24). These definitions state the roles of green infrastructure planning to provide benefits for the ecological, economic, and social actors.

From the view of sustainability, Williamson (2003) defined green infrastructure as an interconnected network of green space that preserves natural ecosystem functions and delivers associated benefits to human populations. From the view of landscape scales, green infrastructure is defined as ‘‘Natural and engineered ecological systems to provide the widest possible range of ecological, community and infrastructure services’’ (Boyle, 2014, p.4).

2.2.1. Typology of Green Infrastructure

GI is categorized in different disciplines and application contexts (Koc et al.2017). Ahern (1995) classified based on issues of scale, goals, landscape context and planning strategy. Natural England (2009) presents a GI typology consisting of parks and gardens (e.g. urban parks), amenity green space (e.g. domestic gardens, living roofs), natural and semi-natural urban green spaces (e.g. woodland, wetlands, open and running water), green corridors (rivers and canals, road and rail corridors, cycling routes, pedestrian paths) and others such as community gardens, cemeteries, and churchyards. GI is also identified as assets that constitute existing national and local nature reserves, archaeological and historic sites, and functional green spaces such as drainage and flood control areas (Boyle et al. 2014).

Further, Ahern (2002) developed greenways. The UK Green Building Council (2015,p.3) categorized based on multi-scalar features of green infrastructure, which ranges in scale,

"…from individual street trees, green roofs and private gardens through to parks, rivers and woodlands, transport corridors, verges and, at the larger scale, wetlands, forests, and agricultural land".

Green infrastructure is also classified based on three functions or services (Koc et.al. 2017): (a) functional (services), this classification includes the ecosystem functions (provisioning, regulating, supporting, and cultural) and services obtained from nature and the 'multifunctional network, connectivity and accessibility of GI (Mell 2010). In addition, Tzoulas et al. (2007) formulated a framework for the associations between green space, ecosystem, and human health. (b) Structural (form/morphology); this classification helps to understand how different patterns and physical interactions shape a multifunctional network and (c) configurational (spatial interrelationships) attributes of vegetation refer the way elements organize and relate to each other (Koc et.al. 2017). In general, Koc et al. (2017) grouped into four high-level categories; tree canopy; green open spaces; green roofs; and vertical greenery systems on the basis of functionality, morphology, spatial scale, and configuration.

Cameron and Blanusa (2016) viewed urban green infrastructure as an urban green network composed of parks, nature reserves, street trees, gardens, river corridors, ponds, green roofs and walls, farmed land, and allotments, as well as linking elements such as the 'green corridors' found alongside roadways and railway lines and water feature (Cameron and Blanusa, 2016, p.377).

Green infrastructure is also recognized as having the potential to play an important role in climate change adaptation (Gill et al. 2007; Foster et al.2011; European Commission

2013; Matthews and Byrne, 2015). Based on a climatological perspective Koc et al. (2016, p.188) classified into three main categories: vegetation layers, ground surfaces and building structures. Additionally, Mell (2008) and Young et al. (2014) classifications are based on the political, socioeconomic, and ecological values of GI. Both have been demonstrated to be highly applicable for the strategic planning of GI. In relation to this, Davies et al. (2006, p.2) developed using stakeholder participation which shows green infrastructure is made up of a number of diverse landscape features and components and presented a number of classifications proposed to hold a 'green' value.

Green infrastructure can also promote urban sustainability by providing flexible development options that can be retrofitted into the existing fabric of the city (Mell, 2009). Similarly, Ahern (2003*)* stated that space is always limited in cities, doing more than one thing in one place is an obvious and important strategy for urban sustainability. Hansen et al. (2017, p.5) classified green space typology in to eight groups (consisting of 44 elements): natural, semi- natural, and feral, parks and recreation, agricultural land, private, commercial, and institutional; building green, allotment and community gardens, blue space, and river banks which provides an important basis for understanding the functional connections between green spaces and the surrounding built environment.

In an African context, Lindley et al. (2015) and Abo-El-Wafa et al.(2018) stated that green infrastructure includes agricultural land and other vegetated areas, particularly, urban and peri-urban agriculture in African cities provides the provision of food and income for urban residents (Cofie et al. 2003). The South African green space typology is much more limited than the international classification (Schaffler et al. 2013). Most South

African policies and spatial planning frameworks refer only to open spaces, including variants of green space (Schaffler et al. 2013).

In Ethiopia, the Ministry of Urban Development and Construction (MUDC,2015) classified green open spaces in a city into patches (parks, gardens, amenity green open spaces, green open spaces surrounding administrative buildings, cemeteries, natural areas, etc.) and corridors (e.g., river corridors, rights of way, linear parks, etc.). Further, MUDH (2015) stated that the connectivity of green open spaces with each other to create one large UGI network within the city, with green and nature in the urban fringe and outside the city corridors, which connect green spaces throughout the city raise the value of the urban ecological system. In the context of Addis Ababa, the green spaces are categorized into field crops, vegetable farms, public recreational parks, riparian vegetation, plantation forest, institutional forest (mixed forest), street plantation, and grassland (Water Resilient Green Infrastructure in Africa (WGA,2014).

Among the types of green spaces, recreational parks, botanical gardens, and community (neighborhood) green spaces are selected. A community green space in this research refers to small areas located near residential areas to provide green areas for residents and serve as the 'lung' of the city. A botanical garden is a special recreational park with rich biodiversity and a protected area in the city. AACPPO (2017) also describes forests as a network of multi-purpose green spaces that provide ecosystem functions. For the purpose of this research, urban forest refers to all woodlands situated in urban areas and is delineated as urban forests.

2.2. Origin and historical development of green infrastructure

This section deals with the origin and development of the urban green space literature in the UK followed by the development of the urban green spaces. The origin of green infrastructure was associated with the development of industrialization which led to urbanization. However, the physical and institutional infrastructure of cities was not prepared for this unprecedented urban growth, resulting in lamentable living conditions (Eisenman, 2013) and these conditions led to social reforms at the turn of the twentieth century.

Urban green spaces origin is related to the linking of parks, green spaces, and natural areas to benefit people and biodiversity (Benedict and McMahon, 2002). The 'Emerald Necklace' was considered as a model of integration of existing protected lands, ecological corridors, and built linear elements (Ahern, 2003). Olmsted initially developed the Emerald Necklace system in response to flooding from the Charles River (Mell, 2015). The system largely functions today to provide recreation, transportation, water quality, and flood control, scenic amenity, and wildlife habitat (Ahern, 2003).

North American green infrastructure development has its foundations in landscape conservation (Benedict and McMahon 2006). It has historically emphasized the ecological by focusing on GI as a means to ensure the provision of ecosystem services in facilitating more sustainable forms of growth (Lennon, 2014). Green infrastructure in the UK originated when England established a Select Committee to build a park due to a major outbreak of cholera, which led to the 1847 creation of England's first public park (Eisenman,2013, p.289).

Further, due to the rise of industrialization, cities were experiencing massive growth driven by the dissolution of farms in the countryside causing overcrowding and urban sprawl, lacking sanitation and adequate water supplies. caused immense human misery and degradation (Eisenman, 2013). In addition, garden cities were considered the solution to the problems confronting both the cities and countryside (Clark, 2003; Hardy, 2003; Alexander, 2009). Baycan and Nijkamp (2009) identified GI development in European cities. Kabisch and Haase (2013) show urban green spaces provisioning across a large number of European cities from (1990-2006). Green structures and governance processes are linked to GI and multi-functionality of ecosystems and landscape (Artmann et al. 2017) and redirecting wastewater to treatment plants contributed to convert many former industrial sites to green spaces in Germany (Nickel et.al 2014).

GI has mostly been incorporated into planning in Europe. Baycan and Nijkamp (2009) show a coordinated planning system and the involvement of the community in the planning process of northern European cities; Rolf (2016) explained connecting the existing corridors and parks led to city-wide promotion in Germany; According to Bennett and Mulongoy (2006) Estonia is credited for having developed an ecological network concept and elaborating the model into a comprehensive plan and implementation program (Bennett and Mulongoy, 2006).

The compact nature of European cities also allows a social-ecological-approach to green space restoration in Aarhus, Denmark, and integration of stormwater management in Malmo and Sweden (Mell, 2011; Rolf, 2016; Hansen, 2016). In African cities, strengthening GI planning in urban development is viewed as part of climate adaptation

(Lindley et al. 2015), and incorporating green space plans in the development frameworks is better for long-term mental well-being (Tomita et al.2017). The experiences of developed cities could be a lesson for developing countries.

2.3. Contribution of Green Infrastructure

Different literature suggested the major contribution of urban Green Infrastructure(UGI). UGI provides health and amenity benefits, promote urban sustainability, ecological, economic and social development (Benedict and McMahon, 2002; Mell, 2009). GI planning also contributes to improve environmental quality, conserving and enhancing biodiversity, promoting social cohesion, and supporting the shift towards a green economy (McDonald et al., 2005; Pauleit et al., 2017).

2.3.1. Social contribution of Green Infrastructure

The socially inclusive planning is given due consideration for the participation of social groups as it enables all social groups to participate in the process of UGI planning while putting a special emphasis on the most vulnerable ones (Rolf, 2016). In Durban, South Africa, policy initiatives address the needs of vulnerable populations to climate mitigation and adaptation (Anguelovski and Carmin, 2011).

Social inclusion appeared to offer much room for further innovation. For instance, city administrations in Northern and Western Europe are more open to experimenting with participatory approaches towards planning (Hansen et al., 2017). In Freising, Germany, urban green space offers opportunities for relaxation, interaction, and get-togethers in an intercultural garden (Hansen et al., 2017). The commons are also important for the management of green infrastructure. It is a mode of governance for ecological resources (Bollier, 2012).

Studies also identified the importance of community-owned green spaces, as community gardens increase social cohesion (Firth et al., 2011); community gardening skills developed from people with diverse socio-cultural backgrounds contribute to youth development and gardening skills(Krasny and Tidball, 2009); it has the potential to foster environmental outcomes (Krasny, 2009); and the emergence of urban green commons has a close fit to the reorganization of cities (Colding and Barthel, 2013) to address pertinent and emerging problems.

In the context of this research, the commons are used to explain urban community green spaces that the government allocates for greening. The participation of the community in shared decision-making with relevant stakeholders promotes the potential for developing green infrastructure and its ecosystem services.

The urban forest also provides ecological, environmental, economic, and sociocultural benefits to humans (Wu, 2008). The ecological benefits of the urban forest include the ecosystem function and services. It contributes towards landscape connectivity through corridors, networks, and patches which form a nested spatial hierarchy (Carreiro et al.2007); to conserve biodiversity and climate change mitigation (Barona et al.2020). The environmental benefits can be explained in terms of improving air quality by absorbing particulates and pollutants (Wu, 2008); reducing building energy use (Nowak and Dwyer, 2007); The economic benefits are related to the monetary value of amenity benefits in recreation areas (Tyrvainen, 2001).

The sociocultural benefits also include improving neighborhood and city landscape aesthetics (Nowak and Dwyer, 2007); environmental education, and enhancing psychological and human well-being (Nowak and Dwyer, 2007; Peckham and Ordonez, 2013).

2.3.2. Ecosystem benefits of green infrastructure

The concept of an ecosystem is defined as ‘‘a biological community of interacting organisms and their physical environment” (Coutts and Hahn, 2015, p.9770). It also refers to the integration of biotic and abiotic components (Guerry et al.,2015, p.7349). In the early 1990s, an ecosystem approach became a topic of discussion among the research and policy communities (Haines-Young and Potschin, 2010) with the concern on biodiversity and natural resource management (Hartje et al.,2003; Haines-Young and Potschin, 2010). The origin of the concept of ecosystem service dates back to ancient civilizations (Hubacek and Kronenberg, 2013). From the 1990s, it was advocated as a means to facilitate better decision-making by academicians from diverse backgrounds (Costanza et al., 1997).

Benefits of ecosystem services in terms of ecological components consumed to produce human well-being. Hubacek and Kronenberg (2013) indicate ecosystem services as the benefits derived from the functioning of ecosystems. Costanza et al., 1997; De Groot et al. 2002; Daily et al., 1997; Millennium Ecosystem Assessment, 2005 also indicate the ecosystem services as the benefits which people obtain from ecosystems. The reason for the emergence of ecosystem services was associated with human dependence on nature and the need for political support for conservation (Hubacek and Kronenberg, 2013).

The importance of the concept of ecosystem services is also integrated with the decision-making process through classifying, mapping, quantifying, and the valuation of the services (Costanza et al., 1997; De Groot et al., 2002; De Groot et al., 2010; Rounsevell et al., 2010; Hermann et al., 2011; Barau, 2015). The concept is also important for urban planners because understanding the diversity of perspectives and values of ecosystem services is relevant for planning decisions (Colding, 2011; Hubacek and Kronenberg, 2013; Ahren et al., 2014). It is essential not only for biological conservation, natural resource management, and environmental policy (Jax et al.,2013) but also to incorporate into land use planning and management (Gomez-Baggethun and Barton, 2013).

Millennium Ecosystem Assessment (MEA, 2005) classified ecosystem services into four categories: provisioning, regulating, supporting, and cultural services. The provisioning services include food, raw materials, water, and medicinal plants (MEA, 2005; Barau, 2015). The regulating services are benefits obtained by humans from the regulation of ecosystem processes such as regulation of temperature, climate change mitigation, soil protection, habitat for biodiversity, wind barrier, air purification, water flow regulation and runoff mitigation, and absorption of sound waves (Goodness and Anderson, 2013). The supporting service includes maintaining soil fertility, nutrient cycling, genetic diversity, and wild-animal shelter.

On the other hand, cultural services provide non-material benefits by creating social relationships/interactions such as a sense of place; cultural heritage; aesthetics/the beauty of the landscape; education, children's cognitive development, recreation, relieving stress and investments (De Groot et al., 2002; MEA,2005). The cultural services also link green space and human well-being in current urban planning (Tzoulas et al., 2007; Andersson et al., 2014). All categories of ecosystem services contributed to the emergence and development of ecosystem-based adaptation, which increases resilience and climate change adaptation (Roberts et al., 2012). Further, all services are not generated by ecosystems alone but through the complex interactions of social-ecological systems (Andersson et al., 2014).

Several scholars mentioned the ecosystem benefits of green infrastructure in cities. Benedict and McMahon (2002) emphasize the structural and functional connectivity of GI to provide ecosystem services. (Taylor, 2006) identified functional connectivity, which takes into account the movement or flow of organisms through the landscape. GI also aims to spatially integrate, maintain and enhance ecological connectivity (Taylor, 2006). In line with this, the ecosystem benefits are adopted to replace and explain the functions and benefits of green infrastructure from the global to the local scales (Tzoulas, 2007; Lovell et al., 2013; Hansen et al., 2014).

Additionally, GI contributes to biodiversity conservation and enhances ecosystem services (Naumann et al., 2011). It provides abiotic (groundwater, soil development, sequestration of carbon, buffering of nutrient cycling and climate extremes), biotic (habitat for species, provision of genetic reserves), and cultural (environmental education, cultural history, and health) functions (Ahren, 2007, p.269). Its economic benefits are explained in terms of reducing energy and health care costs (Wang et al.,2014) and related to an increased value of houses/properties close to green areas (Wittemyer et al., 2008). For example, Crompton (2006) shows the willingness of many people to pay more for property located close to parks than for property that does not offer this amenity. GI also provides opportunities for environmental policy goals at different levels of urban governance and increasing quality of life (Kabisch, 2015; Mell, 2008) in cities around the world.

In addition, governing ecosystem processes requires coordination across levels of policy and legislation (Peterson et al. 2007). While policies focus narrowly on endangered species or habitats without incorporating ecosystem change over time (Ernstson et al. 2010). To achieve and maintain functioning ecosystems, governance needs to be fitted to and deal with different ecological scales. Among those, the commons as a governance system is important for ecological resources management.

2.4. Urban Green Infrastructure Planning Principles

Scholars define the concept of green infrastructure planning differently. According to (McDonald et al.2005, p.7) there is no "one-size-fits-all" blueprint for green infrastructure plans. Firehock et al. (2013) combine the words 'green' and 'infrastructure' to reflect both the natural systems and infrastructure to be included equally in the planning process. While, Firehock, (2013) defined ''Green infrastructure planning as a strategic landscape approach to open space conservation. This definition notes that green infrastructure planning is or should be landscape conservation planning linking different ecological features and functions.

Green infrastructure planning is also considered an interconnected blueprint for conservation that involves ecologists, land use planners, and development opportunities (McDonald et al. 2005; Firehock et al. 2013). UGI planning creates multifunctional networks on different spatial levels (Hansen et al. 2017). It is also important to design sustainable city systems (Beauchamp and Adamowski, 2013). Green infrastructure planning is different from other types of conservation planning as it focuses on a linked network design (McDonald et al. 2005). While, Hansen et al. (2017) focused on UGI planning that addresses public sector-led process of planning and implementing green space-related policy goals. Accordingly, the following are urban green infrastructure principles.

2.4.1. Green-grey Integration

UGI planning considers urban green as a kind of infrastructure and seeks the integration and coordination of urban green with other urban infrastructures in terms of physical and functional relations (e.g., built-up structure, transport infrastructure, water management system). Artmann (2017) indicates that a more comprehensive perspective of cities and their ecosystems is required in terms of connecting green with grey infrastructure such as buildings and roads. In addition, Davies et al. (2006) considered grey that contribute to the wider functioning of green infrastructure should be treated as part of the green infrastructure network.

The green-grey continuum concept may help to overcome the lack of obviousness of GI compared to grey infrastructure (Davies et al. 2006), which is well understood in the planning process. In addition, Depietri and McPherson (2017) show grey, hybrid, green and blue infrastructures as a continuum from grey infrastructures, to hybrid, to green and blue where hybrid approaches make use of engineering and ecosystem functions together (Table 2.1).

Table 2-1: Flow of infrastructural adaptation options

Grey	Hybrid or mixed approaches	Green and blue
Hard, engineering structures	Blend of biological-physical and engineering structures	Biophysical, Ecosystems and their services
Very limited role of ecosystem functions	Allows for some ecosystem functions mediated by technological solutions	Mainly relying on existing or restored ecosystem functions and water bodies
e.g. canals, pipes and tunnels of the drainage system; dikes; wastewater treatment plants; water filtration plants	e.g. bioswales; porous pavement; green roofs; rain gardens; constructed wetlands; Sustainable Urban Drainage Systems (SUDS)	e.g. wetlands restoration; installation of grass and riparian buffers; urban trees; stream restoration; rivers, lakes, ponds, oceans and seas

Source: Depietri and McPherson (2017, p. 95)

In addition, Tiwary and Kumar (2014) identified the ecosystem function of GI in built-space integrity beyond the direct human benefits under the ‘regulating’ services of GI in lowering the temperature, influencing water availability and regulating air quality. Therefore, the ecological function of GI beyond the direct human benefits contributes for future sustainability of green-grey infrastructure.

From an ecological perspective, Pauleit et.al.(2017) grouped urban green and blue spaces into four broad categories according to their origin: remnants of (a) natural and (b) cultural landscapes, (c) designed green spaces and (d) derelict land. Accordingly, large variations in land uses and green spaces offers potential for GI planning to support biodiversity, to fulfill various environmental functions, and to meet specific human demands (Pauleit et al. 2017, p. 6).

With regard to integration of green-grey infrastructure, Davies *et al.* (2006) viewed green as green-grey continuum. The continuum shows the relationship between the function and use of a space. Besides, Depietri and McPherson (2017) explain the importance of relying on a mix of grey, green and blue infrastructure as solutions to balance traditional built infrastructures with more nature-based solutions and the combination of green, blue and grey are beneficial solutions against hurricane, cyclone, typhoon and storm surges in urban areas. Besides, Pauleit et al. (2017) categorize urban nature based on variations in land uses and green spaces to provide ecological function. While, Tiwary and Kumar (2014) show the relevance of GI for future sustainability of green-grey infrastructure in terms of regulating services of GI.

2.4.2. Ecological network and connectivity

The second type of urban green infrastructure planning is urban ecological networks and connectivity. Urban ecological networks are complex and dynamic phenomenon due to various definitions and meanings across different disciplines (Ignatieva et al. 2011; Lafortezza et al. 2013). From a landscape ecology point of view, urban and rural ecological networks are important in providing for corridors, connectivity, and wildlife movement (Ignatieva et al. 2011, p.17).

The ecological network includes core areas, corridors, and buffer zones (Jongman et al. 2004, p.3) to ensure biodiversity conservation through protecting high species richness (core areas) and connecting them through corridors that should enable species to move across unsuitable areas (Boitani et al. 2007, p.1416). Further, Landscape Institute (2016) described the following components of an ecological network which include many different components of green infrastructure (Figure 2.1).

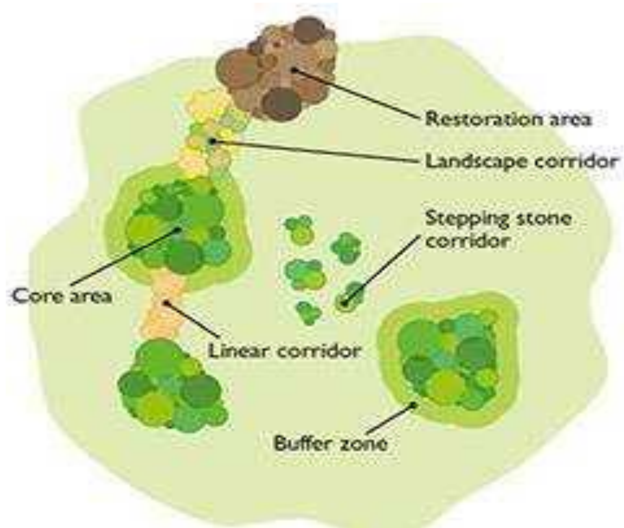


Figure 2-1:An ecological network

Source: Lawton (2010 p. 17)

Core nature areas **(***high-quality habitat managed for biodiversity conservation; Stepping stones* **(***smaller areas of quality habitat intended to aid the movement of habitat in between larger core natural areas; Landscape corridors (linear elements of quality habitat that connect the core nature areas and stepping stones form the 'edges'; Linear corridors* **(***linear elements of connecting habitat suited for the movement that form 'edges' in the network; Restoration areas (degraded areas where management is focused on restoring habitat that might become core nature areas or corridors; and Buffer zones (transitional areas situated between habitat and the matrix.*

Overall, the history of green infrastructure planning originated from the park and recreation (before 1980), open space (1980), open space and greenways (1990), and green infrastructure planning in 2000 (McDonald et al.2005). Fabos (1995) view modern US greenways employ various landscape ecology features. Randolph (2004) identified that ecological greenway networks have the potential to unite Europe, and private gardens are identified as some important stepping-stones in an ecological network (Ignatieva et al. 2011).

Nature protection is part of greenway planning in Canada and the US. The UK focuses on ecological, economic, and social development. In Europe, the compactness of cities led planners to use an ecological-social approach (Mell, 2011). In support of the ecological-social approach in the UK, Artmann (2017) considers cities as integrated socio-ecological systems. While in North America less well-defined approach to landscape planning (Mell, 2011).

Connectivity

Connectivity is referred to as ecological connectivity (Ahern 2007). Amundsen et.al (2009) present green infrastructure (Figure 2.2) as systems composed of core areas, hubs, and corridors. *Core areas* provide essential habitats for sensitive species. Buffering the core areas are *hubs*, which are the largest, least fragmented contiguous area of forest, wetlands, stream systems, or other native landscape types. *Corridors* maintain connectivity in the landscape and provide for animal movement, seed and pollen dispersal, and plant migration (Figure 2.2).

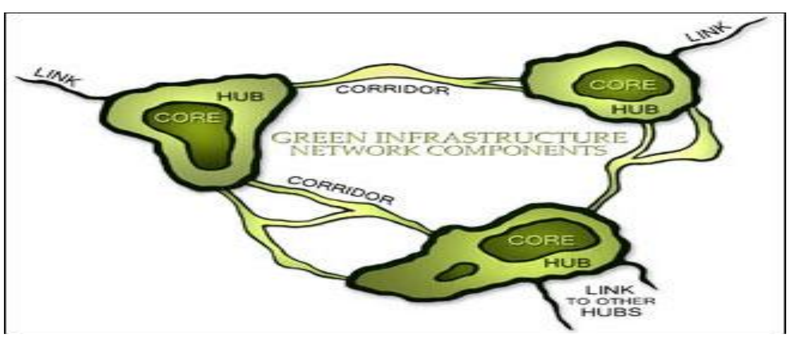


Figure 2-2: GI network components

Source: Amundsen et.al (2009, p. 2)

Kambites and Owen (2006) also identified spatial connectivity in terms of an inherent attribute of GI and necessary at all stages of GI planning process, and landscape connectivity can be achieved for wildlife species and communities by managing the entire landscape mosaic of suitable habitats such as stepping stones or habitat corridors (Bennett, 1999).

The multi-scale connectivity (Figure 2.3) shows the link with different spatial scales within and above city regions (Pauleit et al. 2017), which have taken the form of linear networks, hubs, corridors, inter-scalar networks, from site, city, to regional scale plans and projects Pauleit et al. (2017).

Figure 2-3: Multi-scale green infrastructure

Pauleit et al. (2017, p. 6)

In view of sustainability, green infrastructure is described as the system that helps to protect and restore naturally functioning ecosystems and provide a framework for future development (Williamson, 2003) with five (built, human, social, and natural capitals) that provide viable ecosystems preserved as green infrastructure (Williamson, 2003, p. 4).

2.4.3. Multifunctionality

The multifunctionality principle of green infrastructure is explained in terms of intertwining or combining different functions. For example, Selman (2009) suggested that from a landscape planning perspective: multifunctionality provides us with a way of understanding change and delivering joined-up policy at the landscape scale (Selman, 2009, p. 49). Tzoulas et al. (2007) offer a conceptual framework of GI in urban areas (ecological and social) that links ecosystem health to individual or community health.

2.4.4. Socially inclusive

The socially inclusive relates to a planning process that is open to all and incorporates the knowledge and needs of diverse parties (Hansen et al. 2017). It is more concerned with equity instead of disciplinary and praxis-oriented balance in planning processes (De Bellis et al.2015). Further, socially inclusive planning enables all social groups to participate in the UGI planning process, emphasizing the most vulnerable ones (Rolf, 2016). The multiscale participatory GI planning process is considered an important approach to representing the interests of all stakeholders, including marginalized groups (Lovell and Taylor, 2013). The socially inclusive principle is explained from the view of communally managed urban green spaces.

In general, GI includes different principles. Gradinaru and Hersperger (2018) *identified six principles*: namely coordination, multi-functionality, connectivity, multi-scale planning, diversity, and identity. (1) coordination involves coordination between GI and built-up development, water management, food provision, increasing the quality of life, climate change, air quality, and cultural assets conservation; (2)multi-functionality includes both social, ecological, economic, and cultural functions;(3)connectivity is about the structural and functional connectivity for humans, animals, and plant species;(4) multi-scale planning ranges from national, regional, local, neighborhood, and site levels which include landscape interactions and larger natural areas (Monteiro and Antunes, 2020); (5) diversity includes large and semi-natural areas, largely managed areas, and medium, small, and semi-natural areas; and (6) identity refers to GI planning as a means to strengthen or build place identity (Gradinaru and Hersperger, 2018).

Sandström (2002) identified five GI principles in terms of GI planning objectives to comply with the functions and benefits of GI from spatial planning. GI should be (1) a framework for conservation and development, (2) be protected and planned before development takes place, (3) activities must be grounded in sound science and good land use planning theory and practice, (4) designed to work at different scales, irrespective of administrative boundaries, and (5) be multifunctional.

Likewise, Hansen et al. (2017) identified four principles of UGI planning. The first principle considers the integration of green with grey infrastructures (buildings and roads) and physical and functional relations such as between GI and the built-up structure, transport infrastructure, and the water management system (Davies et al. 2006; Artmann and Grunewald, 2017). It also includes green roofs and walls (Ngan, 2004). Besides, combining grey, green and blue infrastructure is suggested to complement the traditionally built infrastructures (Depietri and McPherson, 2017).

The second principle is the ecological network and connectivity. The ecological network establishes physical, visual, and ecological connectivity between built-up areas, surrounding natural areas, and green spaces (Beatley, 2000). This network includes forests, wetlands, parks, grasslands, trees, flower beds, green courtyards, and green roofs (Mell 2013). Connectivity includes a series of patches, hubs, and linkages (Lynch, 2016) which aims to combat fragmentation of habitats and isolation through linking different groups of people across different physical boundaries (Kambites and Owen, 2006).

The third principle, multifunctionality is explained in terms of its ability to perform several functions and provide several benefits. These functions can be preserving cultural heritage, economic and sustainable resource management and a process of delivering multiple benefits on the same site, aiding social inclusion, health, education, and improving a sense of place (Ahern,2003; Kambites and Owen, 2006; Davies et al. 2006; Tzoulas et al. 2007; Mell, 2008; 2009; Young et al. 2014).

The fourth principle, the socially inclusive is related to the participatory GI planning process to represent the interests of all stakeholders including the marginalized groups (Lovell and Taylor, 2013). It enables residents to gain a feeling of sense of place (Rolf, 2016) and promotes social cohesion through the provision of space for social interaction (Hansen et al.2017).

All principles may be internationally relevant and be applied to evaluate whether the spatial plans incorporate UGI principles or not. Accordingly, incorporating all principles in the spatial plan is not only significant for urban planning but also provides opportunities for climate change adaptation and energy plans. as the principles provide different benefits (environmental, social, economic, and cultural) as explained above. Additionally, GI in the planning process from regional spatial planning to the neighborhood is an important opportunity for climate change adaptation (Gill et al.2007); the best response for mitigating temperatures (Gargiulo et al.2017); and promoting urban development and sustainability (Mell, 2009; Pauleit et al. 2017). Further, increasing green network design within urban planning tools is important to improve ecological processes, enhance disaster prevention and mitigation, and support sustainability (Gargiulo et al. 2017).

2.5. Urban planning concepts and theories/models

The concept of urban planning is defined as a goal-orientated process that seeks to achieve specified desired objectives subject to given constraints to promote human growth (Scott and Roweis,1977). These general definitions of planning refer to the goals of planning toward social change based on rational decision-making and human growth. Further, urban planning a concrete and historically rooted social process (Scott and Roweis, 1977, p.1119) which is developed through the process of historical and social development.

Hall (2002) called spatial planning or urban and regional planning interchangeably based on the changes that occurred after 1960 on the notion that all sorts of planning constitute a distinct type of human activity which is different from the view of planning from an older generation of planners. Hence, Hall (2002) sees all planning is a continuous process which seeks to devise an appropriate way of controlling the urban and regional system. Besides, Healey (2006) elucidate the importance of polycentric development in spatial planning through connecting a number of places to form a network. Similarly, polycentricity now appears to be cropping up everywhere as an ‘ideal type’ regional spatial structure (Davoudi, 2003).

Spatial planning does not only allude to the large scale, to mid-to-long-term temporal horizons and to strategic goals (Healey,2006, p.23). Palermo and Ponzini (2010) elaborate spatial planning is a development in physical planning. In addition, Scott et al. (2013) show the shift from *land-use* planning to *spatial* planning whereby the role of planners and planning shift from regulatory approaches, towards coordinator, integrator and mediator of the spatial dimensions of wider policy streams.

According to Glasson and Marshall, (2007) spatial planning embraces measures to coordinate the spatial impacts of other sectoral policies, to achieve economic development between regions, and to regulate the conversion of land and property uses. Spatial planning is therefore mean a form of planning and policy coordination which include regional policy.

The concept region refers a hierarchical system of central places or cities (Christaller, 1933) and it is a spatially interdependent, or “nodal,” labor market that are functionally integrated internally to the extent that labor, capital, or commodity flows (Hoover and Giarratani, 1985). The focus is on the economic development that determine the central location of the city. While, advances in communications and transportation technology have weakened many of the centripetal forces that tie suburban labor markets to central city business districts and regions may also be defined in terms of natural resource, or other geographic boundaries (Dawkins 2003). Regional planning is identified as inter and intra-regional. The former involves planning between regions with the task of national authorities or international community's which is derived from social welfare since it seeks to change the economic inequality of regions (Glasson, 1978). The intra-regional planning includes planning within a region with the task regional authority. the primary aim is to achieve a satisfactory relationship between people, jobs, and the environment within a region and it is linked with a regional authority (Glasson, 1978).

2.5.1.The master plan model

The master/blueprint planning approach or comprehensive rational model was a standard urban planning model from the earliest times down to the mid-1960s and after the 1947 or in first two decades after World War II (Mahjabeen et al. 2003; Hall, 2002). This model emphasizes expert knowledge and the role of professional experts employed by government in identifying and devising solutions based on rational planning thought (Mahjabeen et al. 2003) with little or no public inputs and little regard to the specific character of the terrain (Fainstein, 2000). It is based on a utilitarian tradition of social philosophy. Further, this model ignored the nature of the agents who carried out planning and was indifferent to the object of their efforts that had ‘neither subject nor object’ (Beauregard,1987, p.367).

This model was criticized by several competing theories. McLoughlin (1969) and Chadwick (1971) planning models based on systems theory was the first reaction; Rhodes (1997) argues governments and professionals no longer have any monopoly on planning processes; unable to relate the object of practice to the outcomes; and its top-down planning by experts deploying an Enlightenment discourse posits a unitary public interest (Beauregard, 1987; Rhodes,1997; Fainstein, 2000);characterized by lack of justification urban design traditions (Palermo and Ponzini, 2010); and a comprehensive physical plan neither practically feasible nor politically viable (Innes, 1996).

2.5.2. The system theory

The system theory was developed by McLoughlin (1969) and Chadwick (1971) in the late 1950s and the 1960s, in USA and then in Britain (Hall, 1983; Mahjabeen et al. 2003). This theory considered different landscapes their activities and communications are systems of the same general class (McLoughlin, 1969). The argument is that cybernetics, the science of communication, control in very complex systems applied to the guidance of cities and regions (Brian, 1969) and sees cities as a system and its ongoing processes needed to be analyzed scientifically rather than in static, end state, aesthetically based blueprint-like drawings (LeGates and Stout, 2015, p. 387).

The general principle is based on the principle of error-controlled regulation, which means that ‘the system is actuated by a control device which is supplied with information about its actual state compared with the intended state’ (McLoughlin, 1969,85). The plan incorporates planning approach which is used to translate general goals in to specific action plan (Pissourios, 2014, p. 88). For example, (McLoughlin, 1969, p. 97,114) identified area of urban parks per certain distance from the city center and accessibility of green space per inhabitant.

In the 1960s and 1970s neo-Marxist regional economic geographers and sociologists view the region as a terrain of power; economic, political, and social and stated that rather than simply developing technical analyses without an understanding of power dynamics, the emphasis given to understand the structural changes needed in order for planning goals to be effectively reached (Knox and Pinch, 2014).

The communicative and participatory theories of planning emerged in the late 1980s and 1990s (Shrestha and Dee, 2008) and a reaction to the technocratic planning model (Naess, 2001). The communicative model draws on two philosophical approaches, pragmatism and communicative rationality. The first emerge is based on Dewey's work that comes out of British philosophical realism and empiricism and the second is from Habermas's original approach traces back to Hegelian idealism and Marxist critical analysis then later to Wittgenstein's scrutiny of language (Fainstein, 2000, p.3).

Communicative rationality refers the world physical things, meanings, values, norms, knowledge, reasoning, and experiences derived from intersubjective through deliberation and argumentation (Healey, 1993; McGuirk, 2001). Habermas's critical theory is an attempt to emancipate the lifeworld from system "colonization" through the revival of an uncoerced and unrestricted public sphere operating on the "universal" pragmatics of communicative rationality (Gunaratne, 2006, p. 96). While, Flyvbjerg (1998) criticize Habermas's classification between 'successful' and 'distorted' utterances in human conversation that success in rhetoric that is not based on rational argument is often associated with distortion (Blakely, 2008); lacks concrete understanding of relations of power needed for political change (Allmendinger and Tewdwr-Jones, 2002) and rationality is determined by power Yiftachel (2001).

In order to understand democratic social change through planning, the analytic planning theory of Foucault offers better prospects than does Habermas (Flyvbjerg and Richardson, 2004) because Foucauldian theory is a sustained analytics of power and rationality (Flyvbjerg and Richardson, 2004) which can be used to support to the empowerment of civil society.

2.5.3.The communicative model

The communicative model explains the interconnection between the systemic side of human life and the value-driven side of human introspection. This theory emphasizes the effects of the planning process on people's self-esteem, values, behavior, capacity for growth and cooperative skills (Naess, 2001). The mutual understanding and agreement derived from a dialogue that transform conflict of interests in to situations where both sides win through decentralized and broad planning processes (Healey, 1992/1996, 1997) and planning based on consensus-building is necessary to achieve coordination (Innes, 1996). While, due to insufficient attention to the dynamics of urban regions (Healey 1997), collaborative planning is preferred because it integrates spatial and political sensibilities from urban political economy and elements of communicative planning theory (Allmendinger and Tewdwr-Jones, 2002, p.32).

Collaborative planning model has been identified as a form of practice from theoretical foundation (Harris, 2002). It is about why urban regions are important to social, economic and environmental policy and how political communities may organize to improve the quality of their places (Healey, 1997,12). The practice is related with 'how political communities may organize to improve the quality of their places' (Harris, 2004, p.22). It is an important direction for planning theory with significant potential for practice that will continue to dominate academic debate and (Allmendinger and Tewdwr-Jones, 2002b, p.32) and important to understand complexity, and diversity critical analysts (Healey, 2003). This model is a product of the complex interweaving theoretical work of the communicative approach to planning theory, institutionalist sociology and regional economic geography (Healey,1997).Additionally, (Beauregard, 1987, p.371-372) argued the socially structured and politically contingent land and property development process occupies the center of a practical realm replete with opportunities for planning intervention and the land uses of the city is a socially created, spatially dynamic reality sensitive to historical shifts in political, economic, and cultural forces.

2.5.4. Regional planning

Recent regional initiatives share similar characteristics and constitute a new conception of regional planning such as: focuses on specific territories and spatial planning; tries to address problems created by the growth and fragmentation of postmodern metropolitan regions; takes a more holistic approach to planning that often integrates planning specialties such as transportation and land use as well as environmental, economic, and equity goals; adopts a normative or activist stance(Wheeler, 2002,p.267). Besides, emphasis given to the relative level of social, economic, ecological and urban development, ensuring governance of rational use of territories and maximal protection of natural resources and landscape in the principle of sustainable development that applied in physical planning of regions (Kavaliauskas, 2008).

Though, government agency controls many of the resources for physical development and acts in an integrated and coordinated way and the current transformations led the state continue to play a central role in the ongoing struggle to command, control, and transform social spaces, the socio-economic and environmental development of urban areas cannot be planned by government action in a linear way (Macleod, 2001; Healey, 2017) that the modern regional planning should incorporate the involvement of government and non-governmental actors that they have implications and certainly encourage a regional approach (Voogd 2001). Further, the recent rise of regional planning needs to be reworked in light of contemporary policy imperatives rooted in wider socio-economic, technical and political dynamics, and any analysis of state strategies for sustainable development needs mutually entwined new governance systems, regional strategic planning and regional economic development (Haughton and Counsell, 2004; Scott, 2009). Similarly, Harper (2011) argue planners would seek that urban governance steering (planning as collective action) as a realization of citizen's full knowledge rather than seeking technical knowledge and impartiality. The emphasis is given in involving social and economic actors in a real way that led more governance than government (Rhodes, 1997).

From the view of regional initiatives, the shift from welfare state dominated the political scene from the 1950s to the 1980s in all national governments of Europe brought an institutional transformation to all European cities with the focus on the relationships within the public sector that led to significant changes in intergovernmental relationships (Salet et al.2003, p. 5).

In general, a technocratic procedure of urban intervention approach perceived urban intervention as a design practice in the 1960s is giving way to the systems view of planning arose in the UK in the late 1960s based on a scientific analyst to a greater concern with a political, economic and social discourse in the1970s and1980s, and then gradually to the communicative and collaborative planning models in the late 1980s and 1990s which tend to a paradigm shift that dominates the present urban planning theory. The debate on planning theory move from the planners as a technical designer to the planner as a scientific analyst to encompass postmodernist ways of thinking about urban planning.

2.6. Governance Concepts, Approaches and Theories/Models

The term governance originated from the classical Latin and ancient Greek times applied to the government to mean steer (Jessop, 1998). Governance differs from government in its inclusion of different actors, the modes and manner of governing, and its characteristics (Rhodes,1997; Jessop, 1998). Accordingly, it has a short history which begun from the 1970s.

2.6.1. Definition of Governance

The concept of governance brings up a variety of debates and controversies in using the term (Toikka,2011). The definitions used by different disciplines, scholars, or organizations relate directly to the focus of their governance research, policy, practices and scope. From the view of land management and administration, (Palmer et al. 2009) emphasize power and authority and democratic process. World Bank (2007) define the concept in terms of policy making and implementation. While, Public administration authors (Rhodes,1997; Chhotray and Stoker, 2009; Feris, 2010; Barbara, 2011) focus on the legitimate power to provide public services and the inclusion of non-state actors.

Although there is an increasing diversity of definitions developed for governance, common themes underlying each of them are particularly relevant for this study. Below, Palmer et al. (2009) offer a recent definition. The definition provides insight into the complexity of the governance concept by noting the four specific governance characteristics.

The first, **governance is conceptually broader than government',** is related with the inclusive approach in contrary to the traditional top-down approach, which focus largely on the power of sovereign states to control resources, to make and implement policies.

The second, **governance emphasizes processes and institutions.** Process refers how power is exercised, how decisions are made and by whom and how decisions are made, and how differences and grievances are managed. The third, **governance recognizes the importance of politics and power** refers to the relationship between politics and power to the understanding of a given context and **governance is conceptually neutral** indicate the quality of governance (Mushinge, 2017, p.35).

Table 2-2 Definition of governance

Source	Definition
Palmer et al. (2009,p.1; Scott and Marzano, 2015)	‘‘Governance is the the management of a country's affairs at all levels through the exercise of political, economic, and administrative authority. It comprises the mechanisms, processes and institutions.’’
World Bank (2007,p. 67)	‘‘Governance is the process through which organizations and public authorities acquire and use the power to shape public policy and deliver public goods and services.’’
Feris(2010, p.3)	‘‘Governance has been defined as a function of public administration which has been defined as ...the use of managerial, political, and legal theories.’’
Longo (2008, p. 194)	‘‘Governance is a set of institutional arrangements that are used to adopt and implement public decisions. It embraces structures, processes, players and their interrelationships, rules, control, enforcement and accountability mechanisms, incentives, and in general all elements bearing on decisions in the public sphere.’’
Biermann et al. (2009, p. 3)	‘‘Governance is the interrelated and increasingly integrated system of formal and informal rules, rule-making systems, and actor-networks at all levels.”

Two approaches (the radical and less radical) to the historical move to governance deals differently. The radical approach posits governance as a fundamental change in the way societies are governed. Less radicals argue governance can be a slight alteration of changes. Another perspective argues for the stable importance of government in governing. Leicester and Mackay (1998) argued that government should focus on process and information rather than on structure and power, which need a system of 'negotiated governance' by which the central government tasks include policy entrepreneurship, high-quality evaluation, facilitation of deliberation, and support for interest group and alliance formations. Longo (2008, p.192) also argued that governance is characterized by the relational nature of the public sphere in dealing with difficult emerging issues, which require increasing coordination and collaboration on the part of government and beyond the government sphere for a network in which public agencies play multiple roles such include (regulating, designing, financing, controlling, promoting, steering, supporting, and partnering), depending on the context and the public policies required. While Sloat (2002) focused on establishing a network for the structure, the internal rules, the composition of actors, and the goals to be achieved, the emphasis is given to the negotiated links between government and governance. The emphasis is given to the government to support a civil society organization in building trust with the local community to play the lead role in social-ecological innovation networks (Krasny et al. 2013).

2.6.2. Urban governance

Urban governance is also a contested concept (Lukas, 2019). Un-Habitat (2002) emphasizes the need to implement urban good governance towards improving the welfare of urban residents and their right to access the necessities of urban life. Un-Habitat (2002) recognizes the result of good governance is a development that prioritizes disadvantaged people to sustain the environment and provide access to urban livelihoods related to governance approaches and the socially inclusive principle of UGI. Urban governance is considered as a response to address urban challenges (Dahiya and Das, 2020) to sustainable development.

Lukas (2019) identified three different meanings of urban governance. Such include: (a) urban governance as a descriptor of *new* forms of cooperation, interaction, and decision-making in urban affairs, (b) it is a normative concept about how interaction, cooperation, and decision-making *should* be organized, a notion that informs local, regional, and international policy circles, and (c) as an *analytical* concept it provides theoretical tools and categories to differentiate and understand the actual forms and modes by which urban affairs in different geographical and sociopolitical contexts are regulated and how decisions are made. Lukas, 2019, p.1). Its scope encompasses a range of *actors*, multiple *sites*, various layers of *relations*, and a broad range of *activities* or *practices* aimed at steering the economy and society, involving various *modes of power* as well as different *scales* (Lindell, 2015).

2.6.3. Theories and Models of Urban Governance

In the early 1980s, urban regime theory was the dominant theory for studying local politics (Davies,2002). Its roots are in the structuralist school of Marxism (Poulantzas, 1978). It purports to reject structuralism, emphasizing the importance of agency in politics (Elkin, 1987; Stone, 1980). it locks in on the bilateral relationship between the urban political leadership and the business community(Pierre,2014). While urban governance theory is more encompassing and open to variations in agency and institutional and economic embeddedness than urban regime theory (Pierre,2014). The urban governance framework also offers a broader and more generic framework of urban politics(Pierre,2014).

Likewise, national politics and state traditions are the most powerful factors in explaining various aspects of urban politics and strategies of local resource mobilization (Pierre, 1999, p.360) by which nation-states constrain local political choices. In addition, for political or ideological reasons, local elites (Molotch, 1990) tend to make similar choices in policy sectors.

2.6.3.1. Modes and models of urban governance

Modes of urban governance deal with how urban areas are governed and major political actors involved in urban politics, and the informal arrangements that define the governing relationships among and within formal institutions implicated in urban politics (DiGaetano and Lawless, 1999; DiGaetano and Strom, 2003). These include (clientelistic, corporatist, managerial, pluralist, and populist) modes of governance (DiGaetano and Strom, 2003).

The clientelistic mode of urban governance is built around personalized and exchange relationships between politicians and favored interests or clients aimed to provide selective benefits for the politicians and constituents involved (public-private) based on pragmatic exchange (DiGaetano and Strom, 2003).

The Managerial modes of governance are based on formal, bureaucratic, or contractual relations between government officials and private sector interests (Pierre, 1999), with authoritative decisions by government officials (DiGaetano and Strom, 2003) focused on the effectiveness or efficiency of government policy and programs.

The Pluralist modes of governance are characterized by a high degree of competition among contending interests which focuses on conflict management that arise from political rivalry between key actors (DiGaetano and Strom, 2003). The emergence of populist modes of governance focused on democratic inclusion and encouraged individuals and groups to participate in the governing process (DiGaetano and Strom, 2003). Politicians and community activists are key actors responsible for establishing institutional mechanisms and enhancing participation in the governance process.

There are four models of urban governance (managerial, corporatist, pro-growth, and welfare). The first, the managerial model, considers the managers of organizations are key players, and the customers are essential to creating competition both within the public sector and between public and private providers (Pierre, 1999, p.380), which helps to increase the efficiency in service production.

The second model, corporatist or corporatism as a model of political representation, is derived from a distinctly collectivist political culture (Elder et al.1988). The model also identifies the local government as a political and democratic system for the inclusion of social groups, and policy deliberation is seen as a bargaining process (Pierre, 1999) essential to bring in all major actors and interests into the urban political process;

involving organizations which assume responsibility for public service delivery; to create to control vast human and financial resources; and creating a high degree of civil society acceptance of urban political choice(Pierre, 1999, p.382).

The third model, pro-growth, is based on the existence of a political choice of governance in terms of policy, development strategies, and the selection of network partners (Pagano and Bowman, 1997; Pierre, 1999), focused on facilitating accommodation between political and economic power. Elites and senior elected officials are typical participants aimed at economic growth, particularly the growth in the local economy, such as urban planning, the mobilization of resources from the regional and national government, and infrastructural development (Pierre, 1999) based on institutionalized public-private partnerships.

The fourth, welfare model is dependent on the central government aimed to secure the inflow of state funds to sustain the local economy (Pierre, 1999), and the local government officials and state (national) officials and bureaucrats are typical participants. This model detached the city from developing the local economy as the priority is given to close contacts with the state through political or administrative channels, which in turn affect the local government to incur local tax (Pierre, 1999).

2.6.4. Good governance and its principles

Around 1989-1990, the concept of good governance started to gain popularity on the international aid front (Doornbos, 2001) based on an increasing realization that good governance brings many social, economic and political benefits to society worldwide.

Likewise, research in different disciplines increasingly recognizes the notion of good governance. It has become prominent by donor organizations, including the World Bank, in the late1980s for economic development (Kohler-Koch and Rittberger, 2006).

Further, it is identified as a system that puts further requirements on the process of decision-making and public policy formulation and entails the prevalence of the rule of law and an independent judiciary, institutional checks and balances through horizontal and vertical separation of powers, and effective oversight agencies (Santiso, 2001, p.11). Besides, good land governance is considered important to reduce increased pressure on rural and urban land and climate change, which affect areas traditionally considered hazardous or marginal for organizational performance (Deininger and Burns 2010).

Table 2-3: Principles of Good Governance

Principles	Definitions
Participation	Participation means the mechanisms that promote participatory decision-making processes of citizens, particularly the poor, either direct or through legitimate intermediate institutions. Participation promotes representative democracies through competitive elections to achieve political representation.
Accountability	Accountability refers to the extent to which officials are answerable to their constituency about their power and duties. Accountability ensures actions and decisions taken by governments, non-government, private, and civil society officials are subject to oversight to meet their stated objectives and respond to the public and their institutional actors.

Transparency	Transparency means access to information and sharing of information with concerned institutions and the public, and acting in an open manner. Dissemination of open information systems can provide specific information that firms and individuals need to have to be able to make good decisions
Rule of law	Focused on laws on human rights which encompass an independent judiciary, equality before the law, and the requirement for the government to base its actions on well-defined legal authorities.
Consensus oriented	Several actors are involved in the governance process with different interests. Good governance requires mediating different interests to reach a broad consensus on the best interests of the overall group
Strategic vision	The strategic vision is the long-term perspective on good governance and human development. A strategic vision for decision-making considers the historical, cultural, and social complexities of each situation towards future development.
Responsiveness	Responsiveness refers to institutions serving all stakeholders within a reasonable timeframe. It is a measure of accountability where in leaders and public servants address the needs of the public.
Effectiveness and efficiency	Effectiveness involves the capacity to realize organizational objectives, and efficiency refers to making the best use of resources or the capability of acting or producing effectively with a minimum quantity of waste, expense, or unnecessary effort

Equity and inclusiveness	Equity mean similar cases that are treated in similar ways. It recognizes the inherent dignity, and of equal rights, and the recognition of that all men and women have opportunities to improve their wellbeing. Inclusiveness is the inclusion of all actors, particularly the disadvantaged, to participate in decision-making and provide opportunities to improve their well-being.
Subsidiarity	Subsidiarity refers devolutionary principle, which helps to address social problems from the top to the down approach.

Source: Modified from Graham et at. (2003)

The implementation of urban good governance is crucial in improving the urban green infrastructure planning and governance in particular and improving urban quality of life, climate mitigation and environmental resource management in general.

2.6.5. Land governance and land management

Land governance is defined as "The bundle of rules, rights, policies, processes, institutions, and structures created to manage the use, allocation of, access to, control, ownership, management, and transfer of land and natural resources found on land" (Sanjak and Donovanp 2016, p.70). While land management is defined as the process by which land resources are put to good effect (Economic Commission for Europe (ECE-UN 1996). Land management is related to the management of land as an environmental, economic, and socio-cultural resource that includes the implementation of land policy, land administration, and land use planning (Magel and Wehrmann, 2002, p.4).

The distinction between land governance and management is somewhat blurred. Governance concerns the powers, authorities, and responsibilities exercised by organizations and individuals, whereas management refers to the resources, plans, and actions that are a product of applied governance (Lockwood, 2010). In addition, governance is a prerequisite for effective management and determines its effectiveness as well (Eagel,2009; Lockwood, 2010). Further, Enemark (2009) equates land management and land governance that covers all activities associated with the management of land that is required to fulfill political, economic, and social objectives to achieve sustainable development. Given these conceptual similarities, land governance and land management used as synonymous.

There is a shift from urban management to governance. According to (Healey et al. 1995), urban management cannot be understood in terms of 'top down' or 'command and control' models of governance (Healey et al. 1995, p. 18) due to economic globalization, which contributed to the loss of urban government control over urban economies, new activities, and responses (Kearns and Paddison, 2000). Changes to urban governance is attributed to fierce interurban competition; "the transformation in urban governance from the welfare-state model towards the economic development model" (Short and Kim 1999 cited in Kearns and Paddison, 2000, p.345); and the shift from managerialism to entrepreneurialism (Harvey, 1989).

Land administration: FAO (2002) defined land administration as the way in which the rules of land tenure are applied and made operational. In addition, land administration is described as ''the processes which involves the management of public land, record and register private interests in land, assess land value, determine property tax obligations, define land use and management governance systems, and support the development application and approval process for land use (Burns and Dalrymple, 2008, p.3**).** Both definitions show land administration comprises an extensive range of systems and processes to administer the land. Further, land administration provides four components;(1) Juridical (land ownership), (2) Regulatory (land development control and land use planning), (3) Fiscal (land taxation), and (4) Information management: which is an integral component to fulfill the information requirements of the other three components.

The spatial components of the information management also offer a generic conceptual model of land information systems based on legal, parcel-based cadasters (Williamson 1985), which emphasizes the central role of the cadastral overlay and how being integrated with topographic mapping and land registration and provides information to other independent government authorities through a linkage mechanism maintained by the land information center.

Theories

Among governance theories, environmental, multi-level, adaptive, interactive, and mosaic governance are the most pertinent to green infrastructure.

2.6.6. Environmental Governance

According to Bridge and Perreault (2009, p. 492), environmental governance is 'governance through nature' to indicate the influence of economic and political power on socio-natural processes. Similarly, environmental governance uses institutionalized power to shape environmental processes and outcomes (Delmas and Young, 2009, p.71). The definitions encompass the relationship of power to governance, the importance of institutions to governance, and the effect of governance on the environment.

Globalization describes an interconnected world across environments, societies, and economies. Multiplicity, diversity, interdependence, and flows of influence and materials are common themes associated with globalization (Lemos and Agrawal, 2006). With the pace of globalization, different countries are confronting environmental challenges (Lemos and Agrawal, 2006).

Studies identified both the negative and positive impacts of globalization. The negative impact is related to economic globalization by which corporations gained larger degrees of freedom to choose where to locate their activities, and this process led many local governments to involve themselves in predatory inter-local competition (Park et al. 2008). This competition is based on offering subsidies and low environmental and urban standards in order to attract investors, particularly in third-world countries (Lemos and Agrawal, 2006).

The dependency on exporting natural resources for economic growth in developing countries is another reason for the depletion of natural resources (Mittal and Gupta, 2015). globalization also intensifies the use and depletion of natural resources, increases waste production, and leads to a “race to the bottom” as capital moves globally to countries that have less stringent environmental standards (Lemos and Agrawal, 2006, p.300). In addition, in the USA, the rise of neoliberalism and corporate-led globalization led to the political neglect of the mainstream environment (Faber, 2008).

Green infrastructure is an emerging policy response aiming to change biodiversity decline, degradation of ecosystem services, and its negative impacts on human well-being (Suvi and Jukka 2014). In view of this, defining green infrastructure governance requires a theoretical foundation of governance concepts from the view of the environmental, ecosystem, earth system, and adaptive governance.

In literature, there is no single definition of green infrastructure governance. For the purpose of this research, the definition of green infrastructure governance incorporates (World Bank 2007; Palmer et al.2009; Biermann et al. 2009) definition of governance. Accordingly, green infrastructure governance is defined as the exercise of political, economic, and administrative authority in the management and planning of green infrastructure at all levels and providing ecosystem goods and services with an interrelated and increasingly integrated system of formal and informal rules, rule-making systems, and actor-networks at all levels.

Environmental governance is related to adaptive capacity. Adaptive capacity is capable of responding to social-ecological system disturbances (Folke et al. 2003). Adaptive capacity in environment governance involves a social process that confronts a diversity of social actors and cultivates the connection between adaptive capacity and complex adaptive systems thinking (Armitage and Plummer 2010), and it is a critical enabling factor in building multilevel governance systems for complex social-ecological systems (Armitage and Plummer 2010).

Buijs et al. (2017) argued the socio-cultural diversity of cities requires adopting a multi-level, collaborative, and polycentric governance approach and involving a diversity of actors and governance levels in decision-making. Likewise, mosaic governance demands a context-sensitive approach to planning and achieving a well-connected multifunctional urban green infrastructure (Buijs et al. 2017) which is a key to urban resilience.

Adaptive capacity is a critical enabling factor in efforts to build multilevel governance systems for complex social-ecological systems (Plummer and Armitage, 2008). Dietz et al. (2003) also indicate the governance arrangements which accommodate these principles and processes involve multiple centers of decision-making and require many mechanisms for coordinated action.

2.6.7. Adaptive governance and adaptive management

Adaptive governance is a form of governance for the purpose of collaborative environmental management (Folke et al. 2005). It includes both formal legal frameworks and institutions and collaboration across different levels of government as well as non-governmental and individual action (Garmestani and Benson,2013), and it requires the capacity to learn to manage resilience (Hennessey 1994).

Adaptive governance deal with disturbances to cope with unpredictable consequences from continuous and abrupt changes (Folke et al. 2005). It helps to understand how agents and institutions respond to a crisis in new ways or are constrained by resistance to change and how these responses and constraints interact across levels and scales (Boyd and Folke, 2012). It is dynamic in nature, by which systems occur from local to global climate change (Ostrom, 2009). It is a leading approach to successfully meeting the challenges of changes in social-ecological systems (Koontz, 2005) and is directly relevant to understand aspects of the environmental problems that are currently faced by human society (Andersson and Ostrom, 2008).

Adaptive governance addresses the uncertainty interventions by experimenting, monitoring, and adapting to maximize ecosystem service provision (Green et al. 2016). It is operationalized through adaptive co-management systems (Folke et al. 2005). For example, postindustrial cities move towards effective adaptive governance by starting with low-cost, low-risk activities (Niemela et al. 2010).

2.6.7.1. Adaptive Management

The concept of adaptive management has been pursued in diverse fields and incorporates diverse academic perspectives (Stankey, 2005). A new approach to traditional environmental management approaches which do not provide a clear and systematic decision rationale (Linkov et al.2006). It addresses the links between social and ecological systems and involves stakeholders in the analysis and decision process (Magnuszewski et l.2005). It is directly linked with resource management driven by the scientific method to address opportunities for wider stakeholder participation (Holling, 1978).

In the management of natural resources, adaptive management plays a decisive role by providing a framework for action directed to changing the ecosystem state, learning from such change, and supporting decisions and resource allocation (Stankey, 2005). It is important to improve the management process; to learn from the responses to management actions; and to accommodate change by learning from the outcomes of a set of environmental management policies and practices (McDaniels and Gregory, 2004; Stankey, 2005; Gregory et al.2006). The management process includes both identification of problems and desired goals and the development of policy (Stringer et al.2006).

Adaptive management is perceived as an effective management approach, and these perceptions are shared across scholar and practitioner groups (Dissanayake et al. 2019). The emphasis is given to learning by doing, which is important in the socio-ecological systems (Holling, 1978; Armitage et al. 2008). The socio-ecological system is an integrative perspective of that couple's human and natural systems through participatory governance (Plummer and Fennell, 2009).

In environmental management, learning-based approaches focus on learning-by-doing through iterative practice, evaluation, and action modification (Holling, 1978; Berkes, 2009). While adaptive management acknowledges that uncertainty is inherent in any natural system, it seeks to minimize this uncertainty by learning about the system being managed (Linkov et al.2006, p.1080). Adaptive management is synonymous with 'learning-by-doing', which helps to encourage innovative responses through flexible institutional and organizational arrangements (Armitage et al.2008, p.91).

2.6.7.2. Adaptive co-management

Adaptive Co-Management(ACM) is synonymous with adaptive governance (Armitage et al. 2009). It is an emergent outcome of co-management and adaptive management, which is an important innovation in natural resource governance under conditions of change, uncertainty, and complexity (Armitage etal.2010, p. 5). It draws from overarching narratives in environment and resource studies of adaptive management (i.e., learning and collaborative management (i.e., linking) to engender a distinct approach (Armitage et al.2007, 2009).

Adaptive co-Management is a potential tool in a suite of governance options to modify unsustainable social-ecological feedback (Armitage et al. 2008). An innovative method for managing social-ecological systems (Olsson et al. 2004, Folke et al. 2005, Armitage et al. 2007). The intention is to solve resource problems through a collaborative process that fosters ecologically sustainable livelihoods to achieve sustainability (Folke et al., 2005; Plummer and Armitage,2007), and sustainability involves an understanding of the dynamics of linked social/ economic–ecological systems (Plummer and Armitage,2007). ACM is considered an innovative governance strategy to sustain social-ecological systems (Plummer,2009). It also addresses social-ecological systems' complexity and uncertainty (Plummer et al.2014).

ACM constitutes process (collaboration and learning) and outcome (result and effect). ACM process involves collaboration and learning (Plummer et al.2017). Collaboration is composed of collaborative qualities as well as network connections (Plummer et al.2017). Learning constitutes cognitive, normative, and relational. ACM process will lead to outcomes (impacts). Outcomes are manifested as results and effects and effects contributed to ecological or livelihoods (Plummer et al.2017). Both are used to measure individuals' perceptions and experiences of the ACM process and outcomes (Plummer et al.2017). It links groups and fosters knowledge synthesis across vertical (local, regional, national) and horizontal (local organization to local organization) scales (Armitage et al. 2007, p. 93).

2.6.8. Multi-level governance

Multi-level governance is defined based on three elements, both politically independent and interdependent actors, different territories, and flexibility of policy and political authority (Schmitter, 2004, 49). The emphasis is given to the involvement of several actors at multiple scales (Piattoni, 2010), which helps to examine the ways in which urban sustainability is being constructed and contested at a variety of scales of governance and through multiple political spaces (Bulkeley and Betsill, 2005) with multi-level character (Ehnert et al.2018). It is considered as the gradual involvement of institutions of all administrative tiers and all sectors in policy-making (Bache, 1998).

Multi-level governance involves both horizontal and vertical relationships and responsibilities of national, regional, and local government, but also public-private interaction and on broader issues of democracy and participation of different actors (Eckerberg and Joas, 2004). Besides, the multiple scales of governance are important to capture variations in the territorial reach of policy externalities that arise from the provision of public goods from planet-wide in the case of global warming to local in the case of most city services. (Marks and Hooghe, 2005).

The policy success in the planning and management of green infrastructure is associated with multi-level governance in terms of integration of different departments within an organization (land management and administration, transport, etc.) and when a range of urban greenery's multiple contributions are actively and only utilized (Bush et al.2015).

Using a multi-level governance framework, Loorbach (2010) identified four different types of governance activities (strategic, tactical, operational, and reflexive) that are relevant to societal transitions. Adopting Loorbach (2010) components of the multi-level governance framework, Kabisch (2015), show the relationship between urban green space planning and development. Accordingly, the black lines(Figure 2.4) show the connection between all activities. The reflexive level appears in the mid of the figure to show that this is an integrated part of governance processes and should be related to all other levels to make adjustments to goals, agendas, and implementation processes.

Figure 2-4: Components of the multi-level governance framework for urban green space planning and development

Source: Kabisch (2015, p.561)

This framework is adapted to assess the capacity of governance approaches and the relationships between urban green infrastructure planning and governance in terms of the challenges related to governance processes of green infrastructure planning and how these challenges are related to the provision of ecosystem services. The framework includes strategic governance (focuses on processes that address general urban green space planning); tactical governance (activities and processes related to the green development projects, funding possibilities, networks and partnerships); operational governance (implementation and management of green infrastructure plans and assets) and reflexive governance (monitoring and evaluation of activities of existing planning strategies and their implementation).

2.6.9. Interactive Governance

Kooiman (2010) looks at governance as a societal phenomenon to be studied at all levels; Osborne (2006) also considers governance as sociopolitical governance of theory of institutional relationships within society. Further, Kooiman (2003) states the importance of interactive governance with the assumption that societies are governed by a combination of governing efforts that answers to ever-growing societal diversity, dynamics and complexity, and responses to major societal issues. This interactive perspective on governance shows actors are any social unit-possessing agency or power of action and structure refers to the frameworks within which these actors operate (Kooiman, 2010).

The interactive governance approach differs from others by focusing on its applicability and occurrence at different societal scales with overlapping, crosscutting authorities and responsibilities (Kooiman, 2008). This approach consists of (Kooiman, 2010) a system-to-be governed (SG), a governing system (GS), and the interactions between the two (GI). Besides, this approach emphasizes the governing interactions between the governing system and the system to be governed.

The capacity of a governing system applies to all three models of governance. Duit and Galaz (2008) classified the models into (1) State-centered, (2) market-centered, and (3) user-centered. While Jentoft et al. (2010) identified three modes of governance, Hierarchical governance, a top-down, command-and-control system; co-governance involves stakeholders working in cooperation with civil society actors; and government and self-governance refer, where stakeholders play an autonomous steering role. In addition, to state and market-centered, Kooiman (2010) considers civil societies as the third mode of governance.

The state-centered is characterized by the heavy involvement and control of state actors in decision-making and implementation, market-centered refers wholly privately controlled, and community-managed is user-centered. In addition, civil society’s main contribution to governability is channeling societal activities for governance purposes (Kooiman, 2010). Further, Arts et al. (2006) elucidate the importance of the interwovenness of state, market, and civil society in expanding areas of transition or interference zones between these three subsystems.

2.6.10. Mosaic Governance

The active participation of citizens in UGI planning can be analyzed using mosaic governance (Buijs et al. 2019). Mosaic governance is defined as "the diversity of processes that may facilitate existing active citizenship and stimulate it's upscaling through a mix of governance modes and policy interventions tailored to the socio-ecological context of urban landscapes" (Buijs et al. 2019, p.59). Mosaic governance demands a context-sensitive approach to planning (Buijs et al. 2016). It also enhances UGI protection, maintenance, and improvement (Buijs et al.2019). The development of UGI requires urban resilience, which might be based coordination of bottom-up initiatives by local authorities (Buijs et al. 2016) to help local authorities to realize their strategic UGI development (Buijs et al. 2018), widening governance arrangements between local governments and the broad variety of potential urban actors.

In general, an attempt to protect natural ecosystems is increasingly ineffective because our conception of the problem is limited (Bollier and Weston, 2013). Buizer et.al. (2016) also argued in the field of environment, governance is often considered a response to the mounting complexity and multilayered nature of environmental problems, and green governance is considered a direct response to the mounting calls for a paradigm shift in the way humans relate to the natural environment Bollier and Weston (2013). The success of the environmental management approach is based on collaboration, learning and resilience management (Walker et al. 2002), interactive governance (Kooiman et al. 2005), adaptive governance (Folke et al., 2005; Brunner et al., 2005), and adaptive co-management (Ruitenbeek and Cartier, 2001; Olsson et al., 2004; Armitage et al., 2007).

On the other hand, mosaic governance focuses beyond the dichotomy between top-down and bottom-up approaches (Buijs et al. 2016).

2.6.11. The commons and green space management

The common is a governance system for using and protecting nature and society (Bollier, 2012 p.3). A *common* is a regime for managing common-pool resources that abandon individual property rights and state control (Bollier and Weston 2013). It is argued that a *common* is an eminently practical and versatile mode of governance for ecological resources (Bollier, 2012). Further, the human right to a clean and healthy environment is the best way to promote environmental well-being while meeting everyone's basic needs (Bollier and Weston, 2013).

A community garden is one of the elements among green infrastructure typologies usually owned and managed by community members. The management of communally owned community gardens provides environmental, economic, and social benefits. Such includes: increasing social cohesion (Firth et al. 2011); community gardening skills developed by people with diverse socio-cultural backgrounds contribute to youth development and gardening skills (Krasny and Tidball, 2009); it has the potential to foster environmental outcomes (Krasny, 2009) and the emergence of urban green commons has a close fit to the reorganization of cities (Colding and Barthel, 2013) to address pertinent and emerging problems(citizens to squat vacant lands) and community gardens may lead a sense of belongingness and to motivate the participation of members in all activities.

In addition, from the perspective of property rights theory, community residents are more willing to invest in gardens with longer leaseholds (Colding, 2011). According to Waddick (2000), the key importance for securing land for community gardens in the U.S. has been the backing up of various NGOs which help secure community land and establish themselves legally as non-profit organizations. Likewise, community gardening education can also foster environmental outcomes (Krasny, 2009). For example, neighborhood exploration results suggest that the youth learned about their community's assets, needs, weed species, growth problems, and control methods (Krasny and Tidball, 2009).

Community gardens also increase social cohesion through sharing common values, aims and behaviors, social support, and social connections developed through social bonds and networks (Firth et al. 2011). Community gardening skills developed by people with diverse socio-cultural backgrounds contribute to youth development and gardening skills (Krasny & Tidball, 2009); it has the potential to foster environmental outcomes (Krasny, 2009), and the emergence of urban green commons has a close fit to the reorganization of cities (Colding and Barthel, 2013) to address pertinent and emerging problems.

Besides, Andersson et. al (2007) stated both the local ecological knowledge and sense of place are strongest among the informal managers and weakest among employed personnel. Bio-cultural Diversity(BCD) could do particular work in providing options to live sustainably with nature in cities. Durban, South Africa, for example, uses policy initiatives that address the needs of vulnerable populations for climate mitigation and adaptation (Isabelle and Carmin, 2011). In addition, social inclusion appeared to offer much room for further innovation. For example, city administrations in Northern and Western Europe are more open to experimenting with participatory approaches to planning (Hansen et al. 2017).

2.6.12. Policies and institutional analysis

Policy analysis uses multiple methods of inquiry and argument to produce and transform policy-relevant information that may be utilized in political settings to resolve policy problems." (Dunn, 1981). From the perspectives of modes of governance, policymaking is explained in terms of the shift from the single-actor, rational-analytic manner of policy making to a multi-actor process-oriented way (Hajer and Wagenaar, 2003) as a shift from government to governance. In this regard, the policy-making process is embedded in an institutional context of autonomous actors and inter-organizational networks (Rhodes, 1997).

Further, networks are considered an alternative coordination mechanism to hierarchies and markets (Provan and Kenis, 2007) as it is used to depict the complex web of relationships between actors in decision-making processes (van Bueren, 2009). Moreover, the network approach has become one of the dominant ones in the study of policy-making (van Bueren 2009). For example, (Ansell and Gash, 2007) pointed out the relevance of the policy network approach in the field of environmental policymaking for scientific purposes.

The environmental problems are dealt based on environmental policies (Leroy and Arts), and recent changes (and patterns of stability) in environmental policies are analyzed in terms of institutional dynamics. There are debates on policy measures against the environmental challenges in terms of economic or market regulation instruments, on the one hand, and Martell (1994, p. 71) argues state- coercion and rely on the 'voluntary' actions of capitalists and consumers (Spaargaren,1997, p. 40) on the other hand. In developing countries, policies focus less on the negative effects of the exploitation of nature for economic development (Mittal and Gupta, 2015), by which developing countries need to adopt and implement innovative policy approaches to mobilize new agents of change (Hajer et al. 2015).

2.6.13. Park management models

Several authors have developed different models and approaches to park management. However, the application of each park management model depends on the socioeconomic context, the type of parks, and the city's existing institutional and regulatory framework (Takyi et al. 2016). For the management of parks and recreation areas, More (2005) identified five alternative models: the fully public model, public utility model, outsourcing, private-nonprofit, and private-for-profit models.

In the fully public model, park management is considered a governmental function that should be fully funded through taxes (More, 2005), while the government functions as a private corporation in the public utility model. The outsourcing management model involves outsourcing services to private companies. More (2005) further explained that private-nonprofit and private-for profit models involve parks owned and managed by non-governmental organizations. Private-for-profit model parks are owned and operated by private corporations (More, 2005).

In addition, Eagles (2008) analyzes governance based on three independent approaches: (1) the identity and role of the owner of the land and resources; (2) the source of the income for management; and (3) the type of management body. Sources of income are categorized as (1) societal taxes, (2) user fees, and (3) donations. Accordingly, Eagles (2008) suggests three alternatives: a government agency, a nonprofit institution, or a for-profit corporation for resource ownership of parks and protected areas.

The management institution may constitute (1) a government agency; (2) a parastatal corporation owned or wholly controlled by the government; (3) a nonprofit corporation; or (4) a for-profit corporation, public or private (Eagles, 2008, p.39-41). In general, Eagles (2008) identified eight park management models. The models are: (1) the national park model, (2) the parastatal model, (3) the nonprofit model, (4) the ecolodge model, (5) the public and for-profit combination model, (6) public and nonprofit combination model, (7) aboriginal and governance model, and (8) traditional community model.

From the models, the aboriginal and traditional community models and ecolodge model are not considered in this study as the national parks in Ethiopia are managed by the federal government. Since most of these parks are also located in rural areas, the aboriginal and traditional community models are also relevant for rural areas.

2.6.14. Factors influencing the perceptions of green space management

Environmental psychology and landscape studies pointed out that an individual's attitude influences land use transformation (Erickson et al., 2002; Jacobson and Marynowski, 1997; Luzar and Diagne, 1999). Attitude is a powerful predictor of behavior and, thus, an important tool in determining human response to policies and planning decisions (Balram and Dragicevi, 2005). For example, people's perception of accessibility to park space is the most influential factor in a park use decision (Wang, 2015). 2003). In this regard, understanding the perception of urban people to the management green space management, preferences for GI, and ecosystem services of green infrastructure can be linked to their attitude toward volunteering environmental activities for the management and maintenance of green spaces is significant with the view to inform the planning and management of GI.

Studies show the significance of exploring the attitudes or perceptions of residents towards environmental knowledge and concern (Cottrell, 2003); urban green spaces (Balram and Dragicevi, 2005); and their participation in urban park management activities (Wang, 2015). Others indicate the inputs from people could better inform the planning and design process (James et al., 2009); develop public participation in government policies (Buijs et al., 2016); and integrate complex details of local dynamics into the early stages of planning and management processes of UGS (Balram and Dragicevic, 2005).

The inputs from people also guide policies and plans (Faehnle, 2014); help in advancing public participation in urban green infrastructure initiatives (Barau, 2015); and the inclusion of residents' knowledge and their personal experiences is necessary for green infrastructure planning and to understand the socio-ecological dimensions (Faehnle, 2014). Besides, the practical knowledge of planning is connected to local experiences and knowledge (Schon, 1983), which contributes to the bottom-up planning processes (Gashu and Gebre-Egziabher, 2018). While the failure to include citizen participation in urban green space development strategies neglects to facilitate economic activities attributed to social and environmental functions **(**Balram and Dragicevic, 2005).

2.6.15. Forest Policy Arrangement Approach

The urban forest includes all woodlands, groups of trees, and individual trees located in urban and peri-urban areas (Sabatier, 1998) that provide ecosystem services. Urban forestry also refers to the art, science, and technology of managing trees and forest resources in and around urban community ecosystems for the physiological, sociological, economic, and aesthetic benefits trees provide to society (Harris, 2004). Mincey et al. (2013) indicate the human-engineered nature of urban forest management is determined by the actors and policy-makers to influence urban planning, land use, and development. Sandberg et al. (2015) consider three natures of urban forest: (1) integrative, (2) socially inclusive, and (3) strategic, which are important for urban forestry to develop as a collaborative approach.

From the perspective of the integrative approach, Konijnendijk et al. (2005, p.20) viewed urban forestry as a series of strategic, interdisciplinary, and participatory approaches aimed at optimizing the planning and management of urban green structures to provide multiple benefits to urban societies.

Policy arrangement is defined as the temporary stabilization of the content and organization of a policy domain (Arts et al.2006, p.97). It includes structures formed through processes, interactions among policy actors, and formal and informal rules (Park, 2015). In connection to environmental governance, the structural properties of policy arrangements include the Resources, Rules, and Discourses (Leroy and Arts, 2006). While Actors (the fourth policy dimension) will try to advance their interest by mobilizing their resources, making use of rules, framing discourses, or forming coalitions (Arts et al. 2006).

Dynamic change and stability in a policy arrangement are influenced not only by strategic actions and interactions of actors but also by structural processes of social and political change or political modernization (Arts et al. 2006). Political modernization refers to structural processes that affect a certain governance mode (Arnouts et al. 2012). Within the field of environmental policy-making, political modernization refers to the shifting relations between state, market, and civic society (Van Tatenhove et al. 2000). The word 'modernization' indicates the emergence of governance-related with the involvement of citizens and other stakeholders in decision-making (Sandberg et al. 2015).

Regarding the dimensions, Arts and Buizer (2009) emphasize the importance of four interrelated analytical dimensions (discourses, actors, power, and rules) to understand policy practices. These policy arrangement dimensions are interwoven (Park, 2015), and this relationship is symbolized by the tetrahedron (Figure 5), in which each of the corners represents one dimension (Arts et al. 2006). A change in one of the dimensions will affect the other dimensions and change the shape of the entire figure (Figure 2.5).

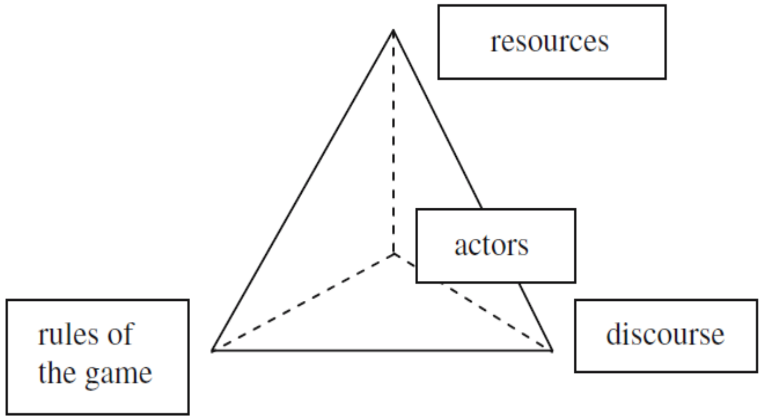


Figure 2-5: The tetrahedron a symbol for the connections between the dimensions of an arrangement

Source: Arts et al. (2006, p.99)

2.7. Governance System in Ethiopia

Ethiopia is one of the few in Africa that was never colonized, sustaining an unbroken chain of historical civilization (Tibebu,1996). Ethiopia is one of the oldest and largest sub-Saharan states and was distinguished by Christianity and a written language from all others (Clapham, 2000, p.3).

Ethiopia's state formation was characterized by indigenous consequent dynamics of potential change rather than colonial(Clapham,1990). Ethiopia has long been governed through a hierarchical political structure based ultimately on the control of territory. For many centuries this hierarchy was headed by an emperor whose membership in a specific 'Solomonic' dynasty (Clapham,1990, p. 35) and Emperor Tewodros (1855-68), Emperor Menelik (1889-1910), and the last emperor of a dynasty, Haile Selassie (1930–1974). The hierarchical political structure made the appointments based on loyalty. Until the 1974 revolutionary regime, Emperors were sanctified by divine status.

Through his land reforms from 1885 to 1868, Emperor Theodores II may be credited with initiating Ethiopia's transition to a modern nation-state (Berhane and Tefera, 2018, p.108). After the overthrew of the imperial regime by the military coup in 1974, Ethiopia had a Marxist-Leninist political trajectory (1974-1991), which led to the creation of formal political institutions consciously derived from Soviet models (Clapham,1990).

2.7.1. The Present system of governance in Ethiopia

With the intent of weakening the previous central state apparatus, the present government introduced a decentralized form of government in 1991 by which the Federal Constitution established the Federal Democratic Republic, consisting of nine Regional States, the federal capital city Addis Ababa, and the special administrative region of Dire Dawa Administrative Council based on semi-autonomous ethnolinguistic territorial units (Mehretu, 2012). These regions were established with adequate power and authority to exercise self-rule based on ethnic considerations, which shows the emergence of democracy and significant political institution building and public ethos (Abbink, 2006).

However, ethnic federalism in Ethiopia remains a contentious debate. Advocates of Ethiopian federalism argue the system created the opportunity for minority groups to exercise their cultural and linguistic rights and the stability of a multi-ethnic state (Habtu, 2005; Abebe, 2012). On the contrary, authors criticized this governance system for creating ethnic-based conflicts (Aalen, 2002; Fiseha, 2015; Abbink, 2011; Berhane and Tefera, 2018); adopting the revolutionary democracy as an appropriate doctrine for sustainable economic development, and rejecting parliamentary democracy and defending democratic centralism based on a vanguard party (Bach, 2011,p.643); the federal structure emphasizes more self-rule than shared-rule (Fiseha, 2015) and the Federal system lacks sufficient institutional mechanisms for guaranteeing shared functions to the constituent units (Jon Abbink cited in Fiseha, 2015); the system failed to facilitate a neoliberal and functional agenda for the economic and political integration of the country as a whole (Mehretu, 2012); and its first precipitous act was to grant secession to one of Ethiopia's 14 provinces, Eritrea which led decades of warfare between the Ethiopian state and Eritrea (Mehretu, 2012). It also results from the country ranking first in the world for internally displaced people, with more than 2.8 million due to ethnic conflict (Ayele, 2019) in various parts of the country.

Regarding the positions held and vital political decisions, all appointed people held the positions of power and political decisions are made in the informal sphere, behind the façade, in circles and networks of a neo-patrimonial nature, impervious to what institutions like a parliament or a high court say Abbink (2006:178). Besides, the government effectively marginalized civil society from the democratization endeavor in the country with its stringent laws(Ayele,2019). In addition, the controversial and flawed Ethiopian parliamentary elections in 2005 led to a crisis in the entire democratization process (Abbink, 2006, p.1).

The impact of ethnic federalism on UGI development is also identified in terms of its bureaucratic institutions (Jebena, 2015; Temesgen, 2015; Daba and Mulu, 2017), which are not autonomous, and civil servants who practice the bureaucracy are assigned based on political affiliation and ethnic quota system which undermine professionalism. This can be reflected from the view of revolutionary democracy, which is a legacy of the government;

the land use regulation was based on a market economy by which the city government focused on the economic benefits of land through land lease policy which partly led to the city government to play a role of developmental state(Tesfaye, 2010; Woldegiyorgis; Wubneh, 2018) and this land leasing has allowed the city near total control of spatial development (Goodfellow, 2015; Knebel and Kolhatkar, 2015); policy and decision making emerge in an ad hoc way at the federal level; and sector-based governance arrangements by which authorities are assigned in favor of political position and ethnic quota system.

2.7.2. Dilemmas between participatory and authoritarian models

Scholars identified the dilemmas between a participatory model of input-legitimacy and a paternalistic, authoritarian model of output-legitimacy (Knebel and Kolhatkar, 2015) that African cities faced. The input legitimacy refers to the involvement of political participation by and citizen representation of the people. The output legitimacy is based on a performance criterion centering on the ability of institutions to govern effectively for the people (Schmidt, 2013, p.6).

2.7.2.1. The participatory model of input-legitimacy

African cities faced a dilemma in deciding between a participatory model of input-legitimacy promulgated by Western donors and a paternalistic, authoritarian model of output-legitimacy followed by Eastern agencies (Knebel and Kolhatkar, 2015). The participatory model of input-legitimacy refers to the Western systems of governance which are based on democratic principles, and it is the basis for incorporating urban good governance principles and conditional upon political reforms (Condon,2012; Knebel and

Kolhatkar, 2015) aimed to transform African state bureaucracies into efficient, transparent, and accountable institutions (Anders, 2008). The conditionality links the Bank's financial support to implement a program of reforms critical for the country's economic and social development (Doornbos, 2006; Anders, 2008, p.5).

This model is influenced by the World Bank's objective of strengthening good governance in developing countries and improving the effectiveness of aid by endorsing 'good governance as a core element of its development strategy in 1996 (Santiso, 2001), intended to transform "dysfunctional" state bureaucracies into efficient and transparent service-providers that are accountable to the public and subject to the rule of law and to transform what donors perceived as bad governance into good governance (Anders, 2008, p.4). It is considered that participatory development and good governance are central concerns in allocating and designing development assistance (Neumayer, 2003). For example, the document DAC Orientations on Participatory Development and Good Governance is mentioned political freedom and democracy, human rights, the rule of law, the quality of public sector management, the control of corruption, and the reduction of 'excessive' military expenditures as the most important aspect of GG (OECD-DAC 1994 in Neumayer, 2003, p.10) in which good governance is the ultimate goal. However, Western governance systems no longer offer the only role model for development to African countries (Knebel and Kolhatkar, 2009). For example, Ethiopia is cited as one of the authoritarian regimes that skillfully transformed into dominant parties while retaining the facade of multi-partyism (Doornbos, 2006). and the Western approach based on conditionality has been considered a development failure (Condon,2012), creating a strong relationship, particularly with China.

2.7.2.2. A paternalistic, authoritarian model of output-legitimacy

Contrary to Western donors, China grants large, unconditional, very cheap loans without concern for transparency or accountability (Condon, 2012, p.1), and the Chinese aid is focused on resource extraction, infrastructure, and other productive sectors, which combines aid with commercially-oriented capital (Chan, 2007; Morgan and Zheng, 2019). Besides, many African leaders perceived China's approach might more easily answer the immediate economic needs (Welle-Strand and Kjøllesdal, 2010)

While China's involvement in Africa is criticized for undermining not only human rights but also principles of good governance, transparency, and accountability to which African countries have subscribed via the AU (Rotberg, 2009). It also reinforces many of Africa's problems of corruption and poorly thought-out policies, resulting in a 'money for nothing' dynamic (Chan, 2007, p.1). Further, the western donor's labeled China a "rogue donor" whose actions will be damaging to Africa in the long run (Condon, 2012, p.1)

The bilateral agreement between China and Ethiopia includes Economic and Technological Cooperation (Jalata, 2014). Despite its contribution to the economic and infrastructure development of the country, it is argued that Chinese aid in Ethiopia greatly affects the planning, management, and development of UGI in terms of creating favorable conditions for weak commitment to good governance approaches. However, the Western model helps develop Ethiopian urban areas specifically through capacity building of urban experts, spatial planning, good governance packages, housing development, and others provided by UN-Habitat.

Concerning the provision of urban services, Heynen (2006) indicated the question of who controls, who has access to decision processes, when decisions are taken, and who is considered partners is critical. Similarly, Young et al. (2014) indicate the influence of political power is shaping social settings within which green infrastructure can advance. This shows how the most powerful and important groups of actors influence and alter cities' social, political, and economic structures.

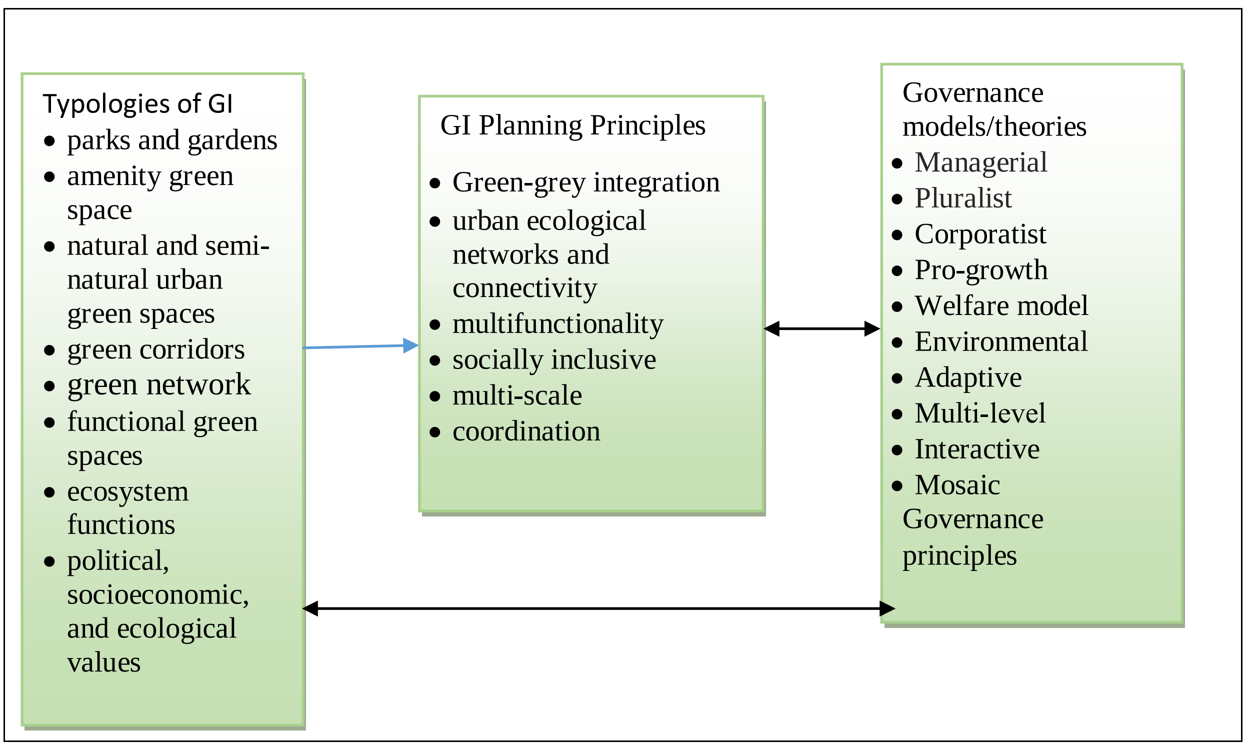


Figure 2-6: Theoretical framework

This framework (Figure 2.6) depicted therelationship between governance and UGI. Governance is crucial for the development of UGI in developing countries. This is due to legal frameworks, policies, and institutions emerge from broad governance framework determine the sustainabile development UGI which enhance te quality of life of citizens. Because UGI provides several benefits, both social, health, economic, environmental,and ecological benefits. The implementation of four principles (green-gray integration, the ecological network and connectivity, multi-functionality, and social inclusiveness) in the planning and management of UGI is significant for UGI development because these principles guide and facilitate the planning procedures of GI

2.8.1. Historical development of Addis Ababa green space plans

Addis Ababa was founded by Emperor Menelik II (Pankhurst, 1961) and his wife, Empress Taitu, in the late 19^{th} century (UN-Habitat, 2017). Since its establishment in 1886 (AACPPO, 2017), Addis Ababa has had at least ten master plans. The first master plan, 'Taitu's era master plan, was an informal master plan led by Empress Taitu that guided the city's development until 1935 (UN-Habitat, 2017). In 1936, Le Corbusier, a French-Swiss architect, and urban planner, prepared a guideline sketch as a master plan (Tufa, 2008). Le Corbusier's plan incorporated the Italian's wish for spatially segregating households by ethnicity and economic status (Ahderom, 1986).

The second master plan developed by Italians during their occupation between 1935 and 1941 (figure 2.6) led to the development of racially segregated settlements (AACPPO, 2017). The plan comprised two parallel axes: the first axis was to connect Arada (the commercial center) with the railway station, while the second axis was a political axis to the east of the commercial axis (Mahiteme 2007). The plan constitutes a green belt zone in terms of green space planning.

The master plan prepared in 1946 by Patrick Abercrombie includes the integration of satellite settlements in all directions around the core city (ORAAMP, 2002). Based on this planning concept, part of the street network and the satellite towns were developed in Figure 2.7 by Bolton Hennessey in 1958/1959 (ORAAMP, 2002).

Another master plan prepared in 1965 (Figure 2.8) by Luis de Marien, a French consulting team (Mahiteme, 2007), incorporates a green zone. The master plan prepared by Le DI Maryion and Polloni in the1966-1967 and 1975 focused on connecting roads between Addis Ababa and adjacent towns (ORAAMP, 2002). Consequently, Addis Ababa Master Plan Project Office (AAMPPO) was prepared in 1984-1986, but this plan pays less attention to physical infrastructures such as roads, squares, and buildings (Mathewos, 2007). AAMPPO was also prepared for 20 years (1986 to 2006) and was approved by the Addis Ababa city administration in 1994 (ORAAMP 2002). Starting from 2000, the master plan from 2017-2023 was prepared by Office for the Revision of the Addis Ababa City Master Plan (ORAAMP), consulted by the German GTZ and the Town Planning Agency of Greater Lyon, France (Knebel and Kolhatkar 2015). The current structure plan prepared by AACPPO (2017) guides the city plan from 2017 to 2023.[1]

[1] Addis Ababa literally mean 'new flower' The location, hot spring (File Wuha) exhibited a great attraction to the Emperor and his wife for its healing effect, and adequate availability of water (Mahiteme, 2007; Tufa, 2008).
The city of Aksum was the first alleged capital city of Ethiopia in the 1st century A.D. However, over time this function was placed on other cities such as Harar, Lalibella, Gondar, Adwa, and Ankobar (Giorghis and Gérard 2007). In the African continent Ethiopia has been officially never been colonised

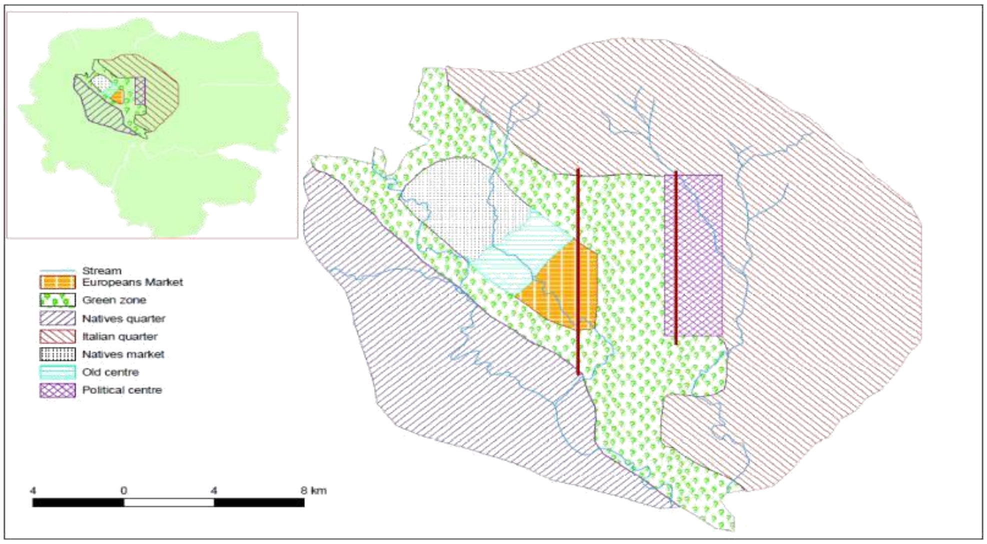


Figure 2-7: The proposed master plan during the Italian occupation
Source: Mahiteme (2007)

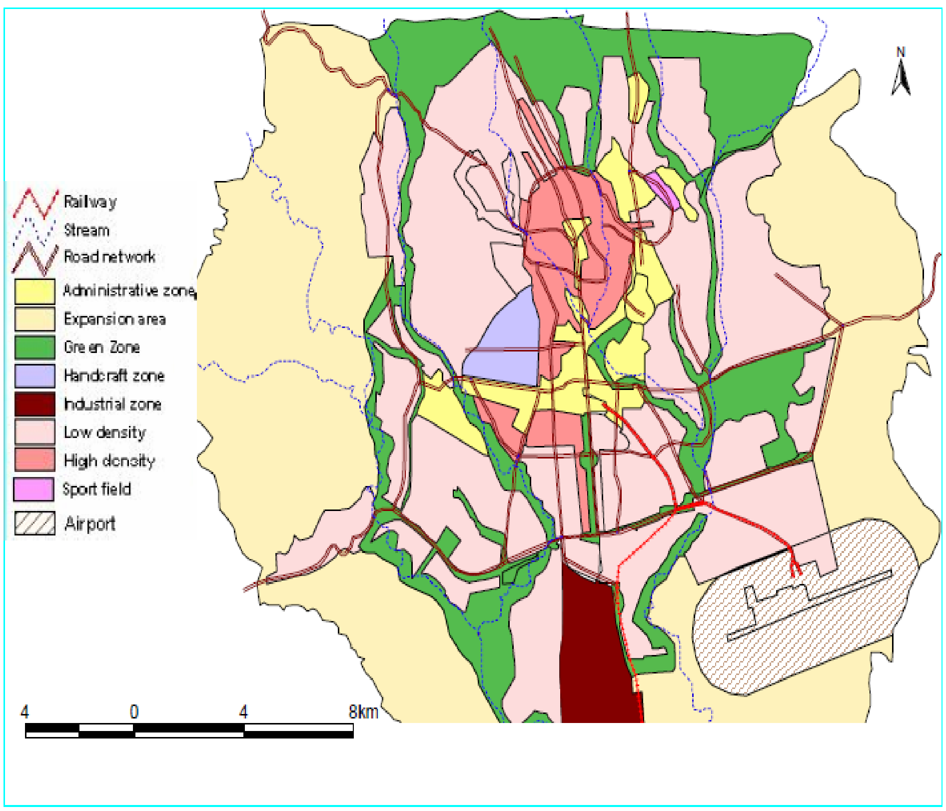


Figure 2-8: Sir Abercrombie's Master Plan
Source: Mahiteme (2007)

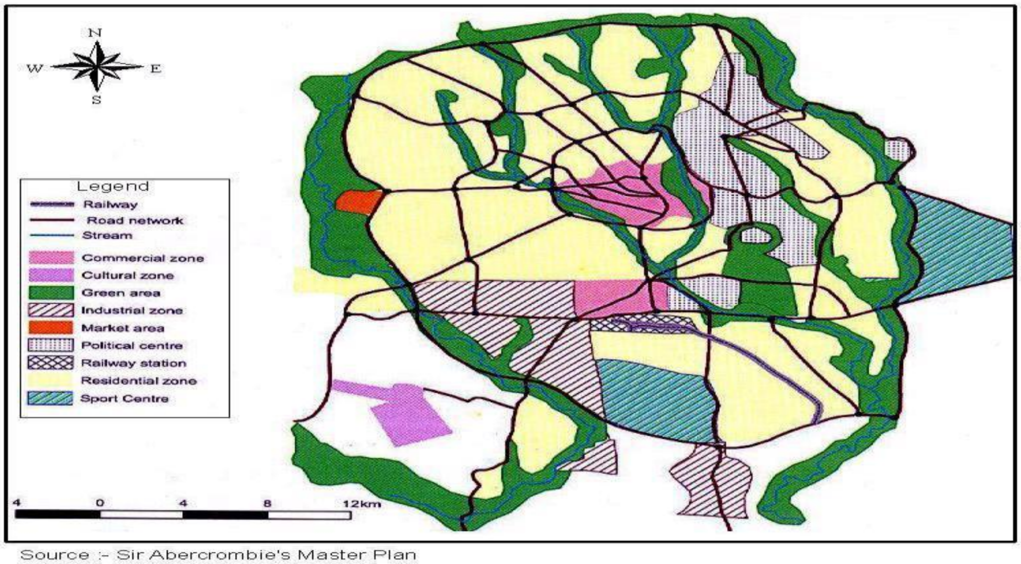


Figure 2-9: Proposed master plan by L.De Marieon, 1965

Source: Mahiteme (2007)

The current structure plan (Figure 2.9) is developed by AACPPO (2017). The plan guides the city's development for ten years (2017-2023). This plan specifies the magnitude and direction of growth in the urban center, principal land use classifications, and layout of major social and physical infrastructure. The structural plan mainly indicates, among others, the magnitude and direction of growth of the urban center, principal land use classes, housing development, environmental protection aspects, and industrial zones (AACPPO, 2017).

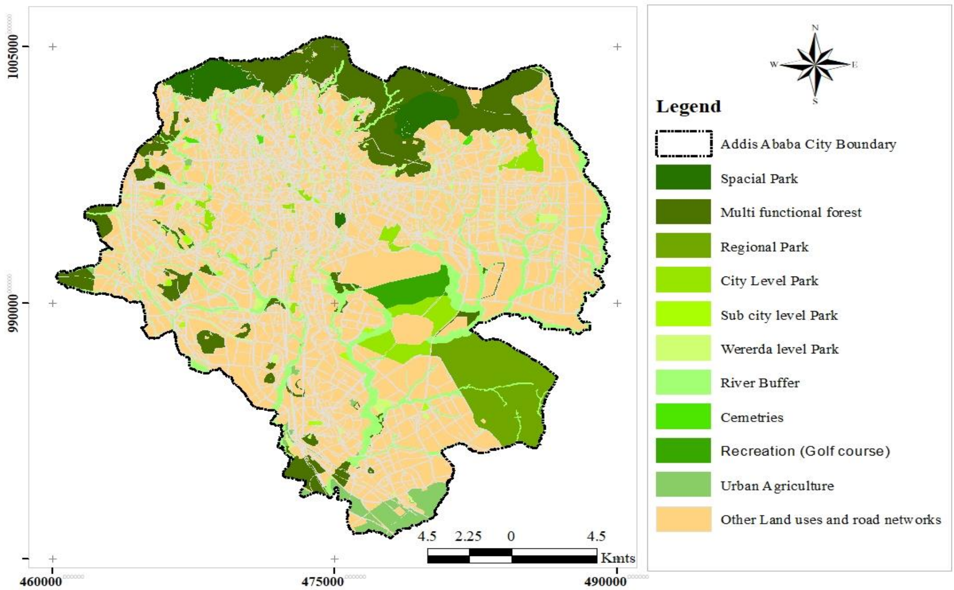


Figure 2-10: Structure plan of Addis Ababa(GI components)

Source: AACPPO (2017)

2.9. Methodological review

2.9.1. Mixed methods

Mixed methods research is an intellectual and practical synthesis based on qualitative and quantitative research (Onwuegbuzie et al. 2007). The mixed method research paradigm offers an important approach for generating important research questions (Onwuegbuzie et al. 2007). Mixed methods research is an attempt to legitimate the use of multiple techniques in answering research questions (Creswell, 2006) and inclusive of local and broader sociopolitical realities, resources, and needs (Onwuegbuzie et al., 2007). Mixed methods research also offers great promise for practicing researchers who would like to see methodologists describe and develop techniques closer to what researchers use in practice (Johnson and Onwuegbuzie, 2004, p.16). Further, designing a mixed study is important to enhance research validity and triangulation from different viewpoints and is likely to provide superior research findings and outcomes (Onwuegbuzie et al. 2007, p.127).

Quantitative Research Approach

A quantitative research design uses an epistemology to determine the proposition's truth value (Amaratunga et al.2002). This approach incorporates standardized measures and statistical techniques (McEvoy and Richards, 2006) based on a positivist approach to social phenomena. Positivist principles underpin quantitative methods and have contributed to the reduction of human experience (reductionism) and the objectification of the human person within social research (Ryan, 2006, p.20). The focus of quantitative research is on deduction, confirmation, theory/hypothesis testing, explanation, prediction, standardized data collection, and statistical analysis. The quantitative approach also focuses on generalizations from a sample to a wider population (McEvoy and Richards, 2006).

Qualitative research approach

The qualitative research approach intends to assess attitudes, opinions, and behavior (Kothari, 2004, p.5). Qualitative research does not bring individuals into a laboratory and is conducted in a natural setting (Creswell, 2007) and focuses on induction, discovery, exploration, and theory/hypothesis generation (Johnson and Onwuegbuzie, 2004, p.18). Qualitative research also allows flexibility, theory, and concepts to proceed in tandem (Amaratunga et al. 2002). Validation in qualitative research is considered to be an attempt to assess the "accuracy of the findings and validation as a distinct strength of qualitative research in that the account made through extensive time spent in the field, the thick, detailed description, and the closeness of the researcher to participants in the study all add to the value or accuracy of a study (Creswell,2007, p.207).

Regarding philosophical assumptions, Creswell (2007) identified five philosophical assumptions that researchers can choose from (ontology, epistemology, axiology, rhetorical, and methodological) philosophical assumptions. An ontology consists of a stance toward the nature of reality (Creswell, 2003). With the epistemological assumption, conducting a qualitative study means that researchers try to get as close as possible to the studied participants (Creswell, 2007). Axiology is the role of values in the research; rhetoric is the language of research; and methodology is the methods used in the research process (Creswell, 2003). The methodology is also a theoretical and philosophical system that structures the way research is conducted (Slevitch, 2011).

2.9.2. Research Strategy

Concerning the qualitative research approaches, researchers can choose from among the approaches, such as a narrative, phenomenology, grounded theory, ethnography, and case study (Creswell, 2007). A research strategy embodies a particular style and employs different research methods (Irani et al.1999). Thus, for this study, a case study strategy (four cases) was selected as a case study focusing on a single case or using a number of cases(Schell,1992). In qualitative research, the case study is one of the frequently used methodologies (Yazan, 2015).

Case study strategy

For a case study, the researcher needs to select a site or sites to study, such as programs, events, processes, activities, individuals, or several individuals (Creswell, 2007). The case study is suitable for investigating contextually rich events or phenomena (Schell,1992). A case study approach also allows the study of phenomena in their natural setting; the researcher can learn the state-of-the-art practices that generate theories from practice and answer questions to understand the complexity of the processes taking place (Irani et al.1999, p.197). Schell (1992), Amaratunga et al. (2002), Yin (2004), and Creswell (2014) provide key characteristics of case study research that apply to this study:

- Useful for examining a phenomenon in its real-life context
- Serve to answer research questions such as; descriptive (what has been happening?) or explanatory (how or why has it been happening?);
- Focus on naturally occurring and ordinary events in natural settings;
- Provide rich data in a real-life context; and
- The researcher makes direct observations and collects data to produce a first-hand and in-depth understanding of people and events.

2.10. Research gap

Conceptual Gap

A lack of green infrastructure planning and management hampered African cities' natural resource development. Green infrastructure becomes a new urban agenda that promote environmental sustainability to create a critical connection between the environment, urban planning, and governance (UN, 2016). These issues require interdisciplinary studies. Langemeyer (2015) underlined the importance of a better understanding of the combination of nature-based solutions with technical-engineering solutions and governance. It is a successfully tested tool for providing ecological, economic, and social benefits through natural solutions and is an important component of sustainable urban planning (Baro et al.2015). Its multiple benefits are important, particularly for Africa, because the country is more vulnerable to global climate change (Hope, 2009), which exerts a devastating impact on socio-economic development.

Methodological Gap

The rapidly expanding cities in Sub-Saharan Africa urgently need to consider the importance of green assets as part of their broader infrastructure development programs (Schaffler and Swilling, 2013). Despite literature on urban green infrastructure, literature on governance of green infrastructure planning and management in African urban areas is relatively scarce. Accordingly, this study addressed four urban areas. Addis Ababa, Hawassa, Debre-Birhan, and Dukem were selected to represent Ethiopia’s urban areas.

CHAPTER THREE : RESEARCH METHODOLOGY

3.1. Study areas

The urban planning system in Ethiopia is based on four levels (Pro. No. 574/ 2008). The hierarchy of plans includes (1) National Urban Development Scheme (NUDS); (2) Regional Urban Development Plan (RUDP), (3) Citywide structure plan (CWSP), and Local Development Plan (LDP). The Structure plan determines the magnitude and direction of growth of the urban center, principal land use classes, housing development, the layout and organization of major physical and social infrastructure, urban redevelopment intervention areas of the urban center, environmental aspects, and industry zone.

Addis Ababa, the capital of Ethiopia, is the country's economic, political, and administrative hub and headquarters of the African Union (AU), The UN Economic Commission for Africa (UN-ECA), and a regional office for many international organizations. The city is among the fastest growing cities in Africa (UN-Habitat 2008) and is located at altitudes ranging from 2025 to 3028 m, with a mean annual temperature ranging from 16–18°C (Feyisa,2013). The total population of Addis Ababa was about 3.041 million in 2012 (CSA, 2012). The population is projected at about 6 million by 2030, with an average annual growth rate of 4% (UNDESA, 2014). Its administrative hierarchy is structured into a two-tier arrangement: sub-cities and *woredas* (small administrative units).

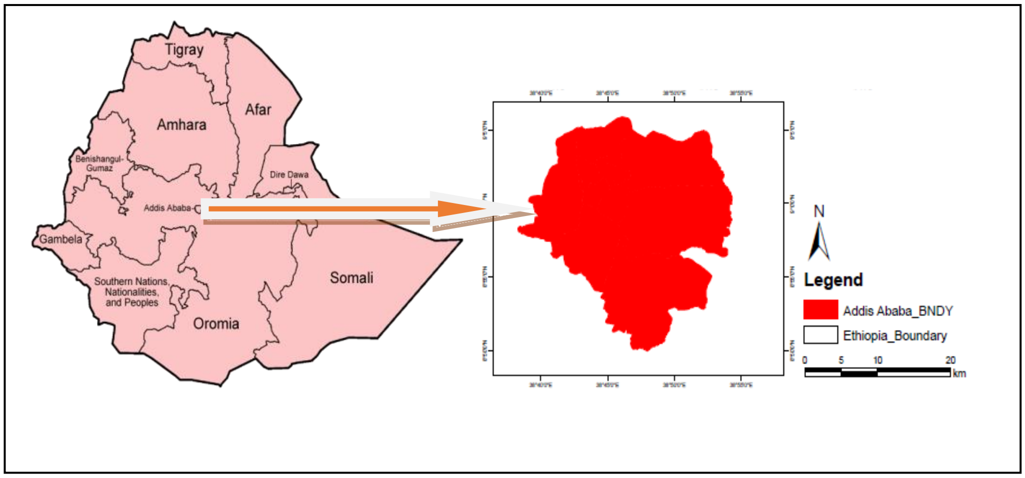
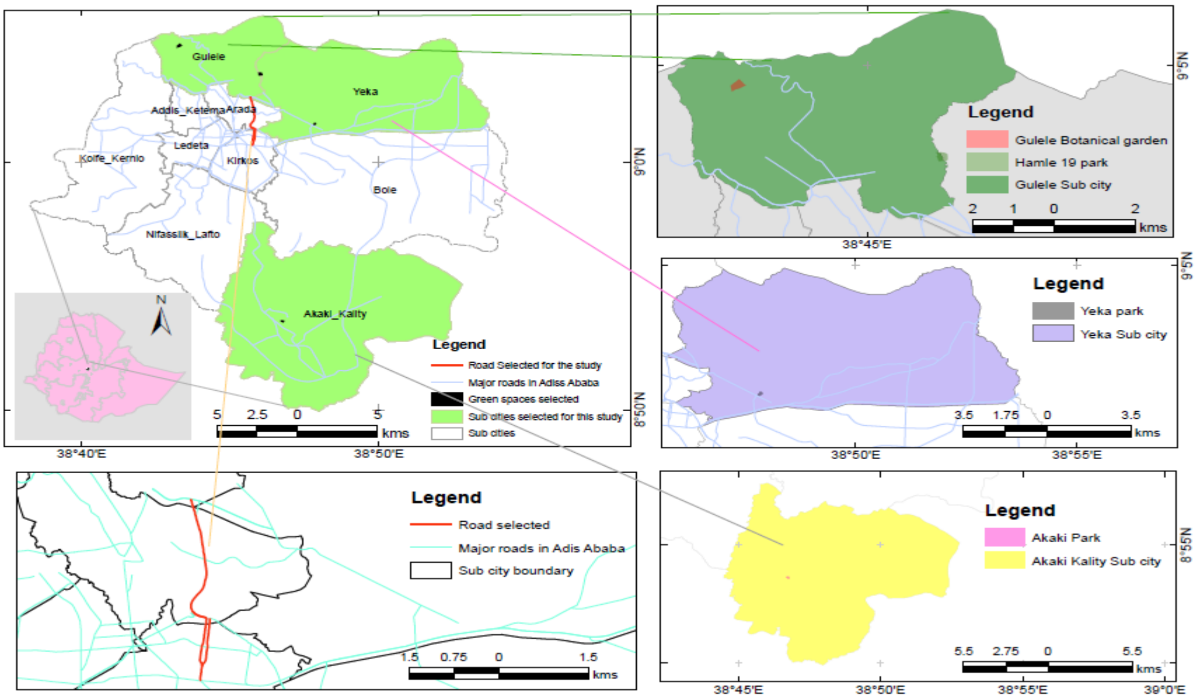


Figure 3-1: Map of study areas
Source: Ethio GIS (2021)

3.1.1. Location of selected green spaces

The selected green spaces (Figure 3.2) have been assessed by focusing on recreational parks, a botanical garden, and community green spaces. Addis Ababa has 20 functional recreational parks (at the city, sub-city, and local/neighborhood levels) and one botanical garden. The botanical garden at the city level and three recreational parks at sub-city levels (*Yeka, Korea, and Hamle 19*) were selected for the study. The selected green spaces are located in three sub-cities, Gulele (Gullele Botanical Garden, Korea, Hamle 19 parks, Yeka (Yeka park), and from Akaki-Kality (community green space). WGDAs are responsible for managing and maintaining urban parks, while *woredas* WGDAs are responsible for outsourcing and partly for community green space maintenance. A community green space in this research refers to small areas located near residential areas to provide green areas for residents and serve as the 'lung' of the city. A botanical garden is a special recreational park with rich biodiversity and a protected area in the city. The management aspect includes designing parks, outsourcing and inspection organization, conservation and research activities, while the maintenance consists of weeding, mowing, hedge cutting, etc.



4 3-0: A map showing the location of the selected urban green spaces

3.2. Research Paradigm

3.2.1. Research Philosophical Positioning

Sound research requires an unraveling of the underlying philosophy and approach that meets the aims set and generates data in a way that the researcher can handle and interpret the results. This research was conducted using a pragmatist philosophical lens. The central notion of pragmatism focuses on the nature of truth. Pragmatism holds that truth is found in “what works” and that truth is relative to the current situation (Given, 2008, p. 672). Pragmatists take a philosophical viewpoint and position their probe at the intersections of subjectively and objectively held knowledge seeking to understand the nature of reality (Given, 2008. p. 674).

A pragmatist philosophy enables researchers to integrate perspectives and approaches with an epistemological justification and logic for mixing approaches and methods (Johnson et al. 2007). In this regard, policy-related urban development research endeavor as the one under consideration is congruent with a pragmatism that advocates the use of mixed methods by integrating both quantitative and qualitative approaches. McEvoy and Richards (2006, p.68) assert that the logic of the pragmatist position is that neither quantitative nor qualitative methods alone are sufficient to develop a complete analysis. Pragmatists also considered critical realism, drawing on qualitative and quantitative research methods to understand social issues.

The central notion of pragmatism focuses on the nature of truth. Pragmatism holds that truth is found in "what works," and that truth is relative to the current situation (Given, 2008, p.672). Pragmatic philosophy also offers a practical and outcome-oriented method of inquiry for selecting methodological mixes that can help researchers better answer many of their research questions (Johnson and Onwuegbuzie,2004, p.17).

The critical realist approach is consistent with the principles of pragmatism, which is considered appropriate for understanding the core issues of this research, as it investigates the underlying mechanism and structure of the social issues. The position taken by this research is that governing green infrastructure, its planning, and management are socially constructed, and the governance issues that affect GI development and the subsequent policies and intervention strategies are socially mediated. From the view of a critical realist, this research recognizes that GI development is caused by many interrelated issues embedded within individuals, institutions, and society.

Following pragmatic philosophy, this study understands urban planning as a discipline that strives to create better cities through improved processes, theories, and practices, focusing on problems that matter to our urban lives and provide tangible solutions (Flyvbjerg, 2001). Accordingly, this research contributes to the interdisciplinary field between urban planning and social science, particularly sociology by enabling discussions and problematization of practices of urban green infrastructure planning principles, policies, and strategies through the practices of governance approaches.

3.3. Research method

3.3.1. Evaluation of the incorporation of urban green infrastructure planning principles in green space plans of cities

The integration of urban green infrastructure planning principles was evaluated by (i) evaluating the integration of urban green infrastructure planning principles in spatial plans and (ii) assessing the perceptions of planning experts on the integration of UGI principles.

3.3.1.1. Green infrastructure planning principles for GI integration

The integration of urban green infrastructure planning principles in the spatial plan was evaluated using GI principles integration strategic planning of urban regions used by Gradinaru and Hersperger (2018) and criterion developed to evaluate the green plan in towns and cities by Sandstorm (2002). The protocol that addresses aspects regarding the plan, the planning context, and the general aspects of how GI is discussed in the plan were adopted (from Grădinaru and Hersperger 2019).

To address the protocol items (questions), the documents were read using different terms of GI included in the items (Tables 3.1 and 3.2).

Table 3-1: Green Infrastructure planning principles; rules for coding

GI principles	Sub-categories	Each subcategory was coded according to these classes
1. Coordination of GI with other strategic domains	a) Built-up development	1. Domain not considered in the plan
	b) Water management	2. No coordination
	c) Climate change adaptation	3. Weak coordination
	d) Food provision	4. strong coordination
	e) Quality of life	
	f) Air quality	
	g) Cultural assets conservation	
	h) Other	
2. Multifunctionality	a) Social functions	1. Not considered
	b) Ecological functions	2 .Poor coordination
	c) Economic functions	3. Detailed consideration
	d) Cultural functions	
3. Connectivity of GI elements	a) Structural connectivity	1. Not considered
	b) Functional connectivity for animal and plant species	2. Poor coordination
	c) Functional connectivity for humans	3. Detailed consideration

4. Multi-scale planning of GI	a) GI as part of the national network	1. Not considered
	b) GI as part of the regional network	2. Poor coordination
	c) GI planning at local (municipal level)	3. Detailed consideration
	d) GI planning at the neighborhood level	
	e) Site-specific GI planning	
5. Diversity of GI elements	a) Large natural and semi-natural areas	1. Not considered
	b) Large managed areas	2. Poor coordination
	c) Medium and small natural and semi-natural areas	3. Detailed consideration
	d) Medium and small managed areas	
6. Identity building	a)Identity building	1. Identity building considered
		1. Identity building is not considered

Source: Gradinaru and Hersperger (2019, p.20).

Indicators used to evaluate the integration of GI planning principles include: "Strong coordination" cases where references to a strategic planning domain are provided in detail. "Weak coordination" cases where such references were few or general (Grădinaru and Hersperger, 2019, p. 20). The "No coordination" category was included to refer to situations where a planning domain is discussed in the plan, but there is no reference to GI. The "Not considered" domain category was additionally included to cover plans which do not address a particular strategic domain weighted (4,3,2, and1) points. In the case of the other planning principles, the sub-categories were coded as "Not considered" when no information was found in the planning documents about it, "Poor consideration" when the sub-category was mentioned in the plan but with no details about its operationalization (e.g., no details about related measures, actions, projects) and as "Detailed consideration" when such details provided were weighted (1,2 and 3) points (Rudolf and Gradinaru 2019, p. 20).

3.3.1.2. Evaluation of green space plans

Evaluation of green space plans was made using six criteria (Sandström 2002, p.375). These include; (1) recreation, (2) maintenance of biodiversity, (3) city structure, (4) cultural identity, (5) environmental quality of the urban area, and (6) biological solutions to technical problems. By adopting these criteria, this research analyzes how the multiple roles of green infrastructure have been explained in the green space plans of the city. The plans were evaluated using four evaluation standards: - the indicator was not mentioned or discussed in the plan; (+) it was mentioned but not discussed; + it was mentioned but briefly discussed, and ++ it was fully analyzed (Sandström, 2002, p. 376). The following are the indicators used to evaluate green space plans (Table 3.2).

Table 3-2: Criteria with Indicators

Indicators for criterion	Explanation of indicator
Indicators for criterion: Recreation	
Importance for everyday life	Daily use by citizens for walking, exercising, playing, and social interaction.
Accessibility	Location of green space within walking distance and without barriers (e.g., roads with heavy traffic)
Geographical distribution	Fair distribution of green spaces in all city districts
Interconnectedness between	Availability of greenways between green spaces
Public health	excursions and for providing an understanding of nature

Surface water	The presence of lakes, ponds, and streams improves the quality of green space
Appreciation	Different ways in which people appreciate parks, woods, and other green spaces
Size of green space	Number and size of parks and other green spaces
Aesthetic functions	Role of parks and other green spaces to beautify the city
National interest	Preservation of specific green spaces of importance for the national heritage

Indicators for criterion: Maintenance of biodiversity	Explanation of indicator
Biodiversity-ecosystem level	The multiplicity of ecosystems in an urban environment
Biodiversity—species level	Presence of a great variety of native species in the urban environment
Presence of greenways	Presence of green passageways between habitats including connection with the surrounding land to facilitate the migration of species
Valuable green cores	Green spaces with native habitats that can act as breeding grounds for species
Green space management	Bodies of surface water increase ecosystem and species diversity
Green space management	The green plan has clearly stated management criteria for promoting biodiversity
Size of green spaces	Positive correlation between the size and number of green spaces and species
Habitat continuity	Older habitats develop higher species diversity compared with younger ones
Rare/threatened habitats or species	Importance of preserving rare/endangered habitats and species
Barrier effects	Man-made obstructions in the landscape that prevent the migration of species between habitats
Biodiversity—landscape level	Variation of landscapes in the surrounding

	countryside
Scientific values	Habitats of specific scientific values
Fragmentation and edge effects	Effects of subdividing a continuous habitat into smaller entities, which increase the amount of ecotones and number of species, and impact on local climate
Representativity	Habitats representative of a particular landscape
Metapopulation aspects	Aggregates of patch populations in the urban

Indicators for criterion: City structure	Explanation of indicator
Identity and character	Each city has its characteristic green spaces that citizens recognize as important and unique for their city
Structuring functions	Lines of trees, avenues, and other vegetation along streets, roads, and squares
Discerning component	A city becomes more comprehensible for the citizens because green spaces separate the urban landscape into smaller districts
Unifying factor	Green space unites urban districts in a natural way
Linkage to rural hinterland	Urban green spaces provide a natural link between the city and the surrounding landscape

Indicators for criterion: Cultural identity	**Explanation of indicator**
Specific cultural aspects	Single cultural features, e.g., cemeteries or mansion parks, are not included in the other indicators
Historical heritage	Green spaces of historical importance, associated with special historical events
District features	Preserving ecosystems developed especially in a particular urban landscape
City character	Historical urban green planning is mirrored in the existing urban landscape
National cultural interests	Green space of national cultural value

Local traditions	Green space, which is a result of particular cultivation traditions and/or techniques

Indicators for criterion: Environmental quality	**Explanation of indicator**
Filter pollutants	Deciduous and other trees can act as a filter and clean the air
Protection zones	Vegetation shields houses and squares from wind
Improve local climate	Vegetation increases humidity, cools down the city and provides shaded areas
Ventilation system	By leading fresh air from the surroundings into the city, greenways exchange and thereby improve the air in the city
Noise reduction	Vegetation reinforces the effects of noise barriers

Indicators for criterion: Biological solutions to technical problems	**Explanation of indicator**
Cleaning stormwater	Green spaces are used to prevent polluted rainwater from running directly into a recipient
Recipient for organic waste	Possibilities to take care of organic waste in green spaces
Importance for sustainability	Green spaces as an important element in local sustainable development policies

Expert's perceptions of the integration of green infrastructure planning principles

Expert's perceptions of the integration of green infrastructure planning were assessed using mixed methods, quantitative and qualitative research design. The qualitative research approach is concerned with the assessment of attitudes, opinions, and behavior (Kothari, 2004, p.5). The exploratory research approach was preferred because this approach is useful for evaluating natural stimuli characterized by the use of factor analysis techniques (Lavie and Tractinsky, 2004).

Expert panel discussion

The expert panel was conducted to gather in-depth data from experts. This panel discussion included nine experts.

The panel discussion included the following issues:

1. Defining the concept of green infrastructure, green infrastructure planning and governance,
2. Discussion on green infrastructure planning policies;
3. Discussion on the institutional framework, the role of stakeholders and the capacity to implement green infrastructure planning principles; and
4. Discussion on green infrastructure governance practices and challenges implementing green infrastructure principles in the city plan.

Data Sources and Types: Both primary and secondary data sources were used. The primary data were collected from experts. Quantitative and qualitative data were collected. The quantitative data were collected from sampled experts, and qualitative data were collected from key informant interviews, expert panels, and document reviews.

Sampling design: Quantitative and qualitative research designs were employed for the research. Due to the exploratory nature of the study, non-probability sampling and purposive sampling design were used to select experts. In addition, nine urban planning experts were selected for the expert panel discussion.

The sample size of experts: Purposive sampling was used to select the sample size of experts. The total sample size of 74 experts constitutes 21 planning experts, 28 environmental experts (Environmental Protection and Green Development Commission), 25 from the city's land administration and management.

Data instruments: The questionnaires on UGI principles were adapted from Hansen et al. (2017). The questionnaire approach includes a 5 point Likert agreement scale ranging from 1 (strongly disagree) to 5 (strongly agree) to operationalize the attitude construct (Ernstson, 2013). Questions used to assess four principles of UGI include: UGI green-gray integration with water channels, roads, and bus routes, channeled rivers, and drainage systems**;** UGI ecological network and connectivity with power and telecommunication, built-up areas, preserving a city-wide and regionally linked green network, bike-pedestrian network, wild animal's movement, built-up and nature network, and green corridors for vulnerable areas. The multi-functionality principle of UGI is to; control flood access, cultural assets access, agricultural products, access to pure water, develop river buffer plants, community participation, and to develop habitat provision. Socially inclusive principle of UGI include; residents actively participating in UGI planning, community greenspaces used for active participation, residents have the right to administer green spaces, residents used green spaces for greening, cooperation to manage community greenspaces, and controlling community green spaces. According to Eagle (2010) governance scores above the neutral point of the five-point scale (3) indicates agreement and is lower than the neutral disagreement score. Scores range from 1 to 2.9, ranked above the neutral score (indicating agreement), and from 3.1 to 4, and 5, ranked below the neutral (indicating disagreement).

Data collection: The data sources for this research were primary and secondary. The primary data were collected from experts using a structured questionnaire. A total of 74 questionnairesw ere collected. The questionnaires were prepared based on the role of experts in planning and implementing UGI. Self-administered questionnaires were delivered to experts who completed them, and the researcher collected them at an appointed time. Different policies, strategies, regulations, standards, and guidelines are secondary data sources.

Data Analysis

Document and content analysis was used. Content analysis was preferred to identify key principles of GI planning. Hence, content analysis of policy documents is widely used in researching environmental issues (Huang et al. 2010). These documents were carefully reviewed and analyzed using principles adopted from the literature on green infrastructure planning (Sandström, 2002; Hansen et al. 2017; Pauleit et al.2017; 2021; Gradinaru and Hersperger, 2018; Monteiro and Antunes, 2020). The spatial plans that refer to GI and its components, the clarity of the definitions, and the plan section where GI is discussed was reviewed and analyzed to show the level of consideration for each sub-category of each principle (Table 3.1and 3.2).

The plan documents include; master plans from 1986-1995; 2002-2012; and 2013-2023 (AAMPPO,1984-1986; ORAAMP, 2000; AACPPO, 2017). Supporting planning documents, such as National Urban Development Spatial Plan (NUDSP 2016), LDP, and green infrastructure management manuals were used to better understand each plan's terminology. The list of reviewed documents can be found in (Table 3.3). Accordingly, three master plans were reviewed and analyzed. The master plans are legally binding as per the amended and recent proclamations, Addis Ababa city master Plan Proclamation No. 17/2004, and the federal urban planning proclamation No. 574/2008.

Table 3-3: Spatial plans and supporting planning documents reviewed in this research

SN	Type of plans	level of government	Year of issuing or approval	Roles/mandate
1	National Urban Development Spatial Planning	National	2015, 2016	Preparing a national spatial plan
2	National Urban Green infrastructure standards	National	2015	Developing urban green infrastructure standards
3	Urban Planning manuals	National	2015	Preparing GI implementation manuals
4	Urban greenery and Beautification strategy	National	2015	Developing an urban green space strategy
5	Addis Ababa master plan	City	1986-1995	Plan preparation and implementation
6	Addis Ababa Master Plan Preparation Proclamation No. 17/2004	City	2004	Issuing master plan proclamation
7	The Urban Plan Proclamation No. 574/2008	City	2008	Issuing urban plan proclamation
8	Addis Ababa master plan	City	2000-2006	Plan preparation and implementation
9	Addis Ababa structure plan	City	2017	Preparing structure plan and implementation; legally binding

All master and structure plans are legally binding as per the amended proclamations and the present structure plan is in force.

Data Analysis

Descriptive statistics, means, and inferential statistics (multivariate and reliability analysis) were used to analyze experts' perceptions of green infrastructure planning principles. This analysis was performed to assess the reliability of the questionnaire. Reliability measures the extent to which a sample's patterns of responses to items are consistent or repeatable across items (Helms et al.2006).

Principal component and factor analysis was employed. For components analysis, factor retention was determined based on Kaiser's criterion (Kaiser, 1960). Variables were considered highly loaded and salient to the interpretation of a factor when the loadings were larger than 0.4 (Miller and Whicker,1999). In the Bartlett test of sphericity, the statistical significance of 0.000 indicates the appropriateness to perform principal component analysis and factor analysis (Banda and Kumarasamy, 2020). Besides, principal component and factor analysis are regularly implemented with Likert scales (Alkire et al. 2015) and factor analysis in human attitude analysis is used to administer a specific population (Pett et al.2003).

3.3.2. The management models and governance principles applied in the management of green spaces

Data Sources and Types: Primary and secondary data sources were used. Quantitative and qualitative data were collected. The quantitative data were obtained from park users, park staff, and park services contractors, and the qualitative data were obtained from key informants and document reviews.

Sampling design: Quantitative and qualitative research designs were used for this research. Non-probability sampling, specifically convenience and purposive sampling designs, were used. The *sample size of respondents* constitutes a total of (106), 70 park visitors, 15 park managers and staff, five contractors. Park managers and staffs have a prominent role in the management of green space. In addition, 12 Key informant interviews were conducted with Environmental Protection and Green Development and Watersheds and Green Areas Development Agency (WGDA) offices and the community members experienced and responsible for the management of green spaces on the management, governance, and the challenges.

Data instruments: The management models and governance principles was also assessed using governance principles. The good governance principles (evaluative criteria) used to evaluate the applicability of the models (Table 3.4) were adapted from (UNDP, 1997; Graham et al., 2003; Eagles et al., 2010). These criteria have been used in many analyses of natural resource management (Lockwood et al.2010), forest management (Agrawal et al. 2008), and protected areas and parks (Shipley and Kovacs, 2005; Hayes, 2006; Eagles et al. 2010). Besides, Graham et al. (2003) argue that the five principles (Table 3.4) are relevant to the full range of models of protected areas (PA) governance.

Table 3-4: Governance criteria

SN	Combined categories (Institute on Governance)	Basic governance principles (UNDP)
1	Legitimacy and voice	Public participation Consensus orientation
2	Direction	Strategic vision
3	Performance	Responsiveness to stakeholders Effectiveness Efficiency
4	Accountablity	Accountability to the public and stakeholders
5	Fairness	Transparency Equity Rule of law

Source: Adapted from (UNDP, 1997; Graham et al. 2003).

Graham et al. (2003) principles of governance for world parks are based on the list of (UNDP) good governance characteristics (UNDP, 1997). The approach referred to as the UNDP–WCPA approach (Eagles et al. 2010) contains ten criteria within five categories (Table 4). The category of legitimacy and voice includes public participation and consensus orientation in decision-making (Graham et al. 2003; Edgar et al. 2006). Public participation refers to the involvement of different actors in decision-making (Edgar et al. 2006). Consensus-oriented decision-making means the ability of different interests to reach a consensus on the best interests of the overall group (Graham et al. 2003).

The strategic vision category considers whether the governing bodies provide clear policy directions or not (Lockwood, 2009). Performance includes three important criteria: namely responsiveness to stakeholders, efficiency, and effectiveness of operations (Eagles et al. 2010). Responsiveness occurs when institutions and processes try to serve all stakeholders within a specific timeframe (Borrini-Feyerabend et al.2013). Effectiveness involves the capacity to realize organizational objectives, and efficiency refers to the efficient management of natural resources (Lockwood et al.2010).

The principle of accountability involves accountability and transparency. Accountability refers to the extent to which officials are answerable to their constituency about their power and duties (Lockwood, 2009). Transparency denotes public knowledge of the policies of the government, which allows the public to have confidence in government intentions (Agere, 2000). Fairness involves equity and the rule of law (Edgar et al. 2006). Equity refers to access to and use of resources and the decision-making process (UN Habitat, 2002), and the rule of law refers to legal frameworks being fair and enforced impartially (Edgar et al. 2006).

Graham et al. (2003) argue that the principles are intended to be internationally relevant and applicable to parks and protected areas. While governance issues have been indicated as a pervasive challenge for landscape management in less developed countries. The challenges, such as weak practices of governance principles and management models, have implications on the benefits of green spaces through power dynamics in the governance process that influence the mismanagement of green spaces, which negatively affects the process of landscape changes. Indeed, the challenges could be addressed through adherence to the principles of sound landscape governance (Graham et al. 2003; Kusters et al.2020) and management models.

Data collection: Both primary and secondary data sources were used. The primary data were obtained from survey questionnaires and key informant interviews. Four data collectors were recruited by the researcher and trained on how to collect quality primary data. These trained data collectors collected the primary data using survey questionnaires from park visitors by asking and completing each question based on the informed consent of each respondent. A total of (90) questionnaires, 70 from park visitors, 15 park managers and staff, and 5 from contractors, were collected. Self-administered questionnaires were delivered to park managers, staff, and contractors who completed them and the researcher collected them at an appointed time.The interviewees were selected based on their roles and experiences in the management of green spaces and related governance issues. Secondary data sources were obtained from reviews of the literature related to legal, policy, and organizational issues on planning and management.

Data instruments: Questionnaires were developed based on the ten governance criteria (Table 3.4). Such include Public Participation questions (those who wanted to contribute to the public participation process had the opportunity to do so, those who contributed to the public participation process were taken seriously, during the public participation process, citizens discuss issues respectfully, input is sought early in the decision-making process, input is sought near the end of the decision-making process, the purpose of engaging stakeholders in any decision-making process is clearly stated, and the public participation decision-making process is adequate). Consensus orientation questions (the decision-making process allows for adequate group interaction, the amount of time allotted for decision-making is adequate, the decision-making process encourages the flow of ideas, and decisions are made by consensus). The strategic vision includes contracting policies are transparent, and that decision-makers are clearly identified.

Responsiveness questions include (seriously respond to public criticism, makes a sincere effort to support those visitors who need help, goes an extra step to help participants, takes time with participants, responds to requests quickly, acts on participants suggestions, uses my input). Effectiveness was split into two separate factors: outcome and process (Eagles et al. 2010). The outcome was used to measure the quality of visitor services that comprised three items (the facilities available are of excellent quality, the natural environment is of excellent quality, and the services are of excellent quality), the process comprised five questions (delivers what is promised, perform their duties consistently well, is/are concerned with quality control, is/are effective because they deliver services themselves, and is/ are effective because they contract services out). Efficiency questions consists of whether enough employees to handle their responsibilities, and Is/are efficient.

Accountability questions (the contracting policies are transparent, an audit trail is available, information is available in an appropriate format, information is available at the appropriate level of detail, the reasoning behind decisions is fully disclosed). Transparency questions (an audit trail is available, information is available in an appropriate format, information is available at the appropriate level of detail, the reasoning behind decisions is fully disclosed, public procurement procedures are open and understandable, the park organization policy is transparent overall).

Equity questions (I have received fair and equal treatment, my needs have been attended to on a fair basis, the procedure for establishing priorities is fair, the procedure for resolving conflict with other users is fair, I am permitted to use services in the same ways as other users, adequate services are provided because user fees cover the costs, adequate services are provided because tax revenues cover the costs, the same quality of services is provided to all) and the rule of law questions (sticks to its major announced policies, and enforces the rules). The range of scores range from 5, strongly agree with the statement, to 1, strongly disagree with the statement. All statements were worded such that agreement indicated good governance and disagreement indicated weak governance.

Data Analysis

Quantitative data analysis: The statistical analysis used in this research includes descriptive statistics (percent and means). Reliability analysis was also used to measure the internal consistency or inter-item correlation of questionnaires.

Qualitative data analysis

Data from interviews were transcribed and analyzed. Data collected from documents for forest management were categorized in relation to the four dimensions of Policy Arrangement Approach (PAA), and thematic content analysis was used to analyze the qualitative data. Criteria used to select documents include documents that convey information on forest management and planning and documents relevant to green space and forest management efforts. The list (13) of reviewed documents can be found in (Table 3.5). An in-depth qualitative analysis of the historical process, the existing forest policy, and the challenges related to forest management was conducted.

Table 3-5: Evolution of dominant discourses in Ethiopian forest policy, exemplified by main objectives of major policy documents in the field from 1994

Year of issuing	Policy documents	Main objectives
1965	Proclamation No. 192/1965	Recognizes three forms of forest ownership: state, private, and protected forest
1980	Proclamation No. 192/1980	Recognizes state ownership of forests
1994	Forestry Proclamation No. 1994	Recognizes three forms of forest ownership: state, regional and private
1997	Forestry Proclamation No. 1997	Provides institutional, implementation, and legislative framework, responsibilities, and mandates for sustainable development of natural resources
1997	Environmental Policy of Ethiopia	Provides guidance and support in the conservation and sustainable utilization of Ethiopia's environmental resources
2005	Urban Development Policy	Incorporate green spaces in national urban development spatial plans
2005	Ministry of Urban Development and Construction (MoUDC)	Developing green infrastructure standards and manuals for Ethiopian urban areas
2007	Forestry Proclamation No. 542/2007	To increase the forestry sector's contribution to economic growth by protecting and developing the forest resource and fulfilling the rising demand for forestry products and services.
2009	CRGE (Climate Resilient Green Economy) strategy	To increase climate resilience
	GTP (Growth and Transformation Plan) (2010/11-2014/15)	Focuses on Ethiopia's green growth

2012	Guideline for Participatory Forest Management in Ethiopia	Facilitate the establishment and implementation of Participatory Forest Management (PFM)
2017	Addis Ababa City Planning Project Office (AACPO)	Developing the structure plan
2018	Proclamation No.1065/2018	Establish private, community, association, and state forest ownership

Additionally, the following indicators were used to assess the management of UGI:

Land Governance Assessment Framework (LGAF) is used to identify policy intervention areas and to evaluate the legal framework, policies, and practices of land governance (Deininger and Burns, 2012). Three thematic areas (Land use planning and management, legal, institutional, and policy framework, and management of public land) were used to evaluate the practices of governance approaches.

The first, Land Use Planning and Management (LUPM), was used to assess the practices of urban good governance principles, such as the influence of land use regulations on UGI development. This indicator assesses the extent to which land use and management regulations (including zoning and land use planning mechanisms) are justified and transparent (Deininger and Burns, 2012).

The second, Legal and Institutional Framework (LIF) was used to assess the legal frameworks that provide access to use the urban communal land such as open and community green areas; the type of land ownership/use; and the participation of the communities in terms of resident's land use right and management of urban green spaces and residents communal UGS management land use right. The third was used to assess the management of public land.

The environmental management of GI was assessed based on strategies aligned with Adaptive co-management (ACM) strategies using environmental policies related with UGI, residents' experiences, and ecological knowledge to inform planning and environmental management process and outcomes.

The *data sources and types, sampling design, and sample size of experts* were used to assess expert's perceptions of the governance of the influence of policy and planning themes on UGI planning, the influence of land use regulations on UGI development, residents land use right and management of urban green spaces,the management of public land, environmental policies related to UGI, resident's experiences and ecological knowledge to inform planning, and environmental management process and outcomes are similar with the methods applied to expert's perceptions on the integration of green infrastructure planning principles.

Data instruments

The questionnaires on the influence of policy and planning themes on UGI planning were adapted from Hansen et al. (2017). Such include national policy in terms of (nature conservation laws, and environmental regulations), regional policy (regional planning programs or laws), municipal or city administration policy (zoning plans or codes), city plan proclamation, research results, NGOs, the second ''Growth and Transformation Plan

II’’ (GTP II), and interference of politicians. The rating scales range from 1 strongly disagree to 5 strongly agree.

Questionnaires on the influence of land use regulations on UGI development were obtained from the Land Governance Assessment Framework (Deininger et al., 2011). Questionnaires include: preparing and improving land-use plans based on public participation, public input is sought in preparing and amending land use plans, public responses are explicitly referenced in the report, and this report is publicly accessible, public input is not sought in preparing and amending land use plans, and new land-use plans are not accessible to the public. The questionnaire's rating scale ranges from 1 strongly disagree to 5 strongly agree.

Questions on resident’s land use rights and management of urban green spaces include: resident’s rights to UGS management and maintenance are legally recognized; resident’s rights to UGS management and maintenance are legally recognized; protecting some of UGS is difficult; the management of all UGS are respected in practice; any disputes that may arise in the management of UGS are swiftly resolved, and UGS land has boundaries demarcated and surveyed, and associated claims are registered. The rating scales range from 1 very low to 5 very well.

The management of public land was assessed whether public land ownership is justified and managed at the appropriate level of government which includes; public land ownership is justified and managed at the appropriate level of government; the management responsibility for different types of public land is unambiguously assigned;

There is clear management responsibilities for different types of public land, but this has little impact on the management of assets; there is enough ambiguity in the assignment of management responsibility of different types of public land to impact to some extent on the management of assets; and there is serious ambiguity in the assignment of management responsibility of different types of public land with major impact on the management of assets. The rating scales range from 1 very low to 5 very good.

Questionnaires used to examine the environmental policies related to UGI include the focus of environmental policy on biodiversity conservation; developing and maintaining ecological corridors; pollution; sustainable natural resource management; provision of ecological services; developing and maintaining natural environment and GI; increasing new places for new GI; rehabilitation of existing natural environment; and the provision of green network.

The questions on resident's experiences and ecological knowledge to inform planning were adapted from Faehnle et al. (2014) in term of the effects of incorporating resident's experiences and ecological knowledge on improving GI spatial plan; providing information on the effect of the previous plan on green spaces management; providing the necessary ecosystem service information; and providing information on the interests or initiatives of residents towards green space management and maintenance. The rating scale ranges from 1 nothing to 5 very good.

Environmental management process and outcomes questionnaires were adapted from (Plummer et al.2017). Environmental management process questions include: whether the process in the discussion of environmental management has been characterized by different opinions of actors, consensus of actors; gives all actors equal opportunities to state their opinion and to influence the outcome; open discussion among different actors; and encourages new solutions. Questionnaires rating scale ranges from 1 (strongly disagree) to 5 (strongly agree).

Environmental management outcomes consist learning items (cognitive, normative and relational). Questions used to examine such learning items consists of whether environmental experts involvement in the environmental management has increased their understanding on; the ecological and social conditions, the problems and challenges of environmental management method, landscape of environmental management (cognitive); understanding the perspective of others, the management process has become more important over time; views on environmental management have led me to act in surprising or new ways (normative); and views on environmental management are similar to those of others involved in the management process; has enhanced cooperation/coordination with other individuals and groups/organizations; increased understanding/acceptance by other actors (relational). Questionnaires rating scale ranges from 1 (strongly disagree) to 5 (strongly agree).

Questionnaires scores a Likert scale ranging from (1) strongly disagree to 5 strongly agree and 3 the neutral score. scores range from 1 and 2 ranked above, 3 neutral and 4 and 5 ranked below the neutral (Eagles,2010, p.1249).

Data Analysis: Statistical Package for Social Sciences (SPSS) was used to analyze the quantitative data and descriptive statistics (means) and inferential statistics (multivariate, and reliability analysis) were used to analyze expert's perception.

3.3.2.2. Legal frameworks, policies, institutions, and organizational arrangements influencing UGI planning and management

Data Sources and Types: The legal frameworks, policies, institutions, and organizational arrangements for green infrastructure planning and management was based on secondary data source. The qualitative data were collected from different documents. The review process was focused on the examination of documents that were relevant to this study. Reviewing UGI policies, plans, management and environmental legislations help to provide a factual account of UGI planning, management and its governance context in Ethiopian. These include standards, institutional and organizational arrangements, policy arrangements, land use rights, and management.

Data Analysis: Document analysis was employed to analyze the reviewed documents of legal frameworks, policies, institutions, and organizational arrangements.

3.3.3. Green spaces fragmentation

Fragstat analysis was also used to analyze the fragmentation of green spaces in Addis Ababa. Public domain version of FRAGSTATS was used to analyze the landscape pattern characteristics on different levels (Li et al.2015). Accordingly, FRAGSTATS 4.2.1 (McGarigal et al. 2012) was used to calculate the selected landscape metrics (Table 3.6). Landscape ecology methods are used in studies of landscape and habitat fragmentation

(Xiu et al. 2020). Among these, landscape pattern metrics use a variety of quantifiable indices to test pattern and structure relationships of landscape patches and predict fragmentation issues at a broader spatial level (Xiu et al.2020). Fragstat analysis was used to assess green space fragmentation in the city. Landscape fragmentation metrics are used to measure the extent of fragmentation of urban green spaces (Li et al.2019). The methods employed in analyzing are the following:

- Two Landsat images from January 2011 and January 2022 were used as input data
- Supervised classification was made as green and non-green covers
- For green cover: trees and shrubs were considered other land covers were considered none
- The raster class was used as an input for fragstat analysis
- Selected landscape metrics were analyzed at the class level for the green cover of each year as indicated in the following table:

Table 3-6: Selected landscape metrics following the definitions of McGarigal and Ene (2012)

Spatial metrics	Abbreviation	Description
Class area	CA	Class Area is a measure of landscape composition; specifically, how much of the landscape is comprised of a particular patch type where the range is explained by CA>0
Percent of landscape	PLAND	Measures habitat extent in relative terms of the target land cover class (0 < PLAND < 100)
Number of patches	NP	Number of patches in the landscape of the same LULC class ($N \geq 1$)
Patch density	PD	Number of patch per unit area
Mean patch size	MPS	It measures the average mean surface of patches and it is used to evaluate landscape fragmentation
Interspersion and juxtaposition index	IJI	Measure of evenness of patch adjacencies equals 100 for even and approaches 0 for uneven adjacencies
Mean shape index	SHAPE_MN	Measures the ratio between the perimeter of a patch and the perimeter of the simplest patch in the same area
Mean Euclidian near neighbor distance	ENN_MN	Measures the degree of isolation and fragmentation of a patch

Detailed algorithms and calculation methods are listed in the FRAGSTATS document (McGarigal et al. 2012).

Key informant interview: Purposive sampling was used to select key informants. A total of 20 key informants were interviewed. These include urban planners, Environmental Protection, Watersheds, and Green Areas Development Agency experts, and community members experienced and responsible for managing community green spaces.

Data sources and instruments: Primary data was obtained from interviewing key informants, and checklists were used as an instrument for data collection.

Questionnaires: The primary data were collected from key informants using open-ended questions. The interviews focused on assessing knowledge of urban green infrastructure, GI and environmental policies, stakeholder participation, and challenges related to Gi planning and community green space management.

Data analysis: using qualitative data analysis, data from key informants were transcribed, summarized, and analyzed

3.3.4. Resident's perception of the roles of city government in the management of community green spaces and ecosystem benefits of green infrastructure

Data Sources and Types: Both primary and secondary data sources were used. The primary data were collected from local residents. The quantitative data were collected from sampled local residents. *Sampling design*: Quantitative research designs were employed. Probability sampling design was used to select local residents.

Sampling Techniques

A multi-stage sampling technique was used to assess the resident's perception. In the first stage, proximity to urban green infrastructure, particularly urban parks, forests and rivers, is a defining variable in clustering sub-cities into some manageable size from which sample respondents were drawn. Taking in to consideration the spatial distribution of functional public recreation parks and proximity to forests (AAOIDPP, 2013, p.8), the number of functional public recreation parks consists of (Arada, 2; Akaki-Kality,1; Addis Ketema,1 Gulele,5 Kirkos, 2 Kolfe-Keranyo,1 Lideta,3 Nefas Silk-Lafto,1 and Yeka, 2). From the distribution, sub-cites were clustered into high (Gulele); medium (Lideta, Arada, and Yeka); lower (Akaki-Kality, Addis Ketema, Bole, Kolfe-Keranyo and Nefas Silk-Lafto). Secondly, the proximity to forests (Gulele and Yeka sub-cities) was selected.

Four sub-cities (Gulele, Yeka, Akaki-Kality, and Bole) were purposively selected from the clusters. The first sub-city selected is Gulele owing to its access to special recreation parks and proximity to the forest. Yeka is selected from the second group due to its access to recreation parks and proximity to the forest. While part of Lideta sub-city is redeveloped area owing to neighborhood parks. While Arada sub-city is recently under urban renewal. From the third cluster, Akaki-Kality takes into account its proximity to the Big and Little Akaki rivers and Bole as it is one of the developed areas in the city. This classification was believed to provide representative samples from the city. *Woredas* (small administrative units) and households were categorized in the third and fourth stages.

Sample population: The projected total population of Addis Ababa constitute 3,040,740; with a total sample size of 570 households. In addition, a sample of 70 city park visitors was taken.

Sample size

The sample size of study areas was determined based on Krejcie and Morgan (1970) sample size estimation. Krejcie and Morgan (1970) is a commonly employed method. Krejcie and Morgan (1970) used the following formula to determine sampling size:

$n_o = \frac{Z^2 pq}{e^2} \quad n_o = \frac{(1.96)^2 (.5) (.5)}{(.05)^2}$

s = required sample size.

X^2 = the table value of chi-square for 1 degree of freedom at the desired confidence level

N = the population size.

P = the population proportion (assumed to be .50) that provides the maximum sampling size

d = the degree of accuracy expressed as a proportion (.05).

Krejcie and Morgan (1970) determined the sample size based on 5 percent precision and 95 percent confidence. Further, as the population increases the sample size increases at a diminishing rate and remains relatively constant at slightly more than 384 cases for a population more than 1000,000 (Krejcie and Morgan, 1970, p.610). Using±7% a precision levels with 95% confidence level, the total sample size was 690 households.

Data instruments

Two general environmental questions: humans must live in harmony with nature to survive and Mankind is severely abusing the environment when humans interfere with nature; it often produces disastrous consequences used to examine residents' perceptions. Questionnaires rating scale ranging from 1 strongly disagree to 5 strongly agree.

The questions to the perception of residents on preferences of green spaces include access to recreational areas, street trees, vegetable areas, grass strips, forest areas, and community green spaces. A five-point scale ranging from 1 very unnecessary to 5 very necessary was used.

The questionnaires used to examine the role of the city government in the management of community green space consists of community green space land use right, GI policies, cooperation between actors, clear regulation and rules, provision of information, and action taken by the government to the management of community green space. A 5 point Likert agreement scale ranging from 1 strongly disagree to 5 strongly agree was employed.

Resident's perception of ecosystem benefits of GI consists of four major ecosystem services categories: supporting, provisioning, regulating, and cultural services. A 5-point Likert agreement scale was used, ranging from 1 strongly disagree to 5 strongly agree.

Data Analysis

Multivariate analyses were performed to assess the instrument's reliability. Cronbach's alpha coefficient is the most frequently used statistical method to measure internal consistency reliability (Gliem and Gliem, 2003; Bonett, et al.2015). Cronbach's alpha ranges between 0 and 1, Cronbach's alpha close to 1 mean greater internal consistency of the items in the scale based on the formula = rk / [1 + (k -1) r] where k is the number of items and r is the mean of the inter-item correlations (Gliem and Gliem, 2003, p. 87). Cronbach's alpha was found to be ranging from α =.756 to .931, which suggested strong internal consistency.

Both descriptive statistics (percent and means) and inferential statistics (correlation coefficients, reliability, principal component analysis (PCA), and factor analysis) were computed. These analyses are regularly implemented with Likert scales (Alkire et al. 2015). Multivariate analyses were performed to assess the reliability of the instrument.

Both principal component and factor analysis were used to analyze the components and factors. The principal component analysis is a type of factor analysis used to reduce the dimensionality of the original data set (Miller and Whicker, 1999) and to analyze a larger set of correlated variables (Dunteman, 1989; Miller and Whicker, 1999). The components are interpreted using the component-variable correlations (called factor loadings) that are the largest in absolute magnitude. For components analysis, factor retention was determined based on the Kaiser Criterion with eigenvalues <1(Kaiser, 1960), and factor analysis provides factors that are computed from the interrelationships of a set of variables (De Gruijter and Kamp, 2008).

Specifying dependent variables involved combining survey items concerning residents' perceptions of environmental knowledge, community green space management, preferences of types of green spaces, the role of city government in the management of community green space, and ecosystem service benefits of GI. The Spearman rho correlation matrix was used to determine the relationship between independent variables that influence the dependent variables. The independent variables were categorized into demographic characteristics (sex, age) and socio-economic factors (level of education and household income). Hence, socio-demographic variables are consistently used as predictors of environmental behavior (Cottrell, 2003).

Table 3-7: Description of dependent variables

Variables	Definition
General environmental knowledge	
ENK-1	In order to survive, humans must live in harmony with nature
ENK-2	Human interference with nature often produces disastrous consequences
Preferences of GI Types	**Access to:**
ARCR	Recreational areas
AST	Street trees
AVES	Vegetable areas
AGRA	Grass strips
AFOR	Forest
Ecosystem services of GI	
Provisioning	
PROV1	Vegetables and fruits
PROV2	Fuel wood
PROV3	Medicines
PROV4	Building materials
Regulating	
REGU1	Regulate temperature
REGU2	Climate change mitigation
REGU3	Soil protection
REGU4	Habitat for biodiversity
REGU5	Wind barrier
REGU6	Air purification
REGU7	Water flow regulation
REGU8	Absorption of sound waves
Supporting	
SUPG1	To maintain soil fertility
SUPG2	Nutrient cycling
SUPG3	Genetic diversity
SUPG4	Wild animals shelter

Cultural	
CULS 1	Promote social interaction
CULS 2	Enhances beauty
CULS 3	Educational services
CULS 4	Children cognitive development
CULS 5	Recreation
CULS 6	Relieve stress
CULS 7	Attract investment

In general, the Quantitative and qualitative data analysis used in this research includes:

Quantitative data analysis

Quantitative data analysis was used to analyze experts and resident's household surveys. The processes involved identifying variables from questions in the questionnaire and defining all the parameters and attributes. The responses were then coded into the SPSS software, and various analyses were run. The statistical analysis used in this research includes descriptive statistics (percent, means, and standard deviations) and inferential statistics (correlation coefficients, reliability, principal component analysis, and factor analysis).

Qualitative data analysis

Qualitative data analysis involves defining, categorizing, theorizing, explaining, and exploring (Bryman and Burgess, 2002). Analyzing qualitative data consists of organizing the data into manageable units and analyzing the data (Bogdan and Biklen, 2003). Instruments of qualitative data include interviews, direct observation, participant observation, questionnaires, and focus group discussions (Yin, 2009). Key informant interviews, expert panel discussions, and observation were used in this research.

Field Observation: Field observation was carried out to observe whether community/neighborhood green/open spaces are used for intended purposes.

3.4. Triangulation, Reliability, and Validity

Triangulation: Triangulation increases the reliability and validity of findings. Triangulation has been adopted to address validity and reliability in this research, as it allows information to be cross-checked from multiple sources (Creswell and Miller,2000; Yin, 2003 and 2009). Triangulation is a methodological technique that leads to a broader and deeper understanding of the research issue (Flick, 2002). There are four types of triangulation (Yin, 2013; Wilson, 2014; Denzin, 2017). Such include;

- Data triangulation: using different sources of data;
- Investigator triangulation: using several people (or at least more than one) in the data gathering and data analysis processes;
- Theory triangulation: using multiple rather than single perspectives to analyze and interpret data; and
- Methodological triangulation: entail within-method triangulation and between-method triangulation(Wilson 2014, p.74).

Through methodological triangulation, the validity and credibility of the findings were enhanced by using mutually reinforcing data collection methods, including documents, survey questionnaires, interviews, expert panel discussions, and land use metrics. Mixed methods made it possible to triangulate and validate the information from multiple sources.

Reliability*:* Cronbach's alpha is one of the most widely used measures of reliability in the social and organizational sciences (Bonett et al. 2015). It is the most frequently used statistical method, a measure of internal consistency reliability (Bonett, et al.2015). Data from experts and households were entered into a computer program (SPSS version 20) and the internal consistency of questionnaire items was tested using 0.70 as the minimum coefficient Alpha. The internal consistency of a scale was examined using item-to-scale correlations and inter-correlations of items within a scale (DeVellis, 2003).

Validity: Validity refers to the findings that accurately represent the phenomena backed by evidence. Schwandt (2001, p.309). Validity also means how accurately the account represents the participant's realities of the social phenomena and is credible to them (Schwandt, 1997) and a useful concept in all forms of research methodology (Geoffrey, 2019).

Two perspectives determine the choice of validity: the lens researchers choose to validate their studies and the researcher's paradigm assumptions (Creswell and Miller, 2000). The lens refers to the views of people who conduct, participate in, or read and review a study, and the qualitative paradigm assumes that reality is socially constructed and it is what participants perceive it to be (Creswell and Miller, 2000, p.125). In addition, Guba and Lincoln (1994) identified three paradigm assumptions (postpositivist, constructivist and critical influence) which influence researcher's choice of validity.

The post-positivist emphasizes the meaning and the creation of new knowledge and the importance of observation for the growth of knowledge (Ryan, 2006; Given, 2008). In terms of the concept of policy science, the post-positivist is designed to address the multidimensional complexity of social reality (Fischer, 1998).

The constructivist assumption is considered as the construction of concepts and knowledge texts as ‘versions of the world which is relevant for the understanding of collected data (biographies) and constructs of the critical analysis of procedure and methodological requirements (Flick et al. 2004, p. 93). The validity procedures in this assumption is attributed to trustworthiness which leads to improved understanding of constructions of others, stimulates action, and empowers action because constructivists believe in pluralistic, interpretive, open-ended, and contextualized (Creswell and Miller, 2000, p.126). The critical perspective holds the assumption that the researchers should uncover the hidden assumptions about how narrative accounts are constructed, read, and interpreted (Creswell and Miller, 2000).

CHAPTER FOUR : RESULTS

4.1. Evaluation of the implementation of urban green infrastructure planning principles in green space plans of the city

4.1.1. Green infrastructure planning principles in the spatial plans

4.1.1.1. Green infrastructure in spatial plans

Green infrastructure is defined only in the structure plan of 2017 as a ‘‘physical green environment within Addis Ababa city’’ which includes formal park gardens, woodlands, green corridors, waterways, street plantations, and open courtyards.The definition explicitly referred to types of GI elements, and was stated only in one plan under Norms and Standards (2016-2040) of the plan. In this plan, the environment is considered as one of the major components that comprise green infrastructure, waste and natural resource management, and urban agriculture, and GI is explained in terms of green space as one component of key environmental issues to address waste management and environmental pollution, energy, green spaces, natural resources, and natural hazards.The objectives of the 2017 plan do not directly address GI in the 1986 and 2002 master plans and the 2017 structure plan; rather, the planning of green spaces has been based on the ecosystem services approach in the 2017 structure plan. This approach allows considering the goals of sustainable development in developing ecologically sustainable urban regions.

In the 2002 structure plan, there was no coordination of the GI concept, but the plan mentioned green spaces as part of the environment that cover the slope with green, developing city parks, covering riversides with green, and interventions in urban agriculture. While in the 1986 and 2002 master plans, the GI concept was not considered.

In the two plans (GI was described vaguely as public open space or green spaces and there was no definition at all).

4.1.1.2. Principles of GI planning as followed in spatial plans

A. Coordination with other strategic domains

Weak coordination was observed between GI and water management, built-up development, food provision, increasing the quality of life, and climate change in the 2017 plan. This plan emphasizes the need to develop multifunctional green spaces for the city's environmental protection. Regarding the coordination with water management planning, this plan recognizes multifunctional green space that contributes to reducing flood risks, but without providing information on actions to pursue such multifunctional functions and physical relations. Besides, GI with climate change mitigation to regulate climate and air quality, hydrological and biochemical cycles, and soil processes, but, less attention was paid to the potential of GI to improve air quality. Also, GI planning was not coordinated with food provision. Rather food provision was included in benefits of Urban and Peri-urban Agriculture (UPA) where UPA was categorized under environmental management wherein the plan there is no reference to GI. However, UPA was considered an important strategy for poverty alleviation and the social inclusion of disadvantaged groups.

Weak coordination between GI and built-up development was observed in the 2002 plan, where green space is indicated for the protection of the existing green space covering all the high relief areas. In this plan, GI was not considered with water management planning and with climate change mitigation. However, this plan indicates the need to develop protected forest and conservation areas along rivers and streams.

In the 2002 master and 2017 structure plans, GI planning was not coordinated with food provision. Rather food provision was included in urban agriculture to use improved farm implements aimed at getting higher output per unit and increasing agricultural productivity through horticulture and using streams for irrigation. While, in the 1986 plan, GI was not considered with food provision, water management planning, climate change mitigation, and increasing the quality of life.

Likewise, weak coordination in the 2017 structure plan was identified between green infrastructure and objectives on increasing quality of life; however, green space was considered to increase the per capita accessible green space and provide multiple ecosystem services through the provisioning, regulating, and cultural services. GI planning was also poorly considered, with the objectives of increasing the quality of life in the 2002 master plan.

Quality of life was mentioned in terms of the objective of encouraging reforestation, urban agriculture, and the development of the botanical garden. Coordination of GI with built-up development, water management; food provision; increasing the quality of life, and air quality were not considered in the 1986 and 2002 master plans. In the 1986 and 2002 master plans and 2017 structure plans, there was no coordination between GI with cultural assets conservation. In all plans, GI was not considered with other domains.

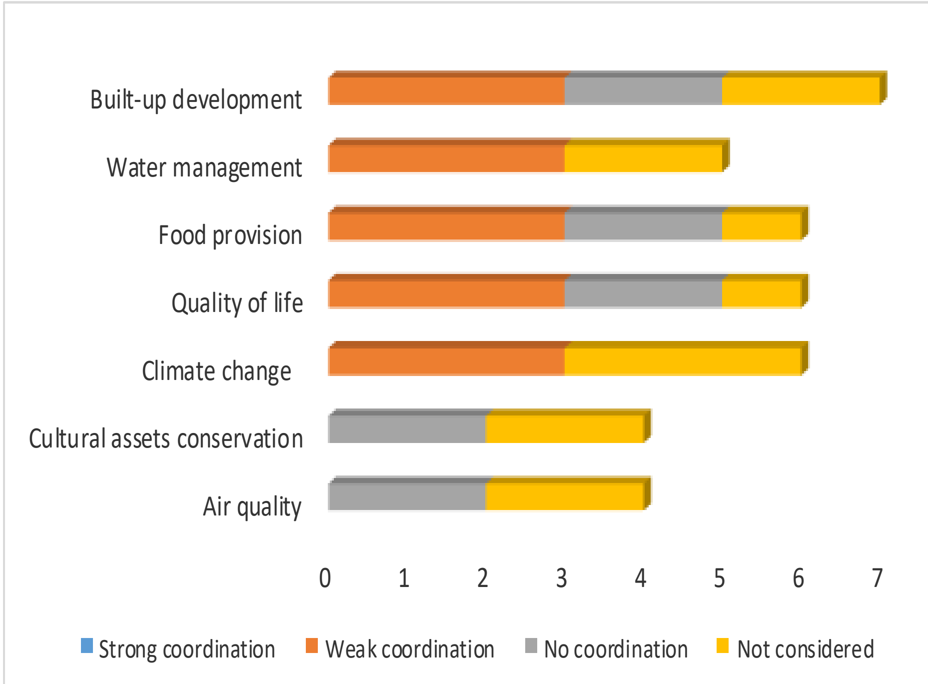


Figure 4-1: Green infrastructure planning principles coordination between GI and other spatial planning domains

B. Multifunctionality

The multi-functionality principle in the 2017 structure plan was mentioned in terms of ecosystem services. In this plan, the ecological functions of GI were strongly considered as the ecosystem services approach that considers the multi-functionality principles of ecosystem services. The plan did not state GI planning principles. The social, economic, and cultural functions of GI were poorly considered in this plan but varied in consideration. The plan also stated the economic benefits of GI in terms of tourist attraction and income.

The multi-functionality principle was poorly considered in the 2002 master and 2017 structure plans and not considered in the 1986 master plan. In the 2002 master plan, the green framework development constituted green spaces. In the 2017 structure plan, the focus was on public open space design that includes urban green corridors, waterfront, woodland, public park or garden, playing fields, and cemeteries. Both the social, economic, and cultural functions of GI were poorly considered in three plans but varied in consideration of cultural functions.

C. Connectivity

The structural connectivity, such as the physical relationships between components of an ecological network, was poorly considered in the 2002 master and 2017 structure plans. The 2017 structure plan envisages the ecological network based on the provision of networked and functional green spaces, and the 2002 master plan considers connectivity in terms of elements of open space design. While in the 1986 master plan, structural connectivity of GI was not considered. The functional connectivity for animal and plant species was poorly considered in the 2017 structure plan but not considered in the two 1986 and 2002 master plans. The functional connectivity for humans was not considered in both plans.

D. Multi-scale planning

The multi-scale planning was considered in the 2017 structure plan. This plan includes green space planning from the region (e.g., regional parks), city, sub-city, and woreda/district to neighborhood levels and site-specific. However, this plan does not consider the national network. In the 1986 and 2002 master plans, multi-scale planning was poorly considered as green areas were scaled only at the city and local levels and one plan (NUDSP, 2016) at national and regional levels.

E. *Diversity of green objects*

The diversity of green objects in the 2017 structure plan refers to managed areas of large (e.g., multifunctional forest, botanical garden) and medium and small size parks (e.g., district and neighborhood). The 2002 master plan considered managed areas of forest and parks (large and small size at city scale), and the 1986 master plan refers to large managed areas (forest) being part of green spaces. Finally, GI planning to build a place identity was not mentioned in both plans.

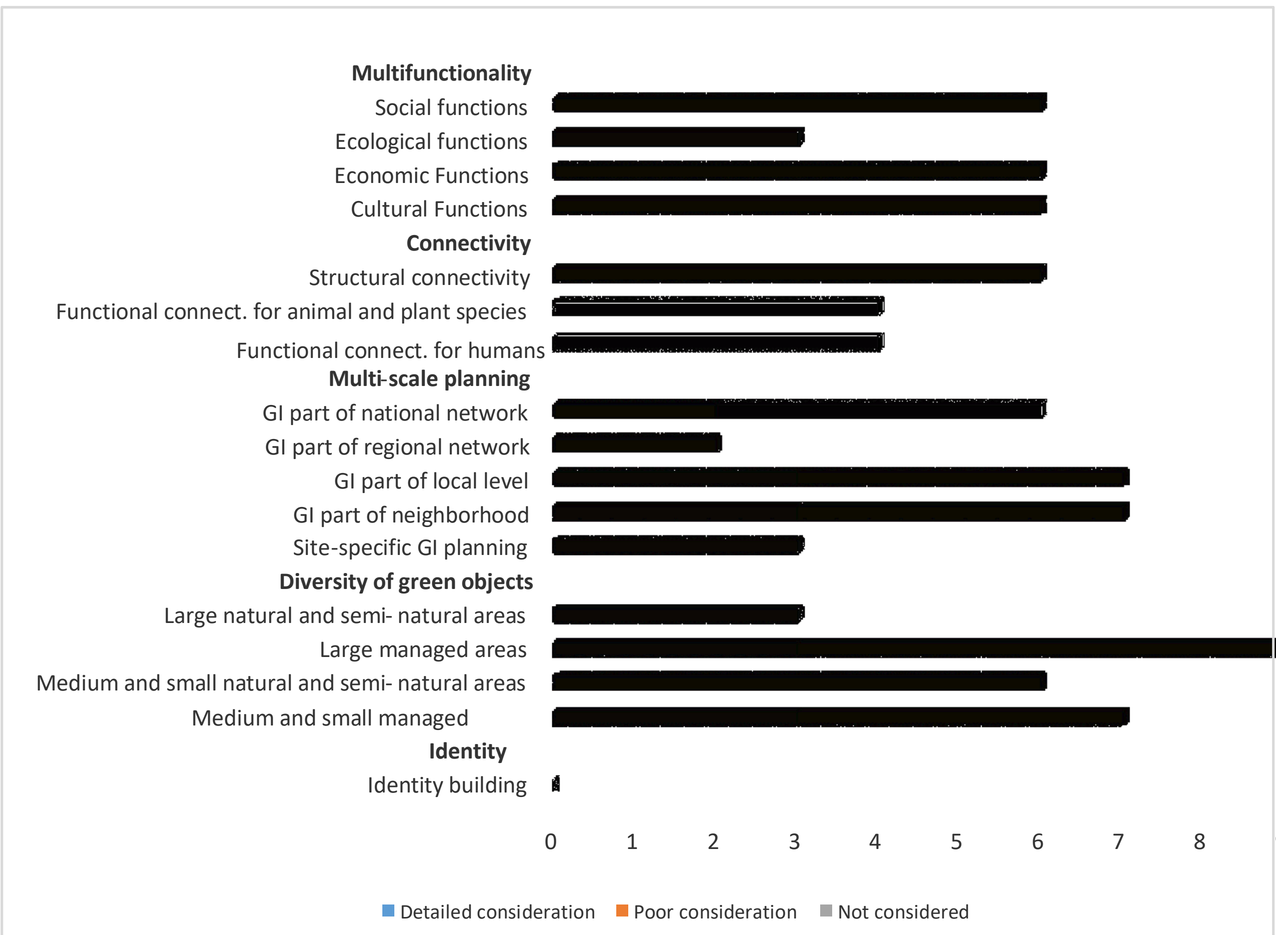


Figure 4-2: Green infrastructure planning principles in spatial plans of Addis Ababa

4.1.1.3. Evaluation of green plans

Six criteria to evaluate the green space plans in towns and cities include; (1) recreation, (2) maintenance of biodiversity, (3) city structure, (4) cultural identity, (5) environmental quality of the urban area, and (6) biological solutions to technical (Table 5). As compared with the six criteria, *recreation* has received more emphasis through increasing the per capita accessible green space and providing multiple ecosystem services in the future. However, the accessibility of green spaces in the two plans, the 2002 master and 2017 structure plans, is stated in terms of geographic distribution without considering the barriers.

Accessibility of geographic distribution of green spaces is considered to be important in everyday life of people that will have the opportunity to visit green spaces, which in turn contribute to improving the lives of people. The indicator importance for everyday life in the 1986 master plan is considered with adopting local, district, and city-wide green and recreational networks in terms of the public parks emphasizing sports and recreation to construct one big city park and preserve available vacant spaces for local sport and recreational facilities at *woreda* and higher administrative levels.

The indicators of interconnectedness between green spaces and green spaces for educational purposes received little attention in the 2002 master and 2017 structure plans. However, the 2017 structure plan considered a Botanical garden for educational purposes. The indicators, public-private green space, and national interest were not stated in 1986, and 2002 master plans and allotments received little attention in the 2017 structure plan. The remaining indicators of public health and surface water were explained only in the

2017 structure plan taking into consideration the rehabilitation of river buffers. The size of green spaces received moderate attention in both plans, the 1986 and 2002 plans and the 2017 structure plan. The plans mentioned the need to increase the size of green spaces at different scales. However, no attention was given to other indicators such as appreciation, aesthetic functions, public-private green spaces, and national interest.

Among the indicators of maintenance of bio-diversity, the multiplicity of ecosystems in an urban environment, green space management, the importance of surface water, and the size of green spaces received moderate attention only in the 2017 structure plan. While the remaining indicators, such as the presence of greenways; biodiversity-species level; valuable green cores; habitat continuity; and the importance of preserving rare/endangered habitats and species, were not mentioned in this plan. However, the plan emphasizes the provisioning, regulating, and cultural services. Though biodiversity-species level and habitat continuity indicators were not mentioned in this plan, the concept ‘ecosystem services’ stated as the benefits/services that provide a functioning ecosystem and the existing botanical garden will enhance the biodiversity-species level and habitat continuity and there is a direct correlation between the multiplicity of ecosystems and green space management. From the criterion of *city structure*, 'identity and character' are mentioned in the 2002 master and 2017 structure plans in terms of developing forest areas and maintaining a botanical garden. While the remaining indicators, such as discerning components, and linkage to the rural hinterland, were not stated in both plans.

The criterion of *cultural identity* includes six indicators. Among such indictors, only 'district features 'and 'national cultural interests' received a little score in the structure plan of 2017. This plan includes natural elements that have recreational, aesthetic, and attractive characteristics that appeal to the curiosity and interest of tourists. The plan contains measures to increase cultural values by creating a new park, 'Adwa Park'. The name 'Adwa' signifies national independence. The park was planned to provide both passive spaces for recreational and (botanical gardens and water bodies); and active park areas include theatres, exhibition centers, amusement spaces, and sports facilities. Others, such as specific cultural aspects, historical heritage, city character, and local traditions, were not stated in this plan.

Among the five indicators for the criterion of *environmental quality,* only one indicator received little attention in the structure plan of 2017 in terms of increasing the number of green spaces in the city. The plan did not state the remaining indicators; filter pollutants, protection zones, ventilation system, and noise reduction. In other plans, the importance of green spaces for urban landscapes received no attention.

From the criterion, *biological solutions to technical problems*, only cleaning stormwater in terms of vegetation coverage of the river buffer zones that will reduce the inflow of undesirable substances to water bodies were stated in the structure plan of 2017. Both plans did not state the indicators of green space as the recipient of organic waste and its importance in local, sustainable development policies.

Table 4-1: The average percentage of the indicators

Criteria	Average % of indicators considered	*N*
Recreation	75	13
Maintenance of biodiversity	73	15
City Structure	50	5
Cultural identity	20	6
Environmental quality	20	5
Biological solutions to technical problems	20	3

N= number of indicators concerning each criterion

Indicators used to evaluate the *recreation* criteria constitute(Table 4.1) 13 indicators in the three green plans making up a total of evaluation cases (n=39). Of these, 25 % were evaluated according to the standard mentioned but briefly discussed, 50% only, and 25 % were not mentioned. In the criterion *maintenance of bio-diversity,* multiplicity of ecosystems in an urban environment and green space management received a medium score in three of the plans. However, the concept of biodiversity was not stated in the plan. The concept of ecosystem is defined only in the 2017 structure plan and emphasizes the ecosystem services; the size of green spaces may positively correlate with biodiversity- the species level. Of the cases evaluated according to this criterion (n=45), 53% received the evaluation standard mentioned, 20 % only, and 25% not mentioned. The remaining nine criteria in all plans were not mentioned. Among five indicators of the criterion *city structure,* only the first indicator, identity and character, received the evaluation standard only *mentioned,* i.e., 50 % in two plans with this criterion (n=15).

With a total of six indicators in the criteria of *cultural identity,* only district features and national cultural interests received the evaluation standard of 20% *mentioned; the* rest four indicators were not mentioned (n=20). For the criterion *environmental quality,* only one indicator received the evaluation standard of 20 % *mentioned,* while four indicators were not mentioned. In the criterion *biological solutions to technical problems*, with three indicators, only cleaning stormwater received the evaluation standard of 20 % *mentioned;* however, two indicators were not mentioned in both plans. In sum, only the plan of 2017gives a moderate consideration for the multiple uses of green space in urban areas.

4.1.2. Perception of expert's on the incorporation of green infrastructure planning principles in the city plans

4.1.2.1. Socio-demographic characteristics of expert respondents

Expert's expertise is categorized into planning, land administration and management, and environment. The sex, age, and educational level of experts in Addis Ababa indicate that 85.3% are male and 14.7% are female. The age of experts ranges from 22-35 (55.4%), 36-55 (40.7%), and 56-65 (3.9%). Experts' educational level varies between those with a first degree 69.7% and a second degree 30.3%. In terms of expertise; Planners constitute (18.8%), Natural resource managers (15.5%), Urban managers (14.5%), Civil engineers (10.5%), Geographers (8.9%), Environmentalists (8.1%), Land managers (7.1%), Architectures (5.9%), lawyers (2.7%), Sociologists (1.5%), Forest managers (1.3%) Agricultural extension (1.2%), Biologist (1.2%), and Horticulturalists (1.2%).

4.1.2.2. Perceptions of planning experts on the integration of UGI principles

The first principle of UGI is green-gray integration (Figure 4.3). Planning experts were asked whether the current plan integrates GI with water channels (e.g., lake, ponds, river, stream), roads and bus routes, channeled rivers (river, riverbanks), and drainage systems. Expert's scores range from (3.0 to 3.6) which is lower than the neutral value.

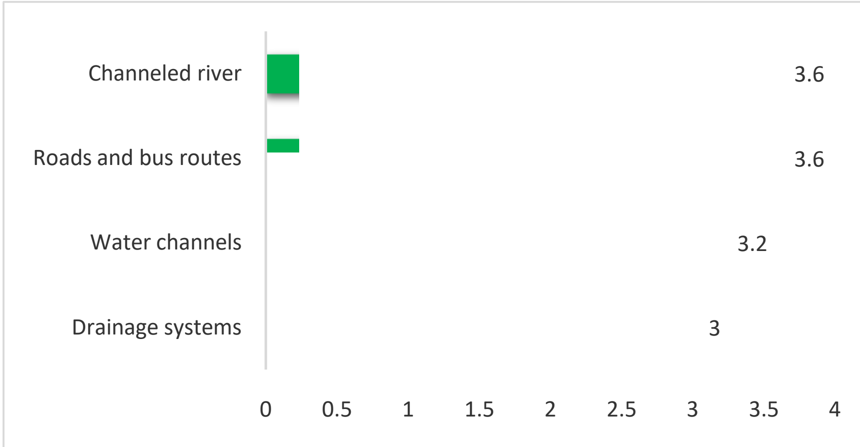


Figure 4-3: *Perception by city planning experts towards the green-gray integration principle in Addis Ababa*

The second principle of UGI planning includes the ecological network and connectivity. Planning experts evaluate the inclusion of ecological network and connectivity principles. The mean scores of (Table 4.2), preserving a city-wide and regionally linked green network, conserving a habitat network to support the movement of wild animals, integrating power and telecommunication infrastructure, developing and maintaining a well-connected bike-pedestrian network, creating connectivity between built-up areas and surrounding natural areas, integrate with built-up structure, and developing green corridors capable of flood control in vulnerable areas scores 2.4, 2.75, 2.8, 2.95,2.95,abve the neutral value and 3.1.lower than the neutral value.

Based on PCA, the overall Kaiser–Meyer–Oklin (KMO) measure was 0.670, and Bartlett's Test of Sphericity X^2=81.9 (df) =21, p<0.000, indicating that the data were likely factorable. Two components were extracted, representing 37.5% and 72.9% of the total variance. The first factor (Table 4.5) refers to power and telecommunication (.821) and have a positive relationship with built-up and nature network, green corridors for vulnerable areas, and wild animal movement. The second factor, to preserve a city-wide and regionally linked green network (.821), was positively related to built-up areas, bike-pedestrian network, and wild animal movement, which indicates the expert's view that a city plan incorporates two factors, and the second factor refers to the integrated green space plan with the neighboring Oromia region.

The expert panel discussants also stated the plan constitutes connectivity in terms of integration of plants with water channels and stormwater, and green roofs and walls are not considered in the green space plan. In addition, the 2017 structure plan includes the guiding principles emphasizing the multi-functionality and multiple ecosystem services to urban and peri-urban populations focusing on the provisioning, regulating, and cultural service.

Table 4-2: Perception of experts towards ecological network and connectivity principle

Ecological network and connectivity principle includes:	Mean
Developing green corridors capable of flood control in vulnerable areas	3.1
Developing and preserving a city-wide and regionally linked green network	2.95
Integrate with built-up structure	2.9
Create connectivity between built-up areas and surrounding natural areas	2.8
Developing and maintaining well connected bike-pedestrian network	2.75
Integrating power and telecommunication infrastructure	2.7
Conserving a habitat network to support the movement of wild animals	2.4

The third, the multi-functionality principle of UGI, consists of the benefits of UGI (Table 4.3). Among the benefits, the provision of cultural heritage or aesthetic values and agricultural products scored mean values (2.8) and (2.9) above the neutral value. While others score lower than neutral, indicating the plan poorly considers the multi-functionality principle of UGI, and somehow, the cultural heritage /aesthetic values of UGI and the provision of agricultural products are considered in the plan. Also, the PCA overall measure of Kaiser–Meyer–Oklin (KMO) was 0.833 and Bartlett's Test of Sphericity (X^2=115.71(df) =21, $p<0.001$). One component was extracted, representing 70.1 % of the total variance. This component, the provision of agricultural products (.91) has a positive relationship with all variables.

Table 4-3: Perception of experts toward the multifunctional principle of GI

Multifunctional principle of GI include:	Mean
Cultural heritage or aesthetic values	2.8
Access to agricultural products	2.9
Access to pure water	3.1
To develop habitat provision	3.2
To control flood	3.4
Community participation	3.5
To develop river buffer plants	3.8

The fourth principle, socially inclusive questions, includes (Table 4.4), residents use green spaces for greening, controlling community green spaces, their right to administer green spaces, and all community green spaces used for community participation scored 2.4,2.5, and 2.7, above the neutral. While residents actively participate in UGI planning scored 3.1 lower than the neutral, indicating low participation of residents in UGI planning.

Table 4-4: Perception of experts towards the socially inclusive principle

Socially inclusive principles	Mean
Residents use green spaces for greening	2.4
Controlling community green spaces	2.4
Residents have the right to administer green spaces	2.5
All community green spaces used for community participation	2.7
Residents actively participate in UGI planning	3.1

The overall Kaiser–Meyer–Oklin (KMO) measure was 0.670, and Bartlett's Test of Sphericity (X^2=27.59(df) =15, $p<0.001$). Two extracted components amount to 43.1 % and 63.4 % of the total variance(Table 4.5). The first factor, residents actively participate in UGI planning (.83), was positively related to the active participation of residents in community greenspaces, their right to administer green spaces, and use green spaces for greening. The second factor, controlling community green spaces, has a negative relationship with cooperation in managing community green spaces but has no relationship with others.

Table 4-5: The component solution to the principles of UGI

UGI Principles		
UGI ecological network and connectivity with;	**Components** 1	2
Power and telecommunication	**0.821**	0.19
Built-up areas	0.302	**0.749**
Preserve a city-wide and regionally linked green network	0.016	**0.935**
Bike-pedestrian network	0.51	**0.742**
Wild animals movement	**0.608**	**0.613**
Built-up and nature network	**0.84**	0.158
Green corridors for vulnerable areas	**0.725**	0.227
The multifunctionality principle of UGI provides;		
To control flood	**0.844**	
access to cultural assets	**0.75**	
access to agricultural products	**0.91**	
access to pure water	**0.867**	
To develop river buffer plants	**0.846**	
Community participation	**0.904**	
To develop habitat provision	**0.897**	
Socially inclusive principle of UGI include;		
Residents actively participate in UGI planning	**0.837**	0.013
Community green spaces used for active participation	**0.815**	-0.067
Residents have the right to administer green spaces	**0.655**	0.486
Residents used green spaces for greening	**0.596**	-0.008
Cooperation to manage community greenspaces	0.305	**-0.826**
Controlling community green spaces	0.513	**0.612**

The scree graph help to identify the number of principlal componenets to retain. Kaisier's critreria shows to retain the largest componenets. Casttell's scree critreria, also help to identify a steep slope points fitted to a straight line of neglegable slope. UGI ecological network and connectivity principle (Figure 4.4) show the two components were retained as the two components account 72.9% of the total variance represent all seven variables and are interpretable. The scree graph of UGI multifunctionality principle(Figure 4.5), two componenets retained account 70.1 % of the total variance represent seven variables. The fourth, Socially inclusive principle (Figure 4.5), also two components were retained account 63.4 % of the total variance represent six variables.

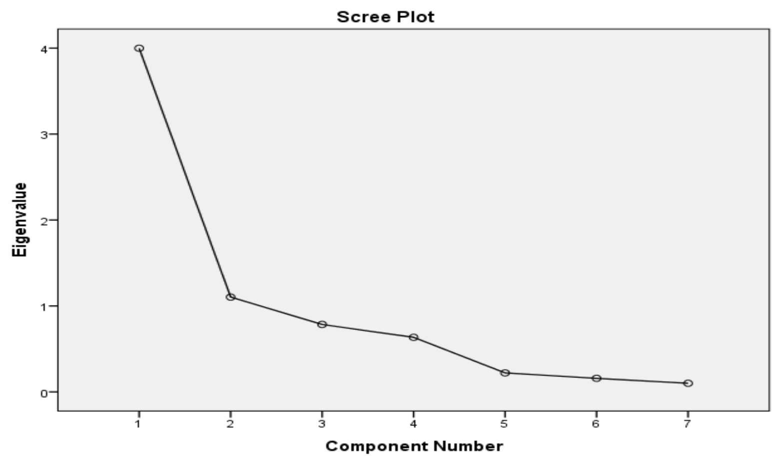


Figure 4-4: Plot of the UGI ecological network and connectivity principle

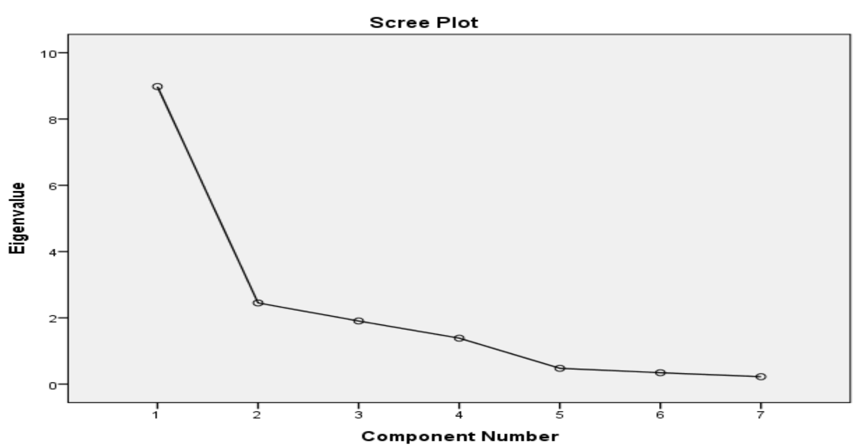


Figure 4-5: Plot of the UGI multifunctionality principle

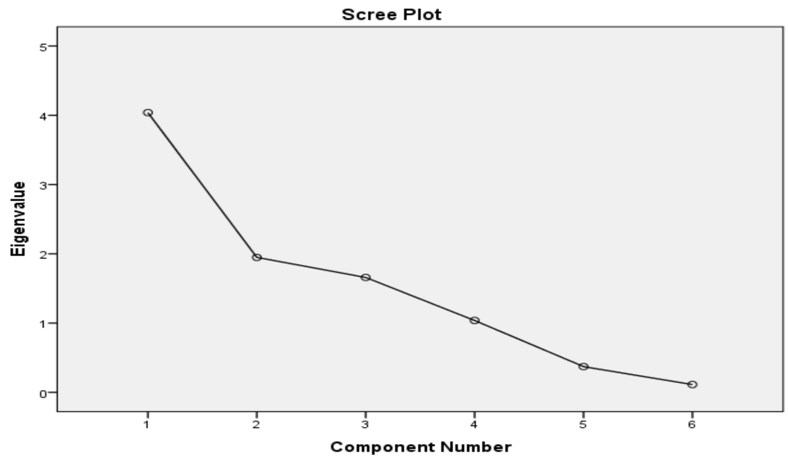


Figure 4-6: Plot of the UGI Socially inclusive principle

4.2. Urban green infrastructure management

4.2.1. Green spaces management models and governance principles

Current park management models

The first model is the public and for-profit combination model. In this model, the government-owned land and resources, the statutory authority was the management body, and funding came predominantly from the government. The government agency outsourced only food and beverage services to small and micro-scale enterprises, and medians were outsourced to private businesses. Examples of this model are Yeka, Ethio-Korea friendship, and Hamle 19 parks.

The second model is the national park model. In this model, the government owns resources, the majority of funding comes from the state, and the government agency is the manager. For all parks in the city, the government owned the land and managed by the city EPGDC and WGDAs to the local level and botanical garden, with the majority of funding being provided by the city government. The third model is the Parastatal Model. There are two different approaches to implementing this model. One approach sees the park agency as being relatively unsuccessful in directly providing tourism services through its staff and programs. The second approach considers the parastatal as successful in providing tourism by its staff and institutions, with little need for outsourcing. The sole botanical garden in the city is an example of this model. The land is owned by the state vested with the power of protecting the environment. It incorporated multiple government departments and managers, and most of the funding came from the city government.

The fourth model, the public and non-profit combination model, suggests the use of many approaches which could best be described as a combination of models. In this model, resources are owned by the government and jointly managed by a government agency and a not-for-profit organization. The model can also be applied by maintaining street trees. An interview with the authorities of WGDA revealed the involvement of one NGO (World Resource Institute) in funding, planting, and maintaining street greening from Estifanos to Sidest Kilo streets.

The fifth model is the nonprofit organization model. In this model, public organizations are independent of governments and advocate social, cultural, legal, and environmental positions, and many environmental membership organizations mainly use it. However, this model is not used in the city.

Governance principles

Two to nine questions were developed based on the ten governance criteria (Table 4.7). The mean governance of all respondents ranged from 2.9 for strategic vision to the lowest 3.83 responsiveness. This shows that all the criteria, except strategic vision (2.93), ranked above the neutral, effectiveness outcome (3.09); the rule of law (3.14); effectiveness process (3.19); accountability (3.28); consensus orientation (3.28); public participation (3.6); transparency (3.63); equity (3.71); efficiency (3.79); and responsiveness (3.83), ranked below the neutral, indicating weak governance. Respondents felt that "they did not know" was higher than "not applicable" (Table 4.9), indicating that the model is valid. Some 36% of respondents answered "do not know" for responsiveness, equity, public participation, effectiveness outcome, the rule of law, transparency, effectiveness process, accountability, and strategic vision, suggesting the need to improve the governance of parks.

Table 4-6: Mean governance criteria scores for a total population

Criterion	Mean	N	Do know	Not applicable
Responsiveness	3.83	83	9	0
Effectiveness Outcome	3.09	87	4	1
Process	3.19	90	2	0
Equity	3.71	86	5	0
Efficiency	3.79	85	2	3
Public participation	3.6	88	4	0
Consensus orientation	3.28	90	0	2
Transparency	3.63	89	3	0
The rule of law	3.14	88	4	0
Accountability	3.28	89	2	1
Strategic vision	2.93	89	2	0

Almost 85% of park visitors mentioned that some illegal activities were performed in parks (chat chewing and taking drugs). Interviewees from WGDA authorities also indicated limited cooperation with the city land administration to have land deeds (for example, part of *Yeka* park is used by the nearby residents for sports activities, and they claimed the open spaces as their own), thus making the office unable to fence the park. In sum, the result of this study has identified weak governance practices in park management.

Challenges related to the governance process and management

Challenges were identified based on the three governance levels: policy, tactical, and operational (Figure 4.8). Four major challenges were identified in this case: (a) lack of long-term green space planning. The city plan is subject to revision every ten years, leading to the conversion of green spaces to mixed-use. For example, among the 59 areas allocated for green space in the master plan of 2002, 54 were changed to mixed-use in the 2017 structure plan; (b) the involvement of politicians at all levels of management and maintenance of green spaces. This led to the allocation of community green/open space for commercial or other purposes; (c) limited cooperation between land management, planning commission, and environmental protection offices to minimize the invasion of green spaces; and (d) no specific law for green space management. An interview with local government officials has, for instance, indicated that there were cases where individuals attempted to incorporate about $50m^2$ of land reserved for green space and close to their residential houses. In this respect, green space management requires specific laws and manuals to protect land reserved for green spaces and to control plan violations.

The six major challenges identified by this study are (a) the frequent re-organization of environmental protection institutions which led to the loss of institutional memory; (b) shortage of experts; (c) limited cooperation between local governments and the community; (d) limited budget; (e) limited involvement of NGOs such as UN-Habitat and World Resource Institute involved in funding small parks and street trees; and (f) the conversion of green spaces, for example, a key informant from WGDA stated that a plaza at Arat Kilo used for buildings, part of Adwa Park, a city park near *Bole* airport redesigned for housing (Figure 4.7), mentioned by key informant from AACPPO, EA-14 in the figure shows a city park in the 2017 structre plan, but later redesigned for housing; a big mosque situated very close to a river buffer at Afinchober, and community green spaces (Figure 4.9) at different parts of the city used for small-scale enterprises and other purposes.

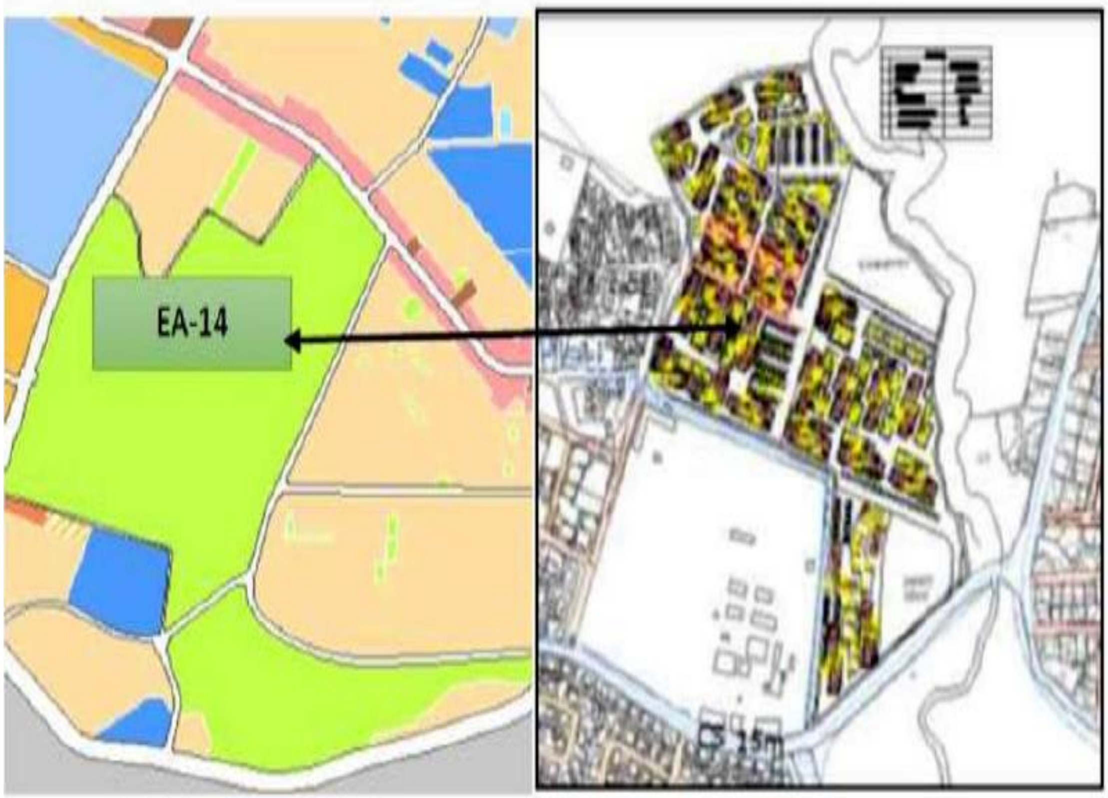


Figure 4-7: City Park redesigned for housing development

The Strategic Park Management Model

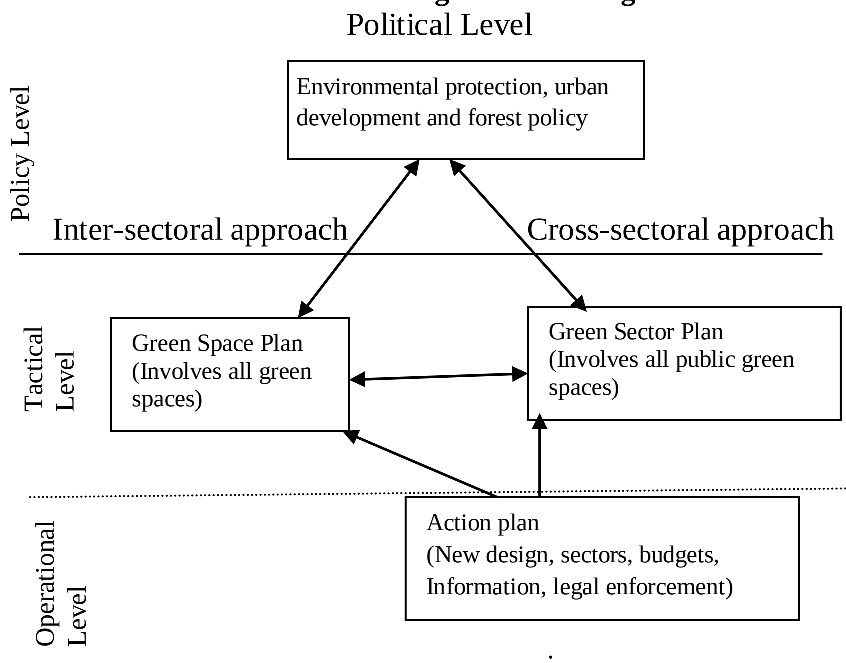


Figure 4-8: The Strategic Park Management Model

The strategic park management incorporates three levels of activities, which will be cross-sectoral at both governance levels (Figure 4.8). On the three vertical governance levels, the right side represents a cross-sectoral approach, and the left represents a park inter-sectorial approach. On the horizontal level, the three levels of activities to be included in the strategic park management include policy, tactical and operational levels.

At a city level, EPGDs have the role of monitoring and regulatory activities. The management and maintenance (operational) activities are to be carried out by the majority of experts from the city, sub-city, and local level WGDAs. Indicating the majority of experts and resources are placed at the bottom of the model. The interviewed city WGDA manager stated that experts and other non-professional workers are responsible for the park management and maintenance activities. The city WGDA is also responsible for developing, administering, and controlling parks, among others.

Community green space management

The community green spaces managed by urban communities are selected to indicate the ecological benefits of such areas and the contribution of the urban community to the conservation and management of green spaces. Regarding types of governance, the management of community green spaces has been categorized as self-governance. The examples cited in this study were the community green spaces found near residential areas managed by the community in greening the city. Besides the fourth dimension, governance by local communities is also suited to community green spaces managed by the urban community.

The selected community green spaces in the study areas are managed by committees selected by communities. The management of community green spaces are the responsibility of committees. The local governments also support the management of community green spaces. This kind of management shows the combination of self-governance and the collaboration of local governments with communities (e.g.Figure 4.10). In this case, the government owns the land. The budget is allocated by both the community and the government (in terms of professional, material, and agricultural inputs (seeds and fertilizers) support). The government contracts and provides title deeds to the community. Community-based management of green spaces has shown a shift from self-governance to the involvement of local governments in supporting technical and agricultural inputs.

The result also revealed the mismanagement of green spaces. Information obtained from key informant community members shows that previously the area (Figure 4.9) was allocated for green space to the community and used for children playing ground, and trees were planted by community members, while, in 2005, the local government allocated to a group of women for economic benefits through small-scale enterprises. The local government organized this group, and one criterion for membership was joining the ruling political party as a member during the 2005 election. Besides, the members were responsible for convincing the community members to vote for the ruling party (key informant interview from community committee member). However, the local government later rented out the area to private businesses.

Figure 4-9: Community green space used for other purposes

In addition, key informants mentioned that the right side of (Figure 4.9) is part of the green space allotted by the local government for community *Iddir* (a community association for helping each other during the death of community members). In turn, the *Iddir* committee rented out to private businesses (maintenance of vehicles). This calls attention to areas allocated for the community green spaces in the plan but used for other purposes by the local government and the community. The result, in general, shows the negligence of the government to environmental protection.

The Park- Organization-User Model

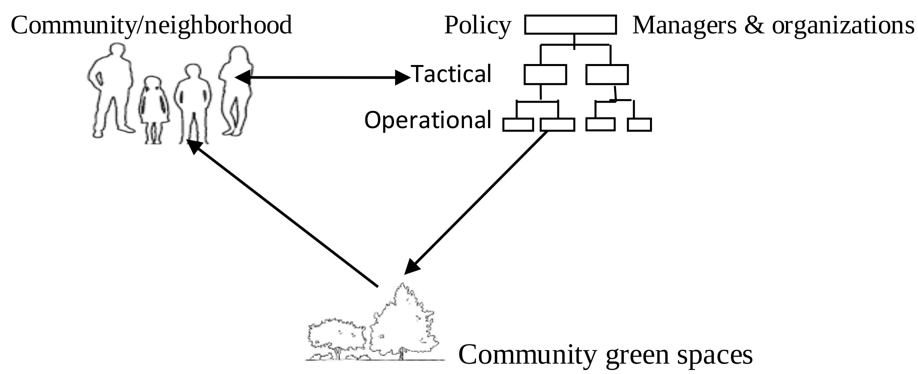


Figure 4-10: The park-organization-user model

The park-organization-user model with three main elements (managers, users, green spaces) and their interrelations was used to explain the community green spaces management (Figure 4.10). Similar to the strategic park management model (Figure 4.8) that incorporates three levels of activities, the park-organization-user model is relevant to analyzing the community green spaces governance process.

In addition to the challenges explained above, the encroachment or conversion of green spaces was also indicated by key informants. According to a city WEGDA expert, during their visit, they identified that green spaces (Figure 4.11) in the Bole sub-city were converted to informal settlements. All key informants also agreed to the existence of the encroachment or conversion of green spaces.

Figure 4-11: Green spaces converted to informal settlement

4.2.2. Urban Forest Management using a Policy Arrangement Approach

This section of the study analyzes forest policies using a Policy Arrangement Approach (PAA) with four dimensions: discourse, actors, power and resources, and rules of the game. Policy changes by three regimes were analyzed; the Imperial (1936-1974), Durg (1974 to 1991), and the present government (from 1991 to present).

1. Discourse

A discourse, the first dimension in the tetrahedron important to study the historical development of forest policy and institutions. Discourses refer to the historical development of forest policies, legislation, and organizational setups of the forest sector in Ethiopia that have gone through many transformations. The first recorded forest management intervention began in 1936. The Ethiopian Federal Democratic Republic Government (FDRE) overthrew the Derg regime in 1991 and introduced a free market economic system. Like the military regime, natural forests remained nationalized. The current government revised the 1975 proclamation in 1994 and 2007 with Forestry

Proclamation No. 94/1994 and Forestry Proclamation No. 542/ 2007, respectively. A legal contract under the 1994 forest law gave forest owners considerable freedom in their management decisions.

The current government adopted a new constitution in 1995 that heralded a decentralized federal polity and a democratic political process. The right to ownership of land and other natural resources, including forests, remained in the hands of the state and people (Article 40), and the government administers land on behalf of the people.

Several strategy and policy documents revealed government commitment toward environmental protection and a green economy in environmental and urban development policy. The Environmental Policy of Ethiopia (EPE), formulated in 1997, focused on sustainable natural resource development through the provision of a legislative framework, monitoring, and evaluation of environmental projects. This policy allowed the government, individuals, and associations to carry out forestry resource development and protection activities. Besides, incentives are considered to encourage investors and organizations engaged in forest resource development. The forest policy issued in 2007 also introduced the concept of community participation with the intent to benefit the inclusion of communities residing inside and adjacent to a state forest. Further, the repealed forest proclamation No.1065/2018 allowed state, private, community, and association forest ownership (provision of title deed), rights, and incentives. This indicates how the government perceived the benefits of forest resources for the country's development.

Regarding the influence of international discourse on urban forest policies, Ethiopia is a signatory of environmental conventions such as the Convention on UN Framework Convention on Climate Change (UNFCCC). Among others, Agenda 21 is the one that recognizes the benefit of urban green resources. For example, the Urban Productive Safety Net Project (UPSNP) supports the government in maintaining green spaces in the city. While the major influence of international discourse was on the rural forest.

Concerning planning, urban development policy (2005) focused on allocating green areas and mainstreaming environmental protection measures in all urban development activities. The city government stipulates the master plan of the city to incorporate green spaces. Regulations No. 16/2004 allow the inclusion of environmental protection map that distinctly shows green places of parks, roads, and squares, forest places, green areas found on riversides, and agricultural places in the structural plan. In line with this, based on the experiences of international and national city's Urban Green Infrastructure (UGI development and management, the Ministry Of Urban Development and Construction (MoUDC) in collaboration with *Deutsche Gesellschaft fur Internationale Zusammenarbeit (GIZ)*, has developed the Ethiopian national urban green infrastructure standard and green infrastructure management manuals considering the need to provide specific standards for location, capacity, and accessibility of urban green infrastructure in 2015.

1. Actors

The second dimension is actors. Analyzing a policy arrangement from an actor perspective requires the analysis of potential actors at different levels, as the forest is a multi-dimensional resource. The actors' roles were identified based on their position to cluster actors that fulfill similar roles in the arrangement. Ethiopia is the Federal

Democratic Republic with ten Regional States and two City administration councils. All regional states and city administrations have legislative, executive, and judiciary powers. In this regard, the FDRE Constitution recognizes the city of Addis Ababa as the capital city of the Federal State, and its residents shall have a full measure of self-government by being represented in the House of Peoples Representatives.

Under the city government executive body is the city mayor, which constitutes the city manager, state functions, bureaus (cabinet), the mayor’s office, and sub-city executive body. The city manager is in charge of municipal services. The Environmental Protection and Green Development Commission (EPGDC) is under the mayor's office. This organization has the power to monitor the Watersheds, Green Areas Development Agency (WGDA), and *Gullele* Botanical Garden Center. The forest management is one unit previously under (EPGDC) and shifted to (WGDA) Entoto and surrounding tourist destination units. In addition, the EPA was the leading governmental institution in developing and coordinating the body for the Climate Resilient Green Economy (CRGE) strategy.

The Addis Ababa Environmental Protection Authority (AAEPA) was established at the city level in 1994. The Proclamation states the roles and responsibilities of the AAEPA.

Concerning forest management, AAEPA was responsible for undertaking forest development activities in accordance with the master plan of the city and ensuring reserved forest areas under the holding of the city government are properly preserved. Proclamation No.64/2019 stipulates re-establishing the environmental protection and green development commission and WGDA. Besides, the Addis Ababa City Government Rivers, Riversides Development and Climate Change Adaptation Project Office (ARDCAP), established by Regulation No. 75/2015, was again re-established by WGDA. Proclamation No.64/2019 also provides relevant legal instruments, the definition of powers, and the duties of the city executive organs. A clear indication of this was the subsequent re-organizations in terms of organizing specific departments to carry out particular activities, including the natural resource research unit within WGDA, meaning that specialized expertise is an important resource in almost any policy arrangement. Another green development project under the prime minister's office that received political significance is called the *Sheger* project. This project focused on greening the city, particularly rivers and riverside development intended to build an international recreational standard riverbank including riverside forests.

At a federal/national level, the (MoUDC) and Ministry of Environment, Forest and Climate Change Commission (EFCC) address the management of the forest. The former is responsible for developing urban planning legislation, policies, strategies, standards, and manuals. While the latter focuses on developing forest sector policies, strategies, proclamations, regulations, and guidelines. In addition, the current forest management involves non-state actors: the government (Addis Ababa university Space Science and *Sheger* greening), NGO (Resource initiative institute), and Orthodox Church (the management and maintenance of green spaces).

2. Power and Resources

The third dimension entered into a tetrahedron is power and resources. The analysis of resource dependencies and power relations are based on actors around a given policy issue to different degrees dependent upon each other for resources, e.g., money, information, or political legitimacy. In this case, the city government allocates the resources (budget) to different sectors, and the environment sector is the one. The resources and power relationship flows from federal (national) and regional (city) to the commission, WGDA, to the local level. Hence, the government holds the resources and is distributed them from the city to the local level through a top-down approach. Funds from NGOs are allocated for the implementation of a specific project. For example, the governmental structure includes a hierarchy of organs at the city, sub-city, and *woreda*(local) levels. At a city level, the city government comprises the City Council, the Mayor, a City Cabinet, a Judicial Body, and the Chief Auditor. At the sub-city and *woreda* levels, the organs of government include the Council, Chief Executive, and a Standing Committee. As a chartered city and regional status, the government of Addis Ababa has the power in the management, planning, and administration of forest resources.

In the case of controlling informal settlements expansion, three tiers of government, the environmental protection commission, WGDA, sub-cities, and woredas peace and security unit are responsible. Accordingly, a range of actors often holds power; this division of power poses challenges as responsibilities can sometimes be unclear, and decision-making can be slow. While lack of cooperation was observed between the environmental protection commission and WGDA to assign forest guards for specific days that may create the possibilities for informal settlement expansion. In addition, interviewed experts mentioned that forest guards are not liable and may engage in bribery that allows the informal settlement expansion. Besides, local-level positions are occupied by the politicians mainly responsible for maintaining political stability. This may sometimes lead to negligence (intentionally or not) in taking action. Particularly, *woreda* peace and security officials are responsible for patrolling and demolishing the informal settlements. According to interviewed sub-cities experts, the situation may create bribery.

4. Rules of the Game

The fourth dimension of a policy arrangement is the rules of the game. In Ethiopia, the federal government develops legal rules (environmental protection, urban planning, land management legislations, and proclamations), while forest management mainly operates at the city and local levels. The legal rules or policies provide a positive outlook but are often not accompanied by a sufficient implementation to realize legal or policy objectives.

The function of the city government includes generating revenues from land leases and as custodians of municipal services indicated in the structure plan. Proclamation No. 574/2008 elucidates protecting the natural environment and ensuring sustainable development. The Addis Ababa City Plan Preparation Program Office AACPPO (2017) incorporates the multifunctional green space intended to conserve and protect forests and prohibits the construction of structures above ground.

The evolution of forest policy over the past three regimes is characterized by a focus on different kinds of the forest: from production forest, plantation of trees, and the inclusion of multi-functional forests in the plan. The changes in the government organizations were attributed to the re-organization of executive organs, which needs specialized experts, and the shift from the government as the only actor to the involvement of non-state actors. While the unclear and sometimes blurred division of power contributed to deforestation.

4.2.3. The influence of policy and planning themes on UGI planning

4.2.3.1. Perceptions of experts on the influences of policy and planning themes on UGI Planning

Planning, land administration and management, and environmental experts were asked about the policy and planning themes that affect UGI planning (Table 4.7). Such questions include the national policy in terms of (nature conservation laws and environmental regulations), regional policy (regional planning programs or laws), municipal or city administration policy (zoning plans or codes), city plan proclamation, research results, NGOs, the second ‘‘Growth and Transformation Plan II’’ (GTP II), and interference of politicians. For planning experts, the overall measurement of Kaiser–Meyer–Oklin (KMO) was 0.578 and Bartlett’s Test of Sphericity X^2=53.35; df = 28, p <0.003). The first principal component has a variance of 3.06, which amounts to 38.2% of the total variance. The second principal component accounts for 56.36%, and the third component accounts for 70.64%. NGOs, city plan proclamation, research results, city administration, and GTP II are more closely related to the components with a value greater than 0.40.

Likewise, for the land administration and management experts, the overall measurement of Kaiser–Meyer–Oklin (KMO) was 0.613 and Bartlett’s Test of Sphericity X^2=115.376; df = 28, p <0.000). Three extracted components amount to 50.12%, 67.7%, and 83.55% of the total variance. The first component, the city plan proclamation, is positively and more closely related to national, regional, and municipal policies. The second component, NGOs, is positively related to research results and GTPII; and the third component, interference of politicians, is closely related to GTPII. While, for the environmental experts, the overall measurement of Kaiser–Meyer–Oklin (KMO) was 0.567 and Bartlett's Test of Sphericity X^2=118.802; df = 28, p <0.000). Two extracted components account for 49.05% and 66.45% of the total variance. The first component, municipal policy, is positively related to GTPII, interference of politicians, research results, and NGOs. The second component, regional policy, is also positively related to national policy and GTPII. Indicating environmental experts are more focused on policies.

Based on the cross-factor loadings in the component matrix and the items in each factor, three extracted factors reflect interference of politicians (0.937); regional policy (0.880), and national policy (0.856), indicating that interference of politicians followed by regional and national policy greatly affects the development of GI. From environmental experts, the factor analysis shows that regional policy (.916) and municipal policy (.880) has greatly influenced the development of GI. Similarly, land administration and development experts indicate the interference of politicians (0.954), followed by NGOs (.939) and regional policy (0.90), which greatly affects the development of GI. Despite Ethiopia being a signatory of environmental conventions and the Climate-Resilient Green Economy Strategy (CRGE) 2011 being the main policy driver for green growth in Ethiopia, these policies are less likely to influence UGI development.

Table 4-7: Components for the influences of policy and planning themes on UGI planning

Policy and planning themes	Components							
	1	2	3	1	2	3	1	2
National policy	0.277	**0.856**	-0.011	0.797	0.227	0.112	0.147	0.863
Regional policy	-0.063	**0.88**	-0.037	**0.9**	0.251	0.011	-0.008	**0.916**
Municipal policy	**0.694**	0.19	-0.274	**0.829**	0.23	0.018	**0.88**	-0.068
City plan proclamation	**0.815**	0.141	0.176	**0.832**	0.066	0.215	0.65	0.362
Research result	**0.809**	0.038	-0.142	0.275	**0.887**	0.157	**0.545**	0.6
NGOs	**0.825**	-0.03	0.036	0.223	**0.939**	-0.006	**0.542**	0.548
GTPII	**0.569**	0.095	0.417	0.162	**0.56**	**0.631**	**0.723**	**0.443**
Interference of politicians	-0.071	-0.06	**0.937**	0.093	0.002	**0.954**	**0.659**	0.054

The scree graph fot policy and planning themes on UGI planning (Figure 4.12) show the two components were retained which account 66.4% of the total variance represent all eight variables and are interpretable.

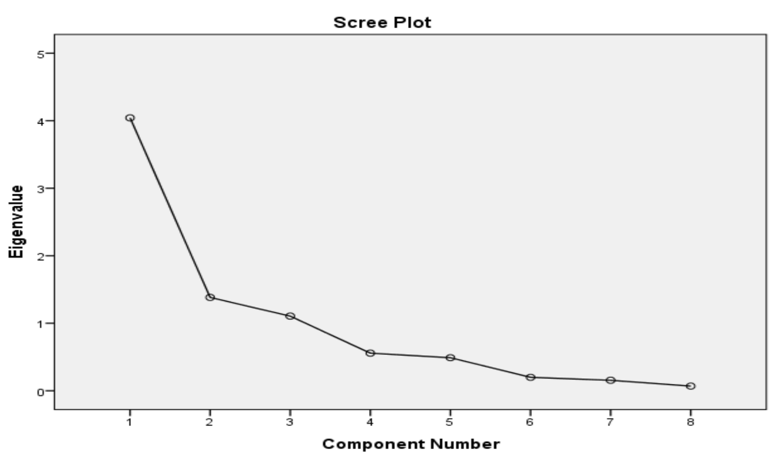


Figure 4-12: Plot of policy and planning themes

The mean score for the effects of policy and planning themes on UGI planning (Table 4.8) shows planning expert's scores ranged from 2.9 for NGOs to 4.0 for urban plan proclamations with a variance of (1.1), and land manager's scores ranged from 2.9 for researchers to 4.2 politicians with the variance of (1.3) demonstrating weak influences. Environmental experts scored from 2.6 for municipal policy and NGOs to 2.8 for researchers and GTP II, and 3.1, 3.2, and 3.4 for national, regional/state policy, and interference of politicians.

Table 4-8: Mean score for the influences of policy and planning themes on UGI planning

Policy and planning themes	Planning	Land management	Environmental
National policy	3.8	3.7	3,1
Regional policy	3.9	3.3	3.4
Municipal policy	3.9	3.4	2.6
City plan proclamation	4	4	2.9
Research result	3.1	2.9	2.8
NGOs	2.9	3	2.6
GTPII	3.5	3.3	2.8
Interference of politicians	3.3	4.2	3.2

4.2.4.The influence of land use regulations on UGI development

4.2.4.1. Expert's perception of the influence of land use regulations on UGI development

Experts were asked to evaluate the land use plans and changes (Table 4.9). The mean score ranges from 2.6 to 3.3. preparing and improving land-use plans based on public participation and public input is sought in preparing and amending land-use plans. The public responses are stated in the report, and this report is publicly accessible scores (2.6) and (2.8). The remaining Public input is /not sought in preparing and amending land use plans indicators scores 3.2 and 3.3.

Table 4-9: Perception of the influence of land use regulations on UGI development

Preparing and improving land-use plans based on public participation	2.6
Public input is incorporated in preparing and amending land use plans	3.3
The report explicitly mentions public responses, and this report is publicly accessible	2.8
Public input is not sought in preparing and amending land use plans	3.2

4.2.5. Resident's land use rights and management of urban green spaces

4.2.5.1. Expert's perception of resident's land use rights and management of urban green spaces

Questions for land use rights and management of community green spaces (Table 4.10), planning experts score the management of all UGS is respected in practice, any disputes that may arise in the management of UGS are swiftly resolved, and UGS land has boundaries demarcated and surveyed, and associated claims are registered scored 2.0. While land management experts score 1.96, 2.32, and 2.24. For the questions, all UGS are effectively protected in practice, resident’s rights to UGS management and maintenance planning experts score 1.62, 2.14, and 2.47, and land management experts score 1.92, 2.44, and 2.52. All scores ranging from 1 to 2.99 are very low (the scores ranged from 1 very low to 5 very well), indicating experts perceived residents’ land use rights and management of urban green spaces was low.

Table 4-10: Mean score of resident's land use rights and management of community green spaces

	Experts	
Management of community green spaces	Planning	Land management
Resident's rights to UGS management and maintenance are legally recognized	2.14	2.44
All UGS are effectively protected in practice	1.62	1.92
Protecting some UGS is difficult	2.47	2.52
The management of all UGS is respected in practice	2	1.96
Any disputes that may arise in the management of UGS are swiftly resolved	2	2.32
UGS land has boundaries demarcated and surveyed and associated claims are registered.	2	2.24

Two components, residents' rights to UGS management and maintenance (Table 4.11), are legally recognized, UGS land has been surveyed and its boundaries are demarcated, and any related claims have been recorded.UGS land has boundaries demarcated and surveyed, and associated claims are registered, accounts 41.8% and 63.4% of the total variance. The first component has a positive relationship with others except for the variable, any disputes that may arise in the management of UGS are swiftly resolved. The second component has a positive relationship with protecting some of UGS is difficult and a negative relationship with any disputes that may arise in the management of UGS were swiftly resolved. For planning experts, the overall measurement of Kaiser–Meyer–Oklin (KMO) was 0.670 and Bartlett's Test of Sphericity X2=27.593; df = 15, p <0.000). Likewise, for land administration and development experts, the overall measurement of Kaiser–Meyer–Oklin (KMO) was 0.762 and Bartlett's Test of Sphericity X^2=58.078; df = 15, p <0.000).

One extracted component, residents' rights to UGS management and maintenance, are legally recognized accounts 54.1% of the total variance and have a positive relationship with others. Both experts perceived the legal recognition of residents' rights to UGS management and maintenance and the protection of some UGS as difficult. In addition, planners perceived UGS land had been demarcated and surveyed, associated claims are registered, and land administration and development experts perceived less.

Table 4-11: Components of resident's land use rights and management of community green spaces

	Planning		Land management
Resident's rights to UGS management and maintenance are legally recognized	**0.837**	0.013	**0.901**
All UGS are effectively protected in practice	**0.815**	-0.067	**0.846**
Protecting some UGS is difficult	**0.655**	0.486	**0.845**
The management of all UGS is respected in practic	**0.596**	-0.008	**0.742**
Any disputes that may arise in the management of UGS are swiftly resolved	0.305	**-0.826**	**0.542**
UGS land has boundaries demarcated and surveyec and associated claims are registered.	**0.513**	**0.612**	0.396

The scree graph for resident's land use rights and management of community green spaces perceived by planning experts (Figure 4.13) show one component was retained which account 54.1% of the total variance represent all six variables and are interpretable.

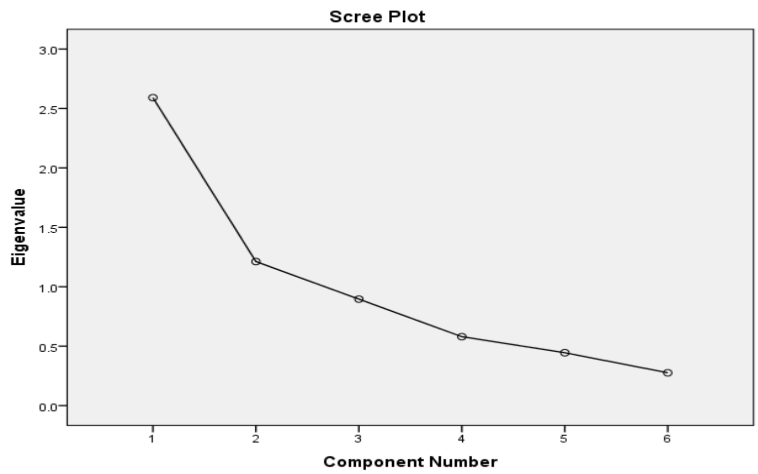


Figure 4-13: *Plot of planning experts perception of resident's land use rights and management of community green spaces*

The scree graph for resident's land use rights and management of community green spaces perceived by land management experts (Figure 4.14) show the two components were retained which account 63.4% of the total variance represent all six variables and are interpretable.

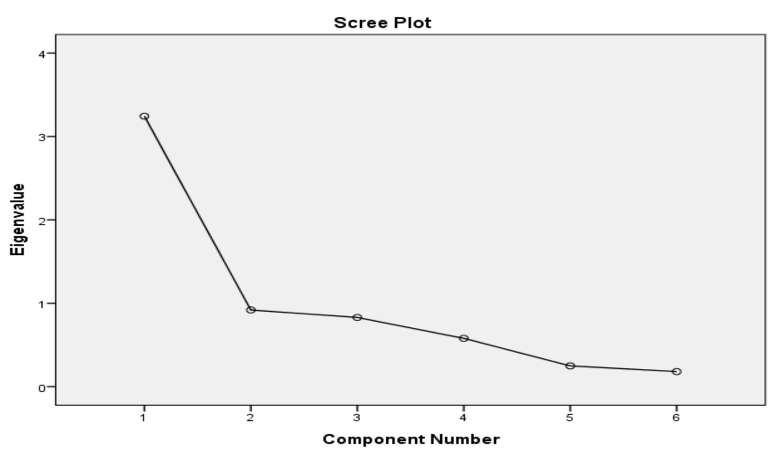


Figure 4-14: Plot of Land management experts perception of resident's land use rights and management of community green spaces

4.2.6. The management of public land

4.2.6.1. Expert's perception of the management of public land

Land management experts were asked to score whether public land ownership is justified and managed at the appropriate level of government (Table 4.12). Experts score the assignment of management responsibilities for various forms of public land is sufficiently ambiguous to impact to some extent the management of assets scored 3.0, neutral value., It has a been a significant impact on the management of assets when there is a serious ambiguity in the assignment of management responsibility for various types of public land, and there is clear management responsibilities for different types of public land ranged 3.04, 3.2, 3.4, and 3.5, from moderate to good values (the rating scales range from 1 very low to 5 very good). Indicating experts viewed the management of public land ownership at the appropriate level of government in the city as good.

Table 4-12: Mean score for public land ownership and its management

In the management of public land:	
The assignment of management responsibilities for various forms of public land is sufficiently ambiguous to impact to some extent the management of assets	3
It has a been a significant impact on the management of assets when there is severe ambiguity in the assignment of management responsibility for various types of public land	3.04
The assignment of management responsibilities for various forms of public land is seriously ambiguous with a major impact on the management of assets	3.2
Public land ownership is justified and managed at the appropriate level of government	3.4
There is clear management responsibilities for different types of public land	3.5

Using PCA, the overall measurement of Kaiser–Meyer–Oklin (KMO) was 0.589 and Bartlett's Test of Sphericity X^2=45.755; df = 15, p <0.000). Two components, public land ownership is justified and managed at the appropriate level of government, and the assignment of management responsibility for various types of public land is seriously ambiguous, which has a significant impact on the management of assets, accounts 43.3% and 80% of the total variance. The first component has a positive relationship with two of the variables (unambiguous and some ambiguity). The second component has a positive relationship with serious ambiguity (Table 4.13).

Table 4-13: Components for public land ownership and its management

	Land management	
In the management of public land:	1	2
Public land ownership is justified and managed at the appropriate level of government	**0.855**	-0.283
There is clear management responsibilities for different types of public land	**0.849**	-0.002
The assignment of management responsibilities for various forms of public land is somewhat ambiguous, but this has little impact on the management of assets	**0.841**	0.247
The assignment of management responsibilities for various forms of public land is sufficiently ambiguous to impact to some extent on the management of assets	0.062	**0.887**
The assignment of management responsibilities for various forms of public land is seriously ambiguous, which has significant effects on asset management	-0.069	**0.867**

The scree graph for for public land ownership and its management (Figure 4.15) show the two components were retained which account 80% of the total variance represent all five variables and are interpretable.

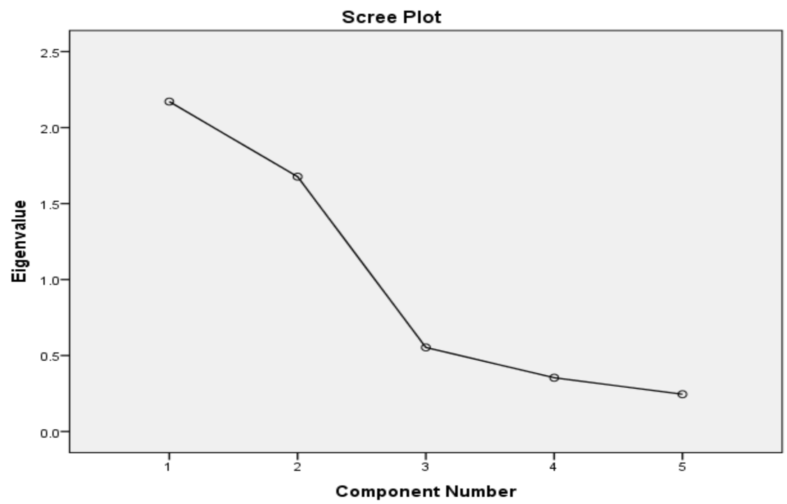


Figure 4-15: *Plot of public land ownership and its management*

4.2.7. Environmental management of GI

Environmental management of GI here refers to the management strategies aligned with Adaptive co-management (ACM) strategies which were examined based on environmental experts' perception of environmental policies related to UGI residents' experiences and ecological knowledge to inform planning and environmental management process and outcomes.

4.2.7.1. Expert's perception of environmental policies related to UGI

Environmental experts were asked to evaluate the environmental policy related to UGI questions (Table 4.14). The mean scores for all questions, new places for additional GI, green networking, environmental pollution control, sustainable natural resource management, accessibility of ecosystem services to all places, maintaining and developing ecological corridors, rehabilitating previous natural places, and focus on biodiversity ranged from 2.3, 2.4, 2.5, 2.6, and 2.8, indicating environmental policies include all elements.

Table 4-14: Mean score for environmental policies related to UGI

Environmental policies related to:	Mean
New places for additional GI	2.3
Green networking	2.4
Environmental pollution control	2.5
Sustainable natural resource management	2.5
Accessibility of ecosystem services to all places	2.6
Maintaining and developing ecological corridors	2.6
Rehabilitate previous natural places	2.8
Focus on biodiversity	2.8

4.2.7.3. Expert's perception of resident's ecological knowledge

Planning and environment experts were asked their views on experts on the effects of incorporating residents' experience and ecological knowledge. The questions include (Table 4.15). Planning expert's score providing the necessary ecosystem service information, information on interests of residents towards green space management and maintenance, information on the effect of the previous plan on green spaces management, and improving GI spatial plan ranged 4.0, 4.09, and 4.19, very good value. Environmental experts score providing the necessary ecosystem service information, providing information on the effect of the previous plan on green spaces management, improving GI spatial plan, and providing information on interests of residents towards green space management and maintenance ranged 3.25, 3.32, 3.46, and 3.57, moderate value (the rating scale ranges from 1 nothing to 5 very good). Indicating both experts considered the inclusion of residents' experience and ecological knowledge in the planning and management of GI development have greater significant.

Table 4-15: Mean score for resident's ecological knowledge

	Planning	Environmental
Improving GI spatial plan	4.19	3.46
Providing information on the effect of the previous plan on green spaces management	4.19	3.32
Providing the necessary ecosystem service information	4.0	3.25
Providing information on interests of residents towards green space management and maintenance	4.09	3.57

4.2.7.5. Expert's perception of environmental management process

ACM is a new approach important to understanding and explaining the experts' perception of the city's environmental management, directly impacting GI development. Using collaboration quality items, experts were asked five questions (Table 4.16). The mean score for open discussion among different actors, different ideas of actors, and actor's consensus ranged 2.5, 2.64, and 2.57, above the neutral value. While encouraging new solutions and giving all actors an equal chance to state their opinions and have an influence on the outcome scores of 2.9 and 3.0, lower than the neutral value.

Table 4-16: Mean score for environmental management process

The environmental management process is characterized by:	Mean
Open discussion among different actors	2.5
Actors consensus	2.57
Different ideas of actors	2.64
Encourages new solutions	2.9
It gives all actors an equal chance to state their opinions and have an influence on the outcome	3

The cognitive learning aspect focused on the expert's understanding of environmental management processes that maintain GI. The assumption was whether adaptive co-management was practiced as a shared understanding of the resource under management. The normative learning aspect focused on the expert's perceptions of the interaction between humans and nature. Regarding relational learning, the focus was on experts' perceptions of working together.

Using learning items (cognitive, normative, and relational), experts were asked whether their involvement in environmental management has increased their understanding or not. The mean score (Table 4.17) for cognitive learning, the ecological and social conditions, the problems and challenges of environmental management and management methods scored 2.0, 2.14, 2.18, and 2.25 above the neutral. The normative learning questions include: The management process has helped me to understand the perspective of others, my views on environmental management have led me to act in surprising or new ways, and my views on environmental management are similar to those of others involved in the management process scored 2.32, 2.36, and 2.86 above the neutral. The relational learning questions include: Increased my understanding/acceptance of other actors and has enhanced my capacity for collaboration and cooperation with others, groups, and organizations, scoring 2.14 and 2.57 above the neutral. While from the normative items, their views on environmental management are similar to those of others involved in the management process 2.86 above neutral value. There were no significant differences in cognitive, normative, and relational learning.

Table 4-17: *Mean score for learning items*

My involvement in environmental management has increased my understanding of:	Mean
Cognitive learning	
The ecological conditions	2
The social conditions	2.14
Management method	2.18
The problems and challenges of environmental management	2.25
Normative learning	
The management process has helped me to understand the perspective of others	2.32
My views on environmental management have led me to act in surprising or new ways	2.36
My views on environmental management are similar to those of others involved in the management process	2.86
Relational learning	
Increased my understanding/acceptance of other actors	2.14
Has improved my ability to work in collaboration and cooperation with other people, groups, and organizations	2.57

ACM outcomes constitute (result and effect items). The mean score (Table 4.18) for the extent to which the process of collaborative environmental management has resulted in considering conflict resolution among actors, creating new collaborations with cities, and transparent, equitable, and fair decision-making scored 2.64, 2.71, and 2.78, above the neutral value. While greater support by those not involved in the collaborative management process for environmental management decisions and using informal consensus to resolve conflict scored 3.04 and 3.25. This shows informal agreements on how to address an issue and greater support by those not involved in the collaborative management process for environmental management decisions are somehow less than other items.

Table 4-18: Mean score for collaborative environmental management

The extent to which the process of collaborative environmental management has resulted in:	Mean
Conflict resolution among actors	2.64
Creating new collaborations with cities	2.71
Transparent, equitable, and fair decision making	2.78
Greater support for environmental management decisions from individuals who are not involved in the collaborative management process	3.04
Using informal consensus to resolve conflict	3.25

For the effect items, experts were also asked to indicate the extent to which they felt the process of environmental management had led to effects towards enhancement of wellbeing, improvements in social and human capital, sustainable ecological and economic management (Table 4.19), scored 1.82, 1.85, 1.93, and 2.04, above the neutral value,indicating experts perceived all items have effects on the process of collaborative environmental management.

Table 4-19: Mean score for the effect items

The extent to which they feel the process of collaborative environmental management has effected:	Mean
Enhancement of wellbeing	1.82
Improvements in social capital	1.85
Improvements in human capital	1.93
Sustainable ecological management	2.04
Sustainable economic development	2.11

4.2.8. The legal frameworks, policies, institutions, and organizational arrangements

4.2.8.1. Legal frameworks and policies

In Ethiopia, the existing policies and legislation at the national level and international legislation related to the environment support the governance of planning and management of green infrastructure in the study areas.

Urban Development Policy of Ethiopia

From the outset, Ethiopia's overriding development policy plan is to fight and eradicate poverty. The Ethiopian Government Poverty Reduction Strategy from 2001 to 2005 was known as Sustainable Development and Poverty Reduction Program (SDPRP). The main emphasis during SDPRP was to build decentralized good governance capacity in Ethiopia's urban centers. From 2005/06-2009/10, the Plan for Accelerated and Sustained Development to End Poverty **(**PASDEP) focused on Agriculture Development Led Industrialization (ADLI), decentralization and empowerment, and capacity building in the public and private sectors.

Based on PASDEP, the urban strategy, the government issued its National Urban Development Policy (NUDP) in 2006. From 2010/11–2014/15, the Growth and Transformation Plan (GTP I) was formulated to sustain rapid and broad-based growth. The 2015–2020 Second Growth and Transformation Plan (GTP II) was also formulated in 2016 to increase the coverage of green infrastructure and recreational areas in the country's urban centers.

The Urban Planning Provision Proclamation

Proclamation No. 574/2008, to Provide for urban plans is declared in response to the need to regulate and guide urban centers by sound and visionary urban plans to bring about balanced and integrated national, regional and local development; Addis Ababa City Master Plan Preparation and Implementation issued in 2004 (Proclamation No. 17/2004) to ascertain the right of residents to participate in the preparation of the plan. The Ethiopian National Urban Green Infrastructure Standard (NUGIS) manual was also developed by the Ministry of urban development and construction to provide specific standards for the location and accessibility of urban green infrastructure.

Urban land Policy and Legal frameworks

In Ethiopia, the feudal system of land ownership was dominated during the imperial regime. Following the downfall of the imperial regime, the land holding systems were radically changed in the mid-1970s by the nationalization of land by the military regime from 1974 until 1991. The present laws dealing with urban land in Ethiopia are the constitution regarding ownership and control, the leasing proclamation, and the expropriation proclamation. Article 51(5) of the constitution empowers the federal government to enact laws regarding land utilization.

Proclamation No. 272/2002 is the law regulating land delivery in urban areas for development. The preamble to the law refers to transferring land by lease in accordance with free market principles. Besides, the Addis Ababa land development and management policy were issued in 2010 to control land resources and ensure good governance. The policy identifies a green economy as one of the strategies focused on reducing carbon from industries, construction and transport sectors, and land demarcation based on the city plan and green space land-use plan implementation.

Urban Environmental Legal, Policy, and Institutional Arrangements

The 1995 constitution of Ethiopia emphasized citizens' environmental rights in Article 44 and environmental objectives in Article 92. To realize this, Proclamation No. 9/1995 established the Ethiopian environmental protection Authority (EPA) in 1995 with mandates and responsibilities. Following the establishment of EPA, the Ethiopian environmental policy was developed and enacted in 1997. The environmental policy issued in 2012 focused on the green economy. Besides, the country sets its vision to achieve middle-income status by 2025 in its Growth and Transformation Plan 2015-2020 (GTP II). This plan includes building a climate-resilient green economy.

Institutions and organizational arrangements

Institutions in urban governance are constrained by organizational factors such as constitutional arrangements and other legal definitions of the responsibilities of public organizations. Accordingly, institutions here are used as either formal rules or informal norms governing the behavior of individuals and organizations that include the rules governing GI, and examining the institutional/organizational arrangements concerned at different levels government.

Ethiopia is the Federal Democratic Republic with ten regional states and two city administration councils. All regional states and city administrations have legislative, executive, and judiciary powers. As a chartered city and regional status, the city government is mandated to formulate and implement policies concerning the city's socioeconomic development. It also organizes Sub-cities and woredas, demarcates their borders, and allocates budgetary subsidies to them. For all environmental issues, Environment, Forest and Climate Change Commission (EFCC) are responsible for formulating policies, strategies, laws, and standards at the federal level. In addition, EFCC is responsible for evaluating the environmental impact assessment reports of federal and inter-regional projects and auditing and regulating their implementation. EFCC also provides technical support for environmental management and protection to regional offices and sectoral institutions. On the other hand, the Regional and city Environmental Protection Agencies are mainly mandated to formulate, implement and monitor regional conservation strategies according to the federal frameworks.

In addition, the constitution of Ethiopia, Article 52(2), clearly stipulates the role of the states in relation to the management of land: States shall have powers and functions to administer land and other natural resources in accordance with the Federal laws. Constitutional land administration, including the power to acquire, develop and transfer land to the ultimate users, is the power of the state's urban local governments (city government and its sub-cities). Regarding the participation of residents, Addis Ababa City Master Plan Preparation and Implementation issued in 2004 (Proclamation No. 17/2004) provides the opportunity for the residents to participate and forward their grievances by announcing the idea of the plan preparation.

The country has introduced a dramatic change in terms of its traditions of governance. The government structure has three tiers (federal, regional, and local). The ten regional states have their own constitutions. This legal framework has enabled more participation of the regional states in matters that concern them. In all regions, the Bureaus of Urban

Development and Construction are responsible for urban management and development issues within the regional government. All regions that have enacted legislation creating urban local government (or city) authorities have adopted an urban governance model that follows the elected council, elected mayor, mayor's committee, and city manager system(Table 4.20).

Table 4-20: Main organizations and their roles in GI management and planning

Organizations	Roles/mandate	
Environmental Protection and Green Development Commission (EPGDC), city level	Conducts studies on various plant species and determines the plant types and quantity to be planted on areas designated for recreational parks, forests, riversides, and other green areas in accordance with the master plan of the city, Ensures that reserved forest areas under the holding of the city government are properly preserved, Studies and presents additional sites that can be used as riverside and forest areas, and	City Mayor
Watersheds, Green Areas Development Agency (WGDA) City level	Follows up and controls forest areas, riversides, and green areas designated for public use. Administers and controls recreation places, zoos, cemeteries, and riverbanks and develops closed parks, open green areas, festival and plaza squares, and riverbanks, Evaluates the project proposal submitted by private investors, religious institutions, or others who are willing to involve in the service of recreational parks and cemeteries.	EPGDC

	Directs, controls, and coordinates and administration work of the city's recreation centers, green areas, squares, and cemeteries.	
Watersheds, Green Areas Development Agency (WGDA) sub-city, and woreda level	Watersheds, Green Areas Development implementation, and maintenance	WGDA
Gullele Botanical Garden Center City level	Botanical garden center and park management	EPGDC
Addis Ababa City GovernmentFarmers and Urban AgricultureDevelopment Commission	Developing and implementing an urban agriculture plan (vegetable plantations)	City mayor
Sheger riverside project	Rivers and riversides development	The Prime Minster
Ministry of Urban Development and Construction(MUDC) federal level	Developing urban planning and management policy, legislation, standards, and manuals	The Prime Minster
Addis Ababa City and Development Commission, city level	\ Developing structure plan of the city, including GI plan	City mayor
Addis Ababa City plan and Development Commission, sub-city and woreda level	The local development plan, implementation, and inspection.	City plan and Development Commission
Addis Ababa City land management and administration, city level	Land administration and management managing green/open space areas	City mayor
Addis Ababa City land management and administration sub-city and woreda level	Land-use plan implementation and green space land-use plan implementation	City land administration and management
Non-government actors		

World Resource Institute	Supporting WGDA in the maintenance of green spaces	Support city WGDA
Ethiopian Orthodox Church	Management of green spaces and forests on their premises	Support from city WGDA
Community/residents	Maintenance and management of community green spaces	Support from city WGDA

4.2.8.2. Organizations mandate towards GI management and planning

Ethiopia has a federal governance structure. Every organization has its mandates and responsibilities for which it is established to accomplish, and its mandates are derived from legislation, policies, strategies, and guidelines at different levels. The council of Ministers is the highest political body accountable to the Prime Minister. The Environment, Forest, and Climate Change Commission (EFCC) is the highest political body among other Ministers mandated to formulate environmental protection policies, develop legislations, proclamations, strategies, standards, and guidelines, and coordinate environment, forestry, and climate change issues.

City Level

At the city level, the Environmental Protection and Green Development Commission (EPGDC) is mandated to design strategies to protect the environment (including rivers, riversides, and ecosystems) from pollution. It also has the mandate to develop the city's environmental protection standards per the Federal agency's standards. In addition, the city Watersheds, Green Areas Development Agency (WGDA) is responsible for developing, managing, administering, and the maintenance of GI elements (recreation parks, neighborhood/community green spaces, plazas, river, and open green areas, festival and plaza squares, riverbanks, and median).

The agency contracts GI watersheds and green areas development services to religious organization (Orthodox church), residents (provides certificate/title deed to the community), associations, and investors at sub-city and *woreda*/local levels. Besides, the city WGDA has four departments: natural resource research unit, construction, Beautification, Parks and Cemetery Development, and Administration Agency (AAPCDA), which is responsible for providing sanitation services (waste collection) and greening. This Agency has the power to develop, administer and control recreation places, zoos, cemeteries, riverbanks, closed parks, open green areas, and medians.

At the local (sub-city and *woreda)* level, WGDA is also responsible for implementing all activities. Sub-city WGDA is under the city and *woredas* are under the sub-city WGDA, which shows the vertical structure, coordination, and communication from the federal to the local level. Horizontal (intra-organizational) coordination and collaboration exist among the departments through a monthly and annual report to their immediate directorates. Among other Ministers, the Ministry of Urban Development and Construction is the highest political body mandated to develop urban planning and land development and management Policy, legislation, standards, manuals, and guidelines that give direction for regions and the two chartered city administrations.

Urban planning Land development and management

City Level

At the city level, the Addis Ababa City Plan Preparation Program Office (AACPPO) is mandated to prepare and review city structure/master planning, LDP, approving construction permits, and plan inspection. Land development and management at the city level are responsible for land preparation and development, land registration, land transaction, and distribution, renewal, land demarcation, the provision of land information, compensation for displaced residents (due to renewal and expansion), ensuring residents land tenure rights, land inventory, land bank, and to regulate informal settlements.

The governmental bodies at the city level have set up vertical administration structures, coordination, and communication. All have offices at sub-city levels down to *woreda* levels across the city, showing the vertical structure, coordination, and communication from federal to local levels. Horizontal (intra-organizational) coordination and collaboration exist among the departments through monthly and annual reports to their immediate directorates.

At the federal level, organizations' mandate is to formulate legislations, policies, strategies, guidelines, and manuals for their respective organizations, and the organizations have specific mandates. However, overlapping mandates concerning the city land management, planning commission, and environmental protection have affected the GI plan and management implementation. And there are limitations in understanding the scope of their mandates in the management of GI in terms of using green spaces. In addition, a range of actors often holds power; this division of power poses challenges as responsibilities can sometimes be unclear, and decision-making can be slow. Lack of cooperation between the environmental protection commission and WGDA led to the informal settlement expansion in the forest area. Besides, weak cooperation between land management, planning commission, and environmental protection creates green space land invasion.The environmental protection offices have less power to maintain green spaces as the land management allocates for other uses, which has again affected the effective implementation of the organizations.

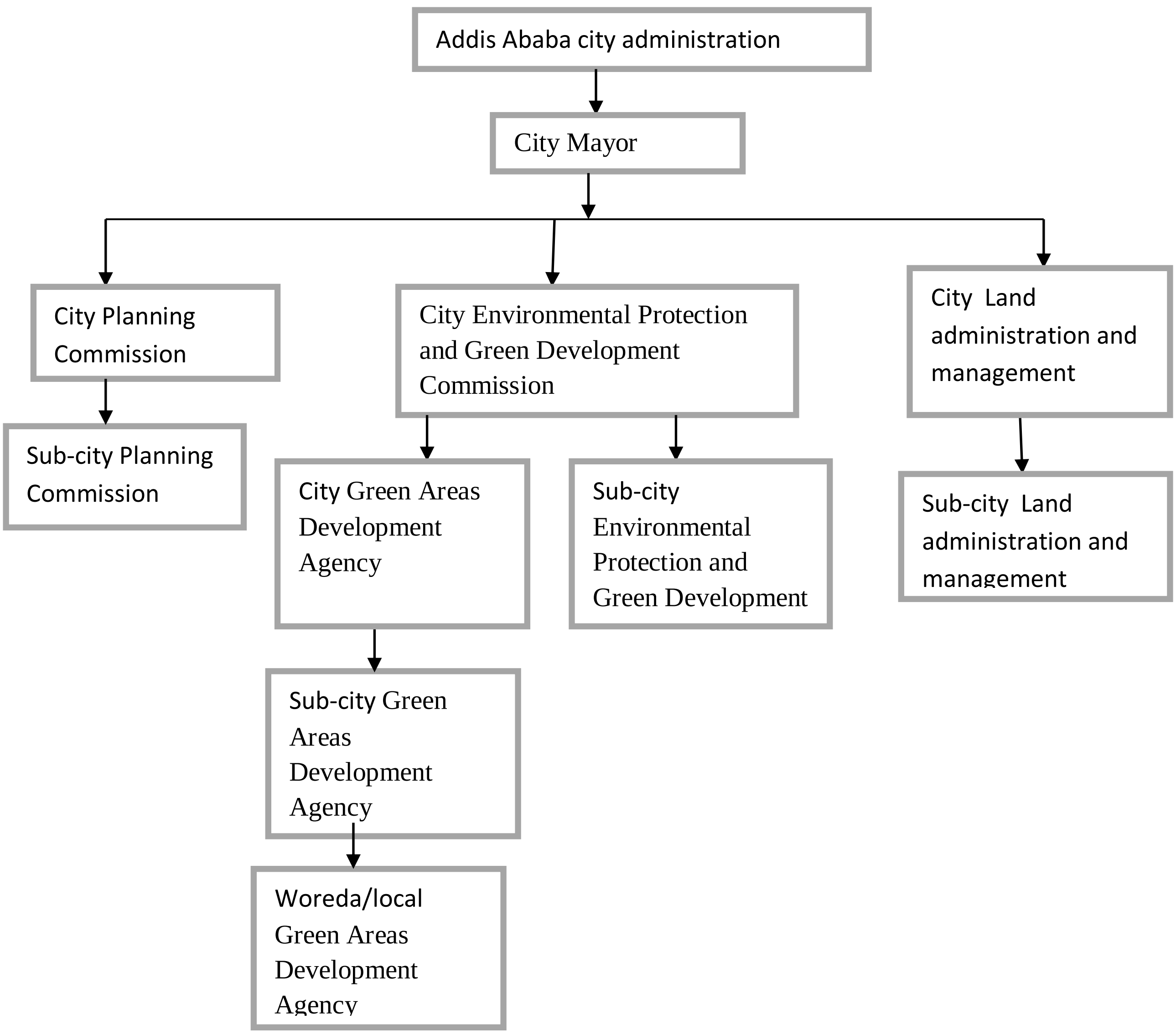


Figure 4-16: Organizational structure

4.3.4. Green space fragmentation

Green space fragmentation in Addis Ababa revealed decreasing patch size (MPS) and an increase in patch number (NP), indicating green space fragmentation. From 2011 and 2022, the Mean patch size (MPS) decreased from 2.20 to 1.17 ha, and the patch number (NP) increased from 1979.00 to 5022.00 (Table 4.21).

Table 4-21: Analysis of selected landscape metrics

Class metrics	2011	2022
CA	4362.75	5858.72
PLAND	8.39	11.26
NP	1979	5022
PD	3.8	9.65
MPS	2.2	1.17
SHAPE_MN	1.22	1.18
ENN_MN	134.24	89.43
IJI	22.72	69.81

Key: *CA*= class area (ha); *PLAND*= % of landscape; *NP*= number of patches; PD=Patch Density; *MPS* mean patch size (ha), SHAPE_MN= mean shape index; ENN_MN= mean Euclidian nearest-neighbor distance (m), *IJI*= interspersion juxtaposition index (%)

4.4. Urban resident's perceptions of the roles of city government in green space management and ecosystem service benefits of green infrastructure

Urban residents' perceptions of environmental knowledge, preferences of UGS types, the role of the city government in the management of CGS, and four ecosystem services (supporting, provisioning, regulating, and cultural services) benefits of UGI. The instruments were tested using Cronbach's alpha to measure the internal consistency reliability scale. Accordingly, Cronbach's alpha scale (Table 4.22) was found for environmental knowledge (.756), preferences of UGS types (.783), the role of the city government in the management of CGS

(.827), and ecosystem service benefits of GI (.931) suggesting strong internal consistency. The closer to 1 indicates the more internally consistent the scale's items are, as Cronbach's alpha coefficient ranges from 0 to 1.

In addition, the correlation between socio-demographic variables (gender, age, educational level, and income) was run to determine the relationships of the perceived environmental knowledge, preferences of UGS types, the role of the city government in the management of CGS, and ecosystem service benefits of GI. While responses from gender (male and female) have no significant variation.

Table 4-22: Cronbach's alpha scores

Variables	Items	No	Alpha
Environmental knowledge	2	564	0.756
Preferences of UGS types	6	564	0.783
The role of the city government in the management of CGS	7	564	0.827
Ecosystem service benefits of GI	24	564	0.931

4.4.1. Socio-demographic characteristics of residents

Respondents constitute 51.4% of males and 48.6% of females (Table 4.23). The age of respondents ranges from 18-65, and above 65 is the least represented. Most respondents lie in two categories: the university and secondary school completed. More than 41 % and 39% of the respondents are university and secondary school completed, respectively. The number of household heads who cannot read and write and who merely read and write (primary school completed) is insignificant, which accounts for nearly 20% of the total household heads. The income level of respondents also ranges from <2000 (6.9% male and 11.2 %female), from 2000-9000 (38.6% male and 34.6% female), and above 10,000 (6.4% male and 2.8% female).

Table 4-23: Socio-demographic characteristics of respondents

Gender		
Male	290 (51.4)	
Female	274 (48.6)	
Age	Male	Female
18-35	23 (4.08)	41 (7.27)
36-55	143 (25.35)	140 (24.82)
56-64	20 (3.5)	5 (0.9)
>65	9 (1.60)	11 (1.95)
Total	290 (51.42)	274 (48.58)
Educational level	Male	Female
Can't write &read	4 (0.71)	4(0.7)
Primary School	39 (6.91)	63 (11.2)
Secondary School	97 (17.20)	125(22.2)
First degree &above	150 (26.60)	82 (14.54)
Total	290 (51.42)	274 (48.58)
Income	Male	Female
<2000	39 (6.9)	63 (11.2)
2000-1000	116 (38.6)	128 (34.6)
>10,000	36 (6.4)	16 (2.8)

4.4.2. Perception of general environmental knowledge

The aggregate mean score for the general environmental knowledge was 1.28 above the neutral value, indicating higher levels of specific environmental knowledge. The PCA analysis revealed one factor that explains 80% of the total variance. The overall measurement of Kaiser–Meyer–Oklin (KMO) was 0.5 and Bartlett's Test of Sphericity X^2=259.208; df =

1, p <0.001). By applying factor analysis, the first factor, the perception that humans must live in harmony with nature, was extracted (Table 4.24). Education was positive, and age and income were negatively related to environmental knowledge.

4.4.3. Perception of preferences for green spaces

Using PCA and factor analysis, the overall Kaiser–Meyer–Oklin (KMO) measure was 0.73, and Bartlett's Test of Sphericity X2=456.106 (df) =15, p (<0.001). The first and the second principal component accounts for 37.2% and 18.3%. The first principal component (Table 4.24), access to community green space (0.776), has a positive correlation with each variable and provides an overall measure level of variables. The second principal component, access to vegetable areas (0.715), is positively correlated with access to street trees and forests and negatively correlated with recreational areas, vegetable areas, and grass strips, indicating differences between their preferences.

Table 4-24: Component matrix for general environmental knowledge

Variables	Component-1	Component-2
Environmental knowledge	**0.779**	
Preferences of UGS types. Access to;		
Recreational areas	0.517	-0.526
Street trees	0.667	0.151
Vegetable areas	**0.715**	-0.04
Community green space	**0.776**	0.197
Forest	0.259	**0.809**
Grass strips	0.611	-0.266
The role of the city government in the management of CGS	0.839	

Among the preferences, the relationship with socio-demographic variables indicates the positive relationship of income and the negative relationship of age and education with access to recreational areas; the negative relationship of education, income, and age with access to street trees; the positive relationship of education and income and a negative relationship of age with access to vegetable areas; the positive relationship of income and the negative relationship of education and age.The first principal component has all postive weights, the second and subsequent principal componentshave a pattern of positive and negative weights.

The scree graph for the preferences for green spaces (Figure 4.17) show two components were retained which account 37.2% of the total variance represent all seven variables and are interpretable.

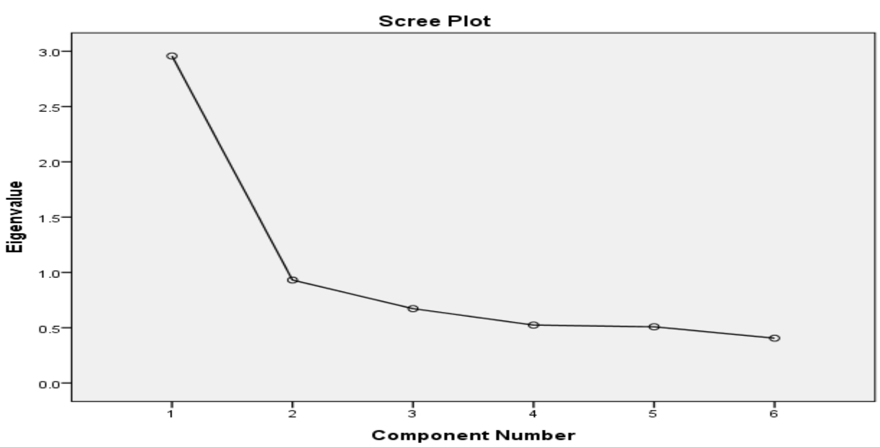


Figure 4-17: Plot of preferences for green spaces

The mean score for preferences (Table 4.25), access to recreation, street trees, vegetable areas, grass strips, forest, and community green spaces ranged from 1.3, 1.4, 1.6, 1.83, and 2.3, indicating all items are very necessary (the scale ranging from 1 very necessary to 5 very unnecessary). Income and education have a positive and age have a negative relationship with access to the forest, and income has a positive and education and age have a negative relationship with access to grass strips.

Table 4-25: Mean score and factor for preferences of green spaces

Access to:	Mean	Factor
Recreational areas	1.3	0.684
Street trees	1.4	
Vegetable areas,	1.6	
Grass strips	1.6	
Forest	1.83	
Community green spaces	2.3	0.778

4.4.4. Perceptions of the role of city government in the management of community green spaces

The respondent's perception of the role of the city government in the management of CGS includes six questions (Table 4.26). Respondents were asked about the *government policy* in terms of the management of CGS. It was found that the positive relationship of education and income and the negative relationship age towards the participation of community members in developing government policy in the management of CGS indicate more educated and high-income respondents perceived the contribution of the government policy towards the management of CGS is low.

Income has a positive relationship, and age and education have a negative relationship with land use rights, concerning the existence of clear regulations and rules, it is argued that an appropriate regulation determines the success of CGS management. The regulations can create the participation of different actors. In this regard, education had a positive relationship, and age and income have a negative relationship with the existing regulations, which might be contributed to proper CGS management.

It was also found a positive relationship of education and income and the negative relationship of age with the provision of information; age had a negative relationship, and education and income have a positive relationship with the participation between NGOs and the residents in the management of CGS; the positive relationship of education and the negative relationship of age and income with the participation of residents with civil society organizations and businesses, which show little or no participation; and a positive relationship of income and the negative relationship of education and age with government actions toward protecting CGS, which indicate government actions toward protecting CGS were poor.

The mean scores (Table 4.26) also show that local government actions against individuals used CGS for other purposes. Residents scored CGS land use rights and GI policies 2.89 and 2.93 above the neutral value. The cooperation between actors, the presence of clear regulations and rules, access to information, and government actions towards the protection of CGS were scored 3.15, 3.27, 3.49, and 3.64, ranked below the neutral value indicating that weak governance in terms of these criteria.

Table 4-26: The role of the city government in the management of community green spaces

Community green space land use right	2.89
Green infrastructure policies	2.93
Cooperation between actors	3.15
Clear regulation and rules	3.27
Provision of information	3.49
Action by government	3.64

From the six criteria, it was found that respondents perceived the role of the city government in the management of CGS was low. The result shows less attention is given to the management of CGS from the policy, participatory approach, and land use rights perspectives.

4.4.1.5. Perceptions towards ecosystem service benefits of green infrastructure

A principal component analysis (Table 4.27) was run on 24 questions that measured factors influencing respondents' perceived benefits of ecosystem services of GI for 564 respondents. The overall Kaiser–Meyer–Oklin (KMO) measure was 0.911, and Bartlett’s Test of Sphericity X^2=7152.709, (df) =276, p<0.001. Five components emerged with eigenvalues greater than 1(Kaiser, 1960). The first components account for (39.5%) of the total variance; the second, third, fourth, and fifth principal components (47.8%, 54.7%; 59.3%; and 63.5%) explain the total item variance. These components include; building materials, fuel wood, animal shelter, and promote social interaction and recreation. The first, second, third, and fifth components positively correlate with other variables. While from the fourth component, promoting social interaction and attracting investment have a negative relationship with all variables.

Table 4-27: Components of ecosystem services benefits of GI

Ecosystem benefits of GI	Component 1		Component 1
Provisioning		**Regulating**	
Vegetables and fruits	0.682	Regulate temperature	0.617
Fuelwood	0.858	Climate change mitigation	0.774
Medicines	0.777	Soil protection	0.762
Building materials	0.86	Habitat for biodiversity	0.692
Pure water	0.724	Wind barrier	0.753
Cultural		Air purification	0.718
Promotes social interaction	0.733	Water flow regulation	0.667
Enhances beauty	0.716	**Supporting**	
Educational services	0.756	To maintain soil	0.795
Children cognitive development	0.739	Nutrient cycling	0.806
Recreation	0.686	Genetic diversity	0.869
Relieves stress	0.636	Wild animals shelter	0.769
Attract investment	0.733		

The variables loaded on the first factor (Table 4.28) reflect the ecosystem benefits of GI in terms of providing for construction materials, particularly trees for house construction (0.886), fuel wood consumption (0.880), shelter for animals (0.803), promoting social interaction (0.754), and for recreation (0.728). To maintain soil fertility, enhance beauty, maintain genetic diversity, provide animal shelter, provide educational services, provide pure water, nutrient cycling, produce vegetables and fruits, and attract investments are more closely related to the components with a value greater than 0.35 or 0.40. while soil protection, absorption of sound waves, air purification, regulating temperature, recreation, relieving stress, maintaining habitat biodiversity, for wind barriers, and climate change mitigation variables have a value less than 0.35 or 0.40, indicating respondents given less values for the ecosystem benefits from these variables.

Table 4-28: Factors to the ecosystem service benefits of green infrastructure

Ecosystem service benefits	1	2	3	4
Building materials	**0.886**	0.001	0.034	0.161
Fuel wood	**0.88**	0.079	0.04	0.197
Medicines	**0.562**	0.175	0.248	0.09
Promotes social interaction	0.118	0.754	0.073	-0.008
Enhances beauty	0.011	**0.649**	0.193	0.133
Habitat for biodiversity	0.056	0.172	0.803	0.13
To maintain soil fertility	0.127	0.125	0.613	0.322
Genetic diversity	0.227	0.132	0.269	0.695
Wild animals shelter	0.303	0.03	0.116	0.682
Children cognitive development	0.155	0.146	0.192	0.194
Educational services	0.236	0.337	0.218	0.216
Soil protection	0.128	0.102	0.247	0.203
Air purification	0.144	0.148	0.154	0.092
Regulate temperature	0.124	0.15	0.072	0.167
Recreation	0.05	0.269	0.086	-0.036
Relieve stress	0.124	0.202	0.182	0.075
Pure water	0.413	0.185	0.076	0.071
Nutrient cycling	0.168	0.142	0.187	0.337
Habitat for biodiversity	0.102	0.225	0.223	0.233
Vegetables and fruits	**0.385**	0.162	0.021	0.126
Runoff mitigation	0.152	**0.386**	**0.369**	0.165
Wind barrier	0.065	0.318	0.209	0.198
Attract investment	0.263	0.366	0.106	0.278
Climate change mitigation	0.059	0.128	0.29	0.209

The scree graph for the ecosystem service benefits of green infrastructure (Figure 4.18) show five components were retained which account 63.5%) of the total variance represent all twenty four variables and are interpretable.

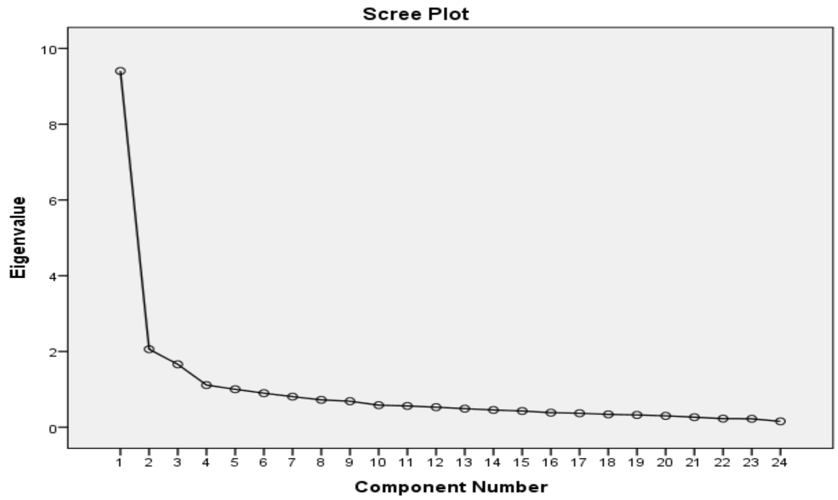


Figure 4-18: Plot of the ecosystem service benefits of green infrastructure

The ecosystem benefits are categorized into the following four services.

1. Provisioning ecosystem benefits

Provisioning ecosystem benefits addresses five benefits through producing natural resources (plants and animals), which are a source of food, water, medicine, and energy. The benefits include (growing vegetables and fruits, fuelwood, medicines, building materials, and pure water provision). Education and income have a positive, and age have a negative relationship with the provisioning services of energy in terms of fuelwood, indicating that high-income respondents gave more value to the benefit of GI in producing fuelwood.

The benefits of GI in public health services are explained based on the provision of medicinal plants. Income and education have a positive and age have a negative relationship with the benefits of GI as a source of medicine; Income and education have a positive and age have a negative relationship with trees particularly used for house construction, and income has a positive and education and age have the negative relationship with the provision of pure water.

2. Supporting services

Supporting services include four benefits: maintaining soil fertility, nutrient cycling, genetic diversity, and shelter for wild animals. Income and education have a positive and age have a negative relationship with maintaining soil fertility in terms of increasing agricultural products; income, education, and age have a positive relationship with the benefits used for wild animal shelter; income and education have a positive and age has the negative relationship with nutrient cycling and maintaining genetic diversity benefits of GI.

3. Regulating services

The Regulating services include regulating temperature, climate change mitigation, soil protection, habitat for biodiversity, wind barrier, air purification, water flow regulation, runoff mitigation, and absorption of sound waves. Income and education have a positive and age have a negative relationship with climate change mitigation, temperature regulation, and soil protection; income, education, and age have a positive relationship with Habitat for biodiversity; and income, education, and age have a negative relationship with wind barrier: income has the negative and education and age have the positive relationship with the absorption of sound waves; age has the positive and education and income have the negative relationship with water flow regulation, runoff mitigation, and air purification.

4. Cultural services

The cultural ecosystem services consist of seven GI benefits. Income and education have a positive and age have a negative relationship with promoting social interaction and relationships; income has a positive and age and education have a negative relationship with enhancing beauty; income and education have positive, and age has a negative relationship with educational benefits, children's cognitive development, recreational benefit, relieving stress and attracting investment benefits of GI. All mean scores (Table 4.19) for the perceived ecosystem benefits of GI ranged from 1.25 to 2.3, above the neutral value, indicating the highest level of agreement on all ecosystem benefits of GI.

Table 4-29: Mean score for perceived ecosystem service benefits of GI

Provisioning	Mean	**Regulating**	Mean
Vegetables and fruits	1.67	Regulate temperature	1.29
Fuelwood	2.3	Climate change mitigation	1.25
Medicines	1.81	Soil protection	1.3
Building materials	2.09	Habitat for biodiversity	1.42
Pure water	1.53	Wind barrier	1.46
Cultural services		Habitat for biodiversity	1.68
Promotes social interaction	1.45	Air purification	1.27
		Absorption of sound waves	2.0
Enhances beauty	1.38	**Supporting**	
Educational services	1.56	To maintain soil fertility	1.36
Children cognitive development	1.37	Nutrient cycling	1.42
Recreation	1.29	Genetic diversity	1.43
Relieves stress	1.31	Wild animals shelter	1.68
Attract investment	1.62		

CHAPTER FIVE : DISCUSSION

5.1.The implementation of urban green infrastructure planning principles in green space plans of cities

5.1.1 Green infrastructure planning principles in the spatial plans of the city

5.1.1.2. Green infrastructure in spatial plans

Two evaluation criteria, GI integration into spatial and green space plans in urban areas, were used to evaluate green infrastructure planning in spatial plans in Addis Ababa. Both evaluation criteria are considered to provide a comprehensive plan analysis important in the future of GI planning in all urban areas of Ethiopia.

Though the current plan is based on implementation manuals prepared in 2015 on GI management and GI standards, the current and previous plans mainly focused on recreational green spaces indicating that planners used the traditional urban planning system. However, GI planning is more complex than conventional planning for nature conservation or open space (Kambites and Owen 2006). In this regard, urban planners and other actors involved in developing strategic or spatial plans need to be aware of the complexity of designing the GI plan. In addition, planners and actors involved in developing strategic or spatial plans need to consider the clear definition, components, functions, and principles of GI. The multi-functionality principle of GI was poorly considered in two plans and not considered in other plans. In comparison, plans would help to achieve sustainable development of urban areas by incorporating the multi-functionality principles of GI. For example, the multi-functional benefits of GI provide both biodiversity and social and territorial cohesion (Lafortezza et al., 2013), and inter-linked GI principles enhance multi-functionality (Hansen et al., 2017).

Further, the overlapping of environmental, economic, and social pillars often represents the sustainable functions of GI (Lovell and Taylor 2013). Regarding the connectivity of GI elements, two plans give poor consideration to structural connectivity, and the spatial plans do not consider functional connectivity for animal and plant species. However, plans would benefit from dealing with the connectivity of GI elements. GI planning provides a blueprint for future land conservation and development efforts because it focuses on scientific analysis to delineate a linked network design that is comprised of ecological hubs and corridors (McDonald et al., 2005); connectivity aims to reduce biodiversity losses (Ahern, 2007) and important to link different groups of people across various physical and metaphorical boundaries, between social and ecological functions and various physical and metaphorical boundaries, between social and ecological functions and administrative connectivity (Kambites and Owen 2006). Although the emphasis is given to the city, local, neighborhood, and site-level multi-scale planning in the 2017 plan, a connection gap exists between the city and regional plans.

Incorporating multi-scale planning at different scales provides vertical coordination of planning. GI networks also promote the spatial distribution of GI elements' multi-functional benefits. With the diversity of green elements, the 2017 plan stands out because the plan is strongly considered while the other plans are poorly considered. Incorporating GI elements at different scales help to evaluate the effect of the interrelationship of patches and corridors within the context of the urban matrix (Cook, 2002) and for network structure analysis. The role of GI in building a sense of place and identity with other domains was not mentioned in both plans. However, GI planning would benefit from emphasis on the role of GI in building a sense of place and identity in terms of incorporating the socially inclusive principles of GI.

Concerning the environmental policy and the proclamations toward natural resources, the Environmental Policy of Ethiopia (EPE,1997) aims to ensure sustainable development of the country. Article 5 of the Urban Planning Proclamation No. 574/2008 also envisages the need for sound and visionary urban plans to carry out development undertakings that positively contribute toward protecting the natural environment" to ensure sustainable development. In light of this, urban planners and other actors better consider the country's environmental policy in the spatial planning of urban areas.

GI is also considered an important spatial plan for climate adaptation and resilience in cities. For example, Gill et al. (2007) elucidate the importance of recognizing the green infrastructure planning process at different scales from regional, local, and neighborhood scales for climate adaptation. Araos et al. (2016) also indicate cities in low-income countries have climate adaptation initiatives and planning irrespective of financial limitations. Accordingly, introducing a new green plan in the case city for climate adaptation and resilience is necessary.

Some progress is observed in the plans. The plans between1986 and to 1990s were prepared based on the master plan approach. While, from 2000 onwards, plans were prepared based on new approaches, the 'structure plan' meant that the role of the government shifted from being the only actor to that of a facilitator for urban development (Knebel and Kolhatkar 2015). This, in turn, contributed to the incorporation of ecosystem services and some GI principles in the structure plan (2017). In this respect, from the structure plan of 2017, green space planning has shown a positive development as compared with the previous 1984 and 2002 plans. Examples of new development include the increasing proportion of green structures in the plan, from 15% in the

2002 master plan to 30% in the 2017structure plan, and the greening and the design of rivers and river buffers intended to provide ecosystem goods and services in the near future.

5.1.2. The incorporation of green infrastructure planning principles in green space plans of cities

5.1.2.1. Expert's perceptions on the incorporation of green infrastructure planning principles

The implementation of four principles (green-gray integration, the ecological network and connectivity, multi-functionality, and social inclusiveness) in the planning and management of UGI is significant for UGI development because these principles guide and facilitate the planning procedures of GI. UGI principles process dimensions are related to governance issues (Faehnle et al. 2014; Hansen et al. 2016), and multi-scale and participatory governance approaches are necessary to overcome the potential challenges of GI implementation (Baro et al. 2015).

The green-gray integration principle is important in providing the built landscape (Davies et al. 2006). Integrating nature into the built-up is a solution to improve urban quality of life (Handley et al. 2007). Besides, the emergence of a green infrastructure approach to spatial planning is attributed to the networks of land and water as critical infrastructure (Benedict and McMahon, 2012). However, green-gray integration planning principles are poorly considered in the plan. Experts perceived the integration of the ecological network and connectivity except for the capacity of developing green corridors to control floods in vulnerable areas. The plan also poorly considers the multi-functionality and socially inclusive principle of UGI. Somehow, the cultural heritage /aesthetic values of UGI and the provision of agricultural products are considered in the plan of Addis Ababa.

Although some studies address GI planning, how current spatial plans address the green infrastructure in Sub-Saharan cities, particularly in Ethiopia, is scant. Considering two evaluation criteria of GI integration into spatial and green space plans in urban areas, this research provides a multifaceted picture of gaps in spatial planning to address and incorporate GI concepts, components, functions, and principles. Based on the analysis of planning documents that stated green space/areas in their plans, this research provides some suggestions to better address GI in spatial plans. This research also identified GI planning in Addis Ababa as the initial planning stage. No comprehensive GI policy can provide a strategic vision for embedding GI in spatial plans.

The shift from the master plan approach to the structure plan helped to incorporate ecosystem services and some GI principles, and the increasing proportion of green structures in the current structure plan can be due to some changes in the role of the government. Adopting and mainstreaming clear concepts, functions, and principles of GI in planning and policies is important to integrate GI into spatial planning and to create connectivity between humans with nature; to increase the potential of urban planning to utilize UGI to address social, economic, health and ecological benefits; and for sustainable use of natural resources in urban areas. The spatial planning of UGI and implementation is important in improving UGI and future urban development.

Thus, it is important to develop a governance arrangement that incorporates negotiations, inter and cross-sectoral policy approaches, UGI land-use zoning regulations, land use plans and changes in a participatory and transparent manner, and ecosystem-based planning policy. Besides, incorporating the green infrastructure planning principles assessed in this research into planning, environmental, and land management policies and practices will be used to develop a comprehensive approach to GI and ensure the future development of UGI.

5.2. Urban green infrastructure management

5.2.1. Green spaces management models and governance principles

The governance of green space management was analyzed using park management models and good governance principles. The result reveals that respondents as having one good level of governance for one governance criterion, the strategic vision. The strategic vision refers to a broad and long-term perspective on good governance (Eagles et al.2010). Ten criteria, effectiveness outcome, the rule of law, effectiveness process, accountability, consensus orientation, public participation, transparency, equity, efficiency, and responsiveness ranked below the neutral point, more toward weak governance practices in park management.

Eagle's (2008, 2009) widely used protected area governance models provide the basis for this investigation. Among five, (1) the parastatal, (2) the national park, (3) the public and for-profit combination, (4) public and nonprofit combination model, (5) the non-profit, and (6) private-for-profit park management models, currently, only four models are partially used in the city. Such include public and for-profit combination, national park, parastatal, and public and non-profit combination models.

The fifth is the nonprofit organization model. In this model, a nonprofit corporation owns the resources, and public organizations operate the institutions in a non-profit manner (Eagles, 2007) is essential in a country with limited financial and manpower resources like Ethiopia. Nevertheless, the inclusion of the model is imperative.

The trend shows the use of the combined public and for-profit private model, the one that WGDA frequently utilizes. The focus is on outsourcing and contracting out park recreational services. This outsourcing and contracting out park recreational service is subject to renewal within a specific period.

Outsourcing and contracting out parks include maintenance, construction, and recreational services. Most of the maintenance and recreational services were outsourced to specific youth and women groups to reduce the city's unemployment rate. The city WGDA used concessions with two approaches for concession takers. These included (a) contracts out to private construction businesses with contractual agreements that include the construction of built-up and then transfer to the agency; and (b) maintenance contractual agreement renewed within a specific period based on each specific activity (WGDA, 2019).

The partnership with residents in terms of providing title deeds for community green spaces managed by residents. This allows legally shared green space management between government agencies at different administrative tiers and enables the inclusion of non-state actors through contracting out watersheds and green areas development services to religious organizations, residents, associations, and investors at sub-city and local levels.

The management of community green spaces has been categorized as self-governance. Self-governance, in this case, is similar to governance arrangements facilitated by small communities without the help of a formal government through bottom-up self-governance by associations, informal understandings, negotiations, trust relations, and informal social control rather than state coercion (Ostrom, 1999).

Concerning the mismanagement of community green space, both the local government and the community association members are contributing to the mismanagement of community green space. Indicating that the green space plans lacked enforcement laws, the economic benefits are not the only driving force. Still, the interference of local governments for political gain or interests and the use of political power are contributing factors to green space changes through the conversion of green spaces to permeable surfaces and built-up areas. Besides, the capture of this green space by the powerful group affects the community's vulnerable members, restricts children's access to playgrounds and elders to use the green spaces, and will require multi-level governance, user-centered, and park-organization-user management models, which incorporate both politically independent and interdependent actors, different territories, and flexibility of policy and political authority.

The result also reveals the challenges of the governance process and management. Addressing these challenges of governance process and management will require an inter-sectoral policy approach at the federal, city, and local levels are important to the management of green spaces. Public parks require new design or plan and collaboration with city planning and land management offices, the community, and others. Though stakeholders from different sectors of the local government meet every month, the discussions focus on the general report of the sectors. At this level, there is a need for strong collaboration between green space administration and development agencies in the health, culture, and education sectors. The operational level is related to the implementation and management of green space plans (Kabish, 2015), which brought the existing visions to the ground (Frantzeskaki and Tilie, 2014).

The strategic park management model (Figure 20) incorporates three levels of activities (policy, tactical, and operational) (Randrup and Persson, 2009). At the tactical level, plans for sectoral green space and at the policy level, strategies and long-term visions (Randrup and Persson, 2009) are major activities in the model that will need long-term planning and management approach. The challenges of green space management at the tactical level could be addressed through policy integration which links policy makers from different policy domains and levels of government and builds policy 'ownership' and implementation (Bush, 2020, p.40).

Park-organization-user model is relevant to analyzing the community green spaces governance process. In this regard, community green spaces properly managed by the community are good examples of the user-centered model. Strengthening self-governance where the community plays a major role and participatory governance in green space management can address governance challenges. In general, the practices of management models and good governance principles profoundly affect the future development of green spaces in rapidly urbanizing cities.

In general, currently, four of the models are partially used. However, all the management models are useful. The dominant park governance approach in the city seems hierarchical governance or state-centered, and this may result in poor park governance. The current public park administration and management focus on maintenance of existing plants, with limited focus on long-term design related to management, recreational activities, budget as well as lack of control on illegal activities, and the uneven political power attributed to the mismanagement of community green spaces. This in general, requires redesigning, including additional recreational services, strong political support, and integrated green space management.

The user-centered model is found suitable for community green space management, while the Park-organization-user model is appropriate to explain the governance approaches to improve the governance process for community green space management. It is argued that adopting the Strategic Park Management Model, which incorporates three levels of activities, political (policy), tactical (plans), and operational (maintenance) levels are useful to improve the governance and management of green spaces. Actors' perceptions of governance are indicative of poor governance. Further, the application of the good governance principles developed by (Graham et al. 2003; UNDP, 1997) can be used for the analysis of city parks. In the context of Ethiopia, it is argued that parks as public goods to be accessible to the public need to be under the control of the government; and this can be achieved by addressing the challenges. Such include; improving the practices of good governance principles and legal frameworks, creating an inter-sectoral policy approach and collaboration, as well as improving outsourcing and incorporating other models. Besides, the combined governance and management models and multi-level governance approaches can be a way to the future development of green spaces. This research provides information that can assist urban green space managers in the decision for the choice of, and implementation of the various management approaches for the provision of park services, conservation in protected areas, and improving policy and good governance principles in urbanizing African cities.

5.2.2. Urban Forest Management using a Policy Arrangement Approach

A policy arrangement approach was analyzed using a policy arrangements approach to understand successive changes in Ethiopia's forest policy since 1936. This approach was selected as an analytical framework because it has only recently been developed to study policy dynamics in the environmental field (de Boer, 2006). It has been applied to analyze stability and change in the environmental policy domain (Janssen et al. 2015); it helps to understand the relationship between policy processes in which actors interact with the underlying social and political transformation (Van der Zouwen, 2006).

PAA also addresses agency, structure, interests, and ideas from a dynamic perspective (Arts, 2006; Arts and Buizer, 2009). Further, PAA is a suitable analytical tool in various policy fields, including environmental policy, rural development policy, natural resources, and forest policy (Arts and Buizer, 2009; Veenman et al. 2009). Moreover, PAA has been applied to analyze changes in forest policies such as in the Netherlands (Veenman et al. 2009), Belgium (Van Gossum et al. 2011), Korea (Parka and Youn, 2013; Park, 2015), and these studies demonstrate, PAA is an appropriate way to describe the dynamics of change of policies with four interwoven dimensions.

A discourse helps to study the historical development of forest policy and institutions. The first recorded forest management intervention began during the Italian occupation,1936-41(Bekele, 2003), focusing on forest inventory and exploitation. The Italians established a forest administration in 1937(Negassa, 2014). From 1941-1974 the predominant policy was modernization that followed Western industrialized countries (Zewde, 1991). For example, the first modern legislation on forest resources was issued during the reign of Emperor Haile Selassie I (1930-1974) in 1965 (Nune,2008) that recognized three forms of forests (namely state forest, private forest, and protected forest) intended to enlarge the sources of state revenue (Rahmato, 2001).

In 1974, a military group known as Derg took power and declared socialism as its major philosophy guiding its political ideology and economic policies. It nationalized all rural and urban land and eliminated the freehold land system. During this regime (1974 to 1991), all forests and land were nationalized and governed by hierarchies of commands (Negassa, 2014). Due to the 1984/5 famine, the government designed collectivization, villagization, and resettlement programs which had devastating effects on the forest resources of the country (Rahmato, 2001). In turn, the government has undertaken the plantation of forests mainly for commercial timber, poles, fuelwood, and construction timber (Million, 2011).

A legal contract under the 1994 forest law gave forest owners considerable freedom in their management decisions, and it recognized three forms of forest ownership: state, regional and private, which led to the shift from a centralized to a multilevel arrangement system of forest governance (Negassa, 2014).

In Addis Ababa, the Eucalyptus species was introduced in 1895(Horst, 2006). For the sake of preserving the fuelwood supply, Menelik II introduced a range of eucalyptus forests in the vicinity of Addis Ababa and ordered the distribution of one hundred tree seedlings to each resident to plant, tend and utilize (Haile, 1991). Menelik II also ordered the residents to replant any areas that were so cleared (Ellis, 1988). From 1957 to 1964, the forest cover increased from 4,000 to 10,400 hectares. In addition, the state leased the land in and around Addis Ababa to the aristocrats and dignitaries (Haile, 1991). This, therefore, led to the proper management of forests before 1974. For example, Addis Ababa was referred to as 'Eucalyptopolis,' or the city of Eucalyptus trees, in 1925 (Horst, 2006).

This greenbelt was further expanded in the 1960s and 70s. The plantation area around Addis Ababa was about 13,500 to 15,000 ha in 1954 (FAO,1985 in Bishaw, 2001; Van Breitenbach,1962) and about 162 000 hectares of plantation forest in 2001(Bishaw, 2001). However, from 1974 onwards, the Eucalyptus plantations became subject to severe degradation (ULG Consultants, 1987) due to the absence of forest management, lack of precision in the delineation of local authority boundaries, and rising firewood demand from urban consumers. For example, within three years (1973-1976), plantations around Addis Ababa decreased by about 33 percent (Haile, 1991). While in 1980, proclamation No. 192/1980 allowed forest and wildlife conservation and development. Accordingly, to increase the supply of construction poles and fuelwood, plantation projects (for example, Addis-Bah Forestry Development Project) funded by African Development Bank (ADB), World Bank, and the government from the mid-1980s involved in planting 33,000 ha around Addis Ababa (Ethiopian Forestry Action Program, 1994).

Forest ownership remained in the hands of the government. In 1995, 1,308 ha of forest land was handed over by the government to the Ethiopia heritage trust for the establishment of Entoto Nature Park (Horst,2006) from Addis Ababa Construction and Fuel Wood Development and Marketing Enterprise (Blombck and Gebremedhin Hadera,1995 in Horst, 2006).

Actors: Analyzing a policy arrangement from an actor's perspective starts by identifying the relevant actors and their influence on the policy process (Liefferink,2006) because actors participate in governing activities (Kooiman, 2003). Besides, (Krott, 2005; Maryudi, 2016) indicate the need to analyze potential actors from local to international levels. Since the forest is a multi-dimensional resource, in this case, the actors' roles were identified based on their position to cluster actors that fulfill similar roles in the arrangement. Accordingly, the federal line ministries are responsible for translating broader policy targets and objectives into their respective sectoral action plans. This includes the translation of cross-sectoral proclamations into action plans and the coordination of the respective regional state institutions for the implementation of action plans through financial disbursement and technical backup (MEFCC, 2018). In addition, the shift from the government as the only actor to the involvement of non-state actors shows the move from centralized (government) to governance by government. In line with this, the forest policy actors can be divided into (1) the government actors who interface with the resource because of legislation and management; (2) research and academic institutions; (3) non-governmental organizations; (4) religious organizations; and (5) forest resource users.

Power and Resources: three governmental layers are responsible for forest management (national, regional/city, and local level). Indicating a range of actors often holds power; this division of power poses challenges as responsibilities can sometimes be unclear, and decision-making can be slow. In the case of controlling informal settlements expansion, three tiers of government, the environmental protection commission, WGDA, sub-cities, and *woredas* peace and security unit are responsible.

While a lack of cooperation was observed between the environmental protection commission and WGDA to assign forest guards for specific days that may create the possibilities for informal settlement expansion, in addition, interviewed experts mentioned that forest guards are not liable, and they may engage in bribery that allows the informal settlement expansion. Besides, local-level positions are occupied by the politicians mainly responsible for maintaining political stability. This may sometimes lead to negligence (intentionally or not) in taking action. Particularly, *woreda* peace and security officials are responsible for patrolling and demolishing the informal settlements. According to interviewed sub-cities experts, the situation may create bribery.

This, in general, is related to weak inventory, monitoring and evaluation mechanisms, limited cooperation between sectors, blurred power relationships among the commission, WGDA, and local levels, and lack of political commitment. This situation, in general, exacerbated the informal settlement expansion similar to (Fetene and Hailu, 2013; Horst, 2006) noted that the squatters had invaded the forest areas and the need to rehabilitate the area.

Rules of the game: Rules of the game refer to regulations, legislation, and procedures relevant to a certain policy domain (Sandberg et al.2014). gabs are observed in the legislation and management of the forest. It is stated that the city government shall take forest areas under private holdings. On the contrary, the city government allows the construction of real estate called *Birhan-Gohe* real estate in Yeka mountain forest that the city government reasserts its power and emphasizes the economic benefits. Besides, the dual functions of providing land on leasehold sales and approving the city's structure plan may lead to dwindling or the conversion of forest areas. For example, *Jemmo* Mountain planned for a multi-functional forest but converted it to condominium housing. Recent reports (AACPPO, 2019) indicate that the expansion in the Yeka forest continues, contributing to deforestation. The influence of rules and institutions on forest management shows an unstable pattern due to the gaps between policy arrangement and implementation, which negatively affect forest management in the city. The interactions of four dimensions show the implications of discourse, actors' roles, power relations, resources, institutional reorganization, and rules and institutions that have positive and negative implications for forest management and development.

In general, a policy arrangements approach has been used to understand successive changes in Ethiopia's forest policy since 1936. The result shows that the historical development and the shift in the country's forest policy emphasized a dominantly elitist approach. The forest policy is formulated at a national level with a focus on the rural forest, and no specific urban forest policy exists. The government actors dominate the policy arrangement. In Addis Ababa, forests were predominantly used for fuelwood and construction materials. Changes in forest management show the move from government to governance by the government, focus on the green economy, and the provision of forest ownership title deeds to state, private, community, and associations that contributes for forest management and development. However, in the study area, this change is not without challenges. It is difficult to mention the proper management of forests in the city. Because of the present political situation, limited cooperation between organizations, unclear responsibilities, blurred power relationship, lack of check and balance, less political commitment, and gaps in policy arrangement and planning and its implementation creates pressure on the management of forests.

This requires an integrative approach; the participation of professionals, NGOs, religious organizations, civil society and community-based organizations, and the users with the government actors. Introducing urban forest policy that focuses on the social bargaining process for the regulation of conflict of interest in the protection of forests and establishing urban forest programs are necessary. Establishing a church forest program would be important to future urban forest management by introducing a specific legal framework for the management of urban forests on the premises of the Orthodox Church because the Orthodox church has a long history of conservation of forest resources (Wassie and Teketay, 2006). Church forests in Ethiopia are mainly preserved for spiritual values, which contribute to the restoration of degraded landscapes through integration into regional landscape planning and management policies (Sahle et al.2021, p.1). Despite the contribution to forest management in rural areas, in urban areas, the church contributes to the management and maintenance of green spaces. Its contribution as an urban forest is stated in terms of maintaining indigenous trees. For example, about 60% of the indigenous plant species were recorded in Hawassa urban church forests (Feyisa et al.2022, p.6). Cutting trees in the church is considered taboo and a sign of a heaven garden (Wassie and Teketay, 2006; Feyisa et al. 2022). It is argued that PAA is relevant to understanding and analyzing urban forest management policy changes.

5.2.3. The influence of policy and planning themes and land use regulations on UGI planning

The policy and planning themes are used to evaluate the extent to which cities incorporate these policy themes in their planning and policy-making (Hansen et al. 2017). And the land use regulations are used to identify the extent to which land use and management regulations (including zoning and land use planning mechanisms) are justified and transparent (WB, 2012). The result of the influences of policy and planning themes shows the interference of politicians was given emphasis, limited regional and national policy of GI, lack of incorporating the public input in preparing and amending land use plans. This, therefore, indicates the top-down approach, lack of pluralism, and the governance system which allows politically affiliated bureaucracy instead of meritocracy (Daba and Mulu, 2017). This may have led to corruption as changes in land-use zoning can have, in many cases, a source of corruption (Deininger et al. 2011). This is similar to studies on land corruption in Addis Ababa found that most of the green areas and some of the land allocated for roads development in the master plan have been transformed into private use (Deininger et al. 2011) and Lindner (2014) explain corruption in the land sector in Ethiopia is a significant problem.

The corruption practices in the city and the conversion of green spaces have a direct relationship with the governance model that the country adopted. As China's involvement in Africa is criticized for undermining the principles of good governance, transparency, and accountability, even African countries have subscribed via the AU (Rotberg, 2009), which reinforces many of Africa's problems of corruption and poorly thought-out policies and is considered a "rogue donor" whose actions will be damaging to Africa in the long run (Condon, 2012; Chan, 2007).In addition, the impact of governance on UGI development is also explained in terms of the present government system, ethnic federalism in its bureaucratic institutions, which are not autonomous, and civil servants who practice the bureaucracy are assigned based on political affiliation and ethnic quota system, which undermine professionalism (Jebena, 2015; Temesgen, 2015; Daba and Mulu, 2017).

The interference of politicians and limited regional and national policy of GI shows little attention is given to the development of UGI. Despite a shift from government to governance with the government in the city planning, gaps in the planning and land administration and management practices and less practices of land-use regulation attributed to poor implementation of GI. This is due to the fact that governance approaches that the city government relies on an authoritarian model of output-legitimacy, sectoral approach, and uncoordinated land use, which in turn led to weak governance of UGI.

5.2.4. Resident's land use rights and the management of green spaces

Resident's land use rights and the management of green spaces perceived by experts ranged from very low to very well. The land use right and management of green spaces was low. Besides, land use right and the management of UGS shows that protecting some UGS and recording boundaries are difficult and lack clear legal provisions for the management and maintenance of community green spaces. However, recording boundaries are important to enforce the associated rights (WB, 2012). A lack of clear demarcation and provisions in the law for the management and maintenance of UGS indicates the need to develop specific regulations for the management and maintenance of UGS, particularly for UGS managed by residents. Besides, difficulties in resolving any disputes which may arise in the managements of UGS and the protection of some of UGS could affect UGS management.

5.2.5. The management of public land

The result of the management of public land in terms of public land ownership managed at the level of government shows some ambiguity in the assignment of management responsibility of public land, which indicates the need to avoid ambiguities by creating a horizontal arrangement and restructuring the level of government.

The ambiguity in the assignment of management responsibility of different types of public land that have an impact on the management of assets also shows the need to work towards restructuring the level of government; the government has to provide new land-use plans to the public; clear management responsibilities of public land ownership; and avoid vertical overlap responsibilities. In addition, the result shows inadequate resources to fulfill land management responsibilities, and a marked inefficient organizational capacity might affect the management of public lands.

In sum, the gaps in the implantation of land use planning, lack of clear boundary demarcation of UGS, lack of clear provisions in the law for the management and maintenance of UGS, and ambiguity in the assignment of management responsibility of different types of public land show how the political system determines land use planning in implementing policies to protect the environment and sustainable development goals (Owens, 1997) as governance determines who has power, who makes decisions and how others can influence decision-making (Sinnett et al.2015). This is related to land use regulation based on the market economy and land leasing, allowing the city near-total control of spatial development (Goodfellow, 2015; Knebel and Kolhatkar, 2015).

5.2.6. Environmental management of UGI

Environmental management of UGI was analyzed using the management strategies aligned with Adaptive Co-Management(ACM) strategies based on environmental policies related to UGI, residents’ experiences, and ecological knowledge to inform planning and environmental management processes and outcomes; environmental management processes include (collaboration and learning) and outcome (result and effect).

Among environmental governance, ACM is considered the recent approach. ACM is a hybrid approach toward the shift in the landscape of environmental governance away from centralized control to the participation and involvement of citizens (Lemos and Agrawal 2006; Plummer et al., 2013). It bridges governance and complex systems by bringing together cooperative and adaptive approaches to management (Plummer and Fennell, 2009).

In order to show the link between the ACM process to outcomes, the emphasis was given to key aspects identified in the ACM literature. For assessing the outcomes, capturing the results from the ACM initiative considered their consequences or effects (Plummer et al.2014). The result shows the positive relationship between results and effects. Results capture what comes about from ACM, effects entail consequences, and results from ACM in this regard are contributed to all effect items. Applying ACM evaluation criteria is helpful for the environmental management of cities.

The result in Addis Ababa reveals all stated environmental policies are included in the environmental policies and the need for effective environmental management. In Hawassa, only rehabilitation of the existing natural environment and the provision of a green network have received relatively moderate attention others received less attention.

Though the resident's experience and ecological knowledge are necessary to improve UGI planning, from all study areas, less significance was given to residents’ experience and ecological knowledge in informing UGI planning. This might be due to the non-inclusion of the participation of residents in planning and less awareness of experts, which reflects the conventional planning approach and the need to create a conducive environment for the participation of actors, creating awareness or training for experts and experience sharing.

Among the collaborative items, encouraging new solutions and giving all actors equal opportunities to state their opinion and to influence the outcome is less; there were no significant differences among learning items (cognitive, normative, and relational); and the result from the outcome indicates each item for results and effects have differences such that results had the lowest scores, but no significant differences were found among effects in Addis Ababa. In Hawassa, the effects had the lowest scores compared to ACM results and effects.

5.2.7. The legal frameworks, policies, institutions, and organizational arrangements

5.2.7.1. legal frameworks and policies

The Ethiopian government has a number of legal, policy, and institutional frameworks on the environment, water, forests, climate change, and biodiversity (EPA, 2012). The first rule concerning environmental matters emerged during the famous *Fetha Nagast* (The Law of Kings) of the thirteenth century (Damtie, 2010). During Durg regime, the focus was on the green revolution to increase food supply through the supply of new crop varieties and inorganic fertilizers (Keeley and Scoones, 2000). While the 1995 FDRE constitution provides the right of all persons to live in a clean and healthy environment. The first environmental policy was approved in 1997, encapsulated from the 1992 Rio Conference on National Conservation Strategy (NCS)and Agenda 21 (EPA, 2012), which captured sustainable environmental development (Cesar and Ekbom, 2013) through natural resources management without jeopardizing the ability of future generations (EPA, 1997).

The key principles and objectives of the environmental policy include ensuring the sustainable use of natural resources; preventing pollution in a cost-effective manner; organizing public participation in environmental management; and enhancing public awareness, education, and participation in the national effort for sustainable development and environmental protection (WB,2017). It also includes providing green spaces and habitats for plants and animals and ameliorating urban microclimates in urban areas (Molla et al. 2019).

The Millennium Development Goals (MGDs) and Growth and Transformation Plan (GTP). GTP I was focused on the transfer of technology and eradicating poverty at large. While explicit consideration and emphasis were not given for environmental protection purposes. GTP II is among the plan to transform the country in multidimensional ways and provide a direction for building a green economy by emphasizing environmental protection issues. GTP II also recognizes poverty-environment linkages and the importance of sound environmental management in sustainable development (Cesar and Ekbom, 2013).

The Millennium Declaration was adopted from the United Nations Millennium Summit of September 2000 held in New York to achieve the eight MDGs. Among these, ensuring environmental sustainability (goal 7) is the one. Growth and Transformation Plan (2015-2020) (GTP II) was formulated in 2016 by the National Planning Commission and has the objective of promoting proper delineation of urban green areas, beautification, landscape design, and urban design works (Molla et al. 2019).

In addition, the country has ratified many of the international conventions. Among others, some of the international environmental protection instruments include; Convention on Biological Diversity; the United Nations Framework Convention on Climate Change; International Convention to Combat Desertification in those countries experiencing serious drought and desertification, Particularly in Africa (Cesar and Ekbom, 2013, p.11). The international conventions on urban governance include Agenda 21. However, the country seems not effective in its domestic performance as effective as its international visibility (Molla et al.2019).

Environmental laws in Ethiopia range from proclamations on the environment, water, forests, climate change, and biodiversity to various rules and strategies. Environmental and sustainable development policies and programs are largely implemented at the regional, city, and local levels. Irrespective of these efforts, additional policies and rules on GI management and planning are vital as situations that cause GI management problems continue to increase.

The local governments in the regional states participate in decision-making that is likely to affect them. Likewise, the Ministry of Urban Development and Construction (MUDC) stipulates urban development policy (urban planning, land development, and management) at the federal level. Further, the two major organizations responsible for the planning and management of GI, the environment protection and AACPP, and the city land administration and management, are under the mayor’s office.

The major policy gap identified is the absence of a specific legal framework and policy on GI management and urban forest. The study also identifies that environmental policy and legislations are general guidelines that lack specific regulations in the management of green open spaces and community/neighborhood green spaces, river buffer zones, and gaps between institutions with the mandate to perform urban policymaking and planning.

5.2.7.2. Institutions and organizational arrangements

The institutional arrangement in terms of the power, function, governance system, and implementation capacity of the federal system and regions, including the city of Addis Ababa, indicates the devolution of power to the local administration to promote decentralized governance at all levels of government. In this regard, the city of Addis Ababa is governed by elected officials, and the city prepares its sectoral policies, strategies, and development programs.

The city institutional structure stretches from city to district levels to implement policy and development plans approved by the city council. The city government allocates the budget to develop programs and implement them and follows up on implementations. The city is divided into sub-cities, and the sub-cities further to *woredas* which are the interfacing point between the administration and city dwellers, *woreda* administration is responsible for encouraging *Woreda* residents and NGOs are working together with the *woreda* administration and *Woreda* residents in the development and a focal point of services delivery for those that can be delivered at *Woreda* level.

In Ethiopian urban areas, the relationship from the federal in terms of policymaking to the regional level and to city level implementation policies shows the vertical structure, coordination, and communication from the federal to the local level. The result is supported by (Zeleke et al. 2006; Mekuria et al.2021), who indicated a top-down approach to natural resource management in Ethiopia. Other Poluha (2004) identified the Ethiopian social organization culture as highly hierarchical. This governance arrangement can be considered traditional governance as the governmental institutions are involved at different levels (Egusquiza et al.2019).

UGI multiple benefits and functions are too broad and complex to be addressed by the government alone. This can be a barrier for UGI planning and management as the traditional structures of city departments, and the 'sectoral language,' which traps knowledge into 'sectoral silos' are major impediments to natural resources (Kabisch et al. 2016), which will require improving and creating coordination roles between departments to plan and implement transdisciplinary and multifaceted projects (Egusquiza et al. 2019), help to create collaboration to plan and implement GI network and connectivity in cities. The success of GI planning and management is also based on collaborative and participatory approaches (Ferreira et al. 2020). Brink and Wamsler (2018), for example, show the importance of collaboration between local government and citizens to address climate impacts.

These challenges would be addressed by creating and supporting effective and functioning multi-stakeholder platforms for dialogue and co-production of knowledge (Mekuria et al.2021). Inputs from stakeholders in participatory and decision-making processes are vital to improving natural resource management (Lal et al.2002). The participatory process is also considered an approach to bring about public trust in the decision-making hierarchical forms are no longer the most effective methods for policy implementation (Sorensen and Torfing, 2007).

While UGI development requires greater attention to detailed plan implementation and a strong commitment to improved inter-agency and inter-governmental coordination and regulatory enforcement, the bottom-up and citizen-led approach is important in enhancing the involvement of citizens and stakeholders (Ferreira et al.2020). Further, mosaic governance is preferred to address the dichotomy between top-down or bottom-up approaches (Buijs et al.2016; Ferreira et al.2020) also important to specify the context and a balance between the expert knowledge and the autonomy of social initiatives (Ferreira et al.2020).

5.2.7.3. Organization's mandate in GI management

At the federal level, the mandate of organizations is to formulate legislation, policies, strategies, guidelines, and manuals for their respective organizations, and the organizations have specific mandates to do. However, overlapping mandates with respect to the city land management, planning commission, and environmental protection have affected the GI plan and management implementation. However, there are limitations in understanding the scope of their mandates in the management of GI in terms of using green spaces. The environmental protection offices have less power to maintain green spaces as the land management office allocates for other uses, which has again affected the effective implementation of the roles and responsibilities of organizations.

The governmental bodies at the city level have set up vertical administration structures, coordination, and communication. All have offices at sub-city levels down to *woreda* levels across the city, showing the vertical structure, coordination, and communication from federal to local levels. Horizontal (Intra organizational) coordination and collaboration exist among the departments through monthly and annual reports to their immediate directorates.

Regarding the horizontal coordination mechanisms across sectors, the results of Addis Ababa revealed that inadequate mechanisms for coordination between AACPPO and land development and management have resulted in overlaps and inefficiency in the implementation of plans. The panel discussion with city planning experts indicates that there has been some disagreement between land development and management and the planning commission in implementing the city plans. Limited vertical coordination between EPGDC and Watersheds, Green Areas Development Agency creates gaps in assigning guards to protect green spaces from a land invasion. Blurred power relationships between the environmental protection offices and land administration and management are attributed to the conversion of green spaces, as the land administration and management offices allocate some green spaces for other uses.

Additionally, the horizontal coordination between WGDA and land management (land tenure) at the sub-city level is somewhat blurred regarding the provision of green space title deeds. For example, the Gullele Sub-city WGDA officer indicated that the sub-city land management provides a title deed for one green space, but the area is used for small-scale enterprises.

Challenges related to stakeholder involvement and cooperation with the management of GI in Addis Ababa were indicated by key informants

Lack of coordination between planning and land management in the implementation of plans is a major challenge. For example, Adwa park, designed as a city park, has been partially parceled and given to mass housing and private business by the city administration (Figure 15). (planning official key informants from the city plan commission). *In relation to title deeds for* *green spaces, one title deed* was issued by the *land administration and management office provided to the sub-city WEGDA office, while the area is already used for other purposes* (key informant from sub-city WEGDA). Which are similar to findings that indicate many public parks exist only on paper in developing countries (Sarporiti, 2006).

Other challenges include the lack of coordination between sectors, especially between environmental and urban planning institutions, coordination between different administrative jurisdictions, and funding both for the construction and the maintenance of UGI and monitoring and control systems that provide relevant data for management as well as to measure the impact of initiatives (Andrade et al. 2013, 2014; Costa et al. 2010; Lange et al. 2018; Vásquez et al. 2016, 2019). The financial capacity in terms of a lack of budget and funding was the challenge facing the planning and management of UGI.

Urban areas could play a critical role in UGI planning and management governance. While the actors that typically lead the governance of UGI planning and management are drawn from across the state, particularly government-based planning and environmental management actors, this might result from very weak states.

5.3.1. Greenspace fragmentation

Urban ecological networks and connectivity principles of GI are analyzed using fragstat analysis. Connectivity assessments help to understand a specie's movement in a spatially explicit context (Bolliger and Silbernagel,2020). The landscape metrics (Table 9) are used for analysis. Accordingly, patch size (MPS) and patch number (NP) are important indicators of green space fragmentation in a landscape. Generally, decreasing in patch size (MPS) and an increase in patch number (NP) indicates green space fragmentation, and a larger vegetation patch means more habitat and is highly connected (Mutanga and Dube,2021). A larger number of urban green patches indicate a higher percentage of fragmented green patches (Chan and Vu, 2017). In addition, very large numbers of small, heterogeneous, isolated vegetation and habitat patches are important (Mutanga and Dube, 2021).

The landscape metrics used in this study measure the level of fragmentation. For instance, The Mean patch size (MPS) is a function of the average mean surface of patches and is used to evaluate landscape fragmentation. Smaller values the index showed a higher fragmentation of the landscape (Kirstein and Netzband, 2001). From 2011 to 2022, the Mean patch size (MPS) decreased from 2.20 to 1.17 ha, and the patch number (NP) increased from 1979.00 to 5022.00, indicating more suitable conditions for green space fragmentation in the city. This might be caused by habitat loss such that formerly widespread populations may suddenly become fragmented into small, isolated populations.

Mean Euclidian nearest-neighbor distance (ENN_MN) that measures the degree of isolation and fragmentation of a patch(m) (McGarigal et al. 2012). The decreases in Euclidean nearest neighbor distance from 2011, 134.24 to 89.43 in 2022, and the decreases in mean patch size from 2.20 to 1.17 indicate the fragmentation increases and the decrease of landscape connectivity. The decrease in Euclidean nearest neighbor distance and increase in mean patch size and connectivity suggest that the ecological network could enhance landscape connectivity greatly (Li et al.2015, p,12900). Which in turn affects the movement of habitat. The distance from remnant habitat patches to other neighboring habitat patches may influence the likelihood of successful movement of individuals among habitat patches. Thus, all the landscape metrics in this study showed that the city's fragmentation issue of green spaces is more serious. It is reasonable that increased landscape connectivity of urban green spaces that reduces vegetation fragmentation is important in maintaining biodiversity conservation in urban areas of Latin America and Africa (Mutanga and Dube,2021). The existing standard is 6 meters from the edge of a river NUGIS is not allowed any activities within 6 meters from the edge of a river. However, crop and horticultural growing and informal settlements are found within 6 meters of the edge of a river. The landscape connectivity in terms of suitability for habitat movement, the focus on incorporating and developing the river buffers in the future plan of the city is vital. In order to develop the river buffers, governance issues should be considered towards clearing buffers from settlements.

Fragmentation has been recognized as a serious threat to ecosystems and ecosystem services in cities (Xiu et al. 2020). This study analyzed the extent of fragmentation using fragstat analysis. The result revealed that all metrics illustrate that the fragmentation level is increasing in the city, showing that green spaces are more fragmented into smaller patches, raising the degree of fragmentation. This calls for the need to prevent fragmentation through introducing planning an ecological network and connectivity along with the city river buffers in which the river buffers will be used fully for habitat movement, which will preserve habitat. Maintenance and enhancement of ecological connectivity will be significant for the future development of GI.

The results of this analysis give some implications for the future structure plan that will be used for the ecological protection of landscapes along the rivers. Planning an ecological network would reduce landscape fragmentation and increase the shape complexity of green space patches and landscape connectivity (Li et al.2015, p,12900). Graph theory is also suggested to be well suited to landscape ecology and planning on a theoretical and scientific basis, contributing to biodiversity conservation (Uy and Nakagoshi, 2007). Applying this method will serve as a baseline to compare and estimate the extent of green space fragmentation, opening debates on GI planning and management policies for an integrated ecological land management approach and advancing our understanding of urban landscape connectivity and strategies for enhancing it.

5.4. Urban resident's perception of the roles of city government and the benefits of green infrastructure

Urban residents' perceptions of green infrastructure benefits were analyzed based on their perception of general environmental knowledge, the city government's role in managing community green spaces, preferences on additional or new GI types, and the ecosystem benefits of green infrastructure. The result shows the socio-demographic variables (age, educational level, and income) determine residents' perceptions of the role of the city government and the ecosystem benefits of GI.

The positive relationship of education and environmental knowledge suggests educational level increases environmental knowledge, which is similar to the findings of Liere and Dunlap (1980) stated that education is positively related to environmental knowledge and people with more years of formal schooling have a higher incidence of pro-environmental behavior than did less educated (Scott and Willits, 1991; Aminrad et al. 2011).

Residents' preferences of green space elements range from access to recreational, grass strips, street trees, vegetable areas, community green spaces, and forests. Levels of income are found to be more likely predictors of preferences. The positive relationship between education and income to the participation of community members in developing government policy for the management of community green spaces indicates more educated and high-income respondents perceived the contribution of the government policy to the management of CGS is low. This result can inform planners about the conservation of urban green spaces.

Anderson et al. (2001) and (Petrosillo et al. 2013), For example, show the property right arrangement for GI has received less attention as compared to other land uses by which land-use decisions can severely affect ecosystem services. A lack of land use right to management of CGS is also attributed to the deterioration of green spaces. This also indicates the need to develop land use rights for the proper management of community green spaces because community green spaces land use rights could determine the success or failure of green spaces management.

Residents perceived the city government's role in managing community green spaces was low. The result shows less attention is given to the management of CGS from the policy, participatory approach, and land use rights perspectives. This may be due to the country's centralized and top-down governance structures. This is consistent with the country's long history of authoritarian practices with a highly centralized state and highly hierarchical, a top-down culture of social organization (Bjerkli, 2015) that may have led to a lack of participation of residents in the management of green spaces and less attention is given to GI management.

Regarding community green space management, educational status is more related to green space management. At the same time, income has a positive relationship with the preferences of green space elements. This indicates that education and income are the best predictors of government policy. Among the benefits of ecosystem services, income and education are the most predictors for the provisioning, supporting, cultural, and regulating ecosystem services of green infrastructure.

The results indicate that respondents were more likely to recognize the ecosystem service benefits of GI when they have a higher level of formal education and income. Age has been found to have an inverse correlation with almost all benefits. This is due to the age category that old age is the least represented. The result is consistent with studies that indicate the significant association between age and environmental knowledge, green space uses, and recognition of ecosystem services (Arcury and Johnson, 1987; Jim and Chen, 2006; Byrne et al. 2015).

Residents' input in this study is also explained in terms of their willingness, capacities, and cooperation among themselves in the management and maintaining CGS. Their cooperation can be, for example, In Bole sub-city, the interviewed key informants stated one situation as; *one day a truck driver tried to use the open space for collecting stones used for construction materials while residents picked whatever materials which used to attack the driver that creates fighting and they maintain the area allocated for green space*. Similarly, in Akaki/Kality sub-city, the interviewed key informants stated that one investor visited the green space already developed, managed, and used for greening by the community and claimed the area to use for business. The community committees deal with the sub-city, and the committees have taken title deeds. Indicating residents are interested in collaborating with officials and participating in protecting the area, management, and maintenance activities. On the contrary, community committees particularly assigned for *Iddir* (literally mean community association for helping each other during the death of a family member) rented part of the area allocated for this association to private businesses. However, there is potential to convert these areas to the intended community green space plan through collaboration with stakeholders, and the commitment of government is crucial in this context.

The result from Hawassa indicates the mean score for citizens in each question item were all above the neutral rating value, suggesting residents have a positive attitude towards the role of city government in the management of community green spaces and the ecosystem benefits of green infrastructure regardless of gender, education, and income. The respondent's positive attitude is related to the city's relatively high coverage of GI. Similar studies show relatively high GI coverage in Hawassa compared to secondary cities (Gashu and Gebre-Egziabher, 2018). Others show the relationship between GI coverage and respondents' positive perception (Baptiste et al. Foley, and Smardon, 2015; Bokhari et al. 2018).

Regarding the role of the city government in the management of community green spaces, compared to Addis Ababa, respondents from Hawassa have a positive attitude. This could be high GI coverage in Hawassa, indicating GI governance in Hawassa is somehow better. The result shows that residents are more likely to be more willing to participate in plans and policy development of community green spaces. The results support arguments that citizens prefer to engage in nature-related issues (Wamsler et al. 2020). Their willingness can be considered an opportunity for the success of GI implementation through creating social cohesion, including cooperative working and experience-sharing (Fors et al. 2018; Rolf et al. 2019; Ferreira et al. 2020).

In general, urban resident's perceptions on environmental knowledge, community green space management, preferences of types of green spaces, the role of city government in the management of community green space, and the ecosystem service benefits of green infrastructure reveal that socio-demographic characteristics such as education, income, and gender were found the best predictors. Residents have high levels of knowledge regarding environmental knowledge and ecosystem service benefits of green infrastructure with little differences in socio-economic characteristics. This shows the need to improve the quantity and the quality of all ecosystem services of GI in the city.

There is also a strong willingness to the management of community green spaces. Key factors affecting residents' willingness to manage community green spaces include less attention given by the city government, the conversion of green spaces to other purposes, and lack of involvement of civil society and NGOs in the management of green spaces.

The Resident's willingness and interest can be used as input for the city government in the planning and managing GI that needs well-defined GI policies. Recognizing, supporting the activities, and using the potential and preferences of residents will bring about meaningful GI management and development. This can be possible through creating a participatory approach among different stakeholders, developing and implementing specific policies, land use rights, and strengthening governance issues. Planners and policymakers can influence and support community green space management by zoning, maintaining, converting green spaces mapped in the plan but used for other purposes, and working with stakeholders (tiers of government, communities, and NGOs) to enable the permanent design of green spaces and management. The assessment of GI in this study allows for more appropriate management and plans to be made and would provide valuable insights for policymakers, urban planners, managers, and landscape architects.

5.5. Synthesis of major findings

UGI development can be analyzed based on environmental, economic, social, and ecosystem benefits in improving the well-being of people. The sustainable development of urban green infrastructure can be viewed as holistic, requiring good governance that acts as the political driving force (Hall and Pfeiffer, 2000). Green infrastructure is also considered a natural life-support system (Benedict and McMahon, 2006). Sustainable urban development requires sustainable UGI development. Sustainable UGI development can be investigated in terms of the governance of UGI planning and management that requires a mix of objectives and methods: analyzing the implementation of green infrastructure planning principles in green space plans of cities, urban green infrastructure management, the extent of green space land use land cover change, and resident's perception of the roles of city government and the benefits of green infrastructure provide scientific methods and knowledge about the impact of cities on UGI is important to improve urban sustainability.

The first aim was to analyze the implementation of green infrastructure planning principles in green space plans of cities. The analysis has two parts. The first part was assessed using an assessment of GI integration into the strategic planning of urban regions and criterions developed to evaluate the green plan in towns and cities to measure their integration into spatial and green space plans in urban areas. The results of this assessment help to understand a multifaceted picture of gaps in spatial planning to address and incorporate GI concepts, components, functions, and principles and to improve knowledge of how spatial plans address GI.

The second part assessed the incorporation of green infrastructure planning principles in plans of cities based on experts' perceptions. The result helps to examine the incorporation of four green infrastructure planning principles (green-gray integration, the ecological network and connectivity, multifunctionality, and social inclusiveness) in green space plans of cities. The result shows GI planning in Addis Ababa was at the initial stage and there is no comprehensive GI policy that can provide a strategic vision for embedding GI in spatial plans. The finding on the challenges and problems planners face when integrating GI principles in a particular political context contributes to the scientific debate on UGI planning and management.

The second aim was to analyze urban green infrastructure management. The analysis was based on park management models and good governance principles, forest management policy approach, the influence of policy and planning themes, land use regulations on UGI planning, , resident's land use right and the management of green spaces, the management of public land, and environmental management of UGI, legal frameworks, policies, institutions, and organizational arrangements were assessed using mixed methods.

Analysis of how the park management models and governance principles are applied in practice would pave the way to build theory-practice knowledge, which is a necessary step in the future development of green spaces. Analyzing urban forest management using a policy arrangement approach focuses on examining the interactions among the four dimensions of policy arrangement and the regimes' policies. The result provides the policy changes from government to governance with the government, and this major turn reflects a fundamental shift in the dominant discourse about the management of forests. The shift in the country's forest policy was emphasized a dominantly elitist approach.

The influence of policy and planning themes on UGI development help to indicate that authorities' interference was a major factor that negatively affected UGI development and the positive contribution of NGOs; and the result from the influence of land use regulations on UGI development, helps to identify the lack of public participation that may have led to land corruption related to changes in land-use zoning.

The perceived land use right and management green spaces was low**.** A lack of public land ownership and its management at the appropriate level of government was found, which might lead to the mismanagement of public land, including green and open areas, which could create corruption practices, and shows unclear legal public land ownership.

In addition, the analysis of urban green infrastructure management help to identify the types of governance approaches. Such include a shift from government to governance with the government in city planning, an authoritarian model of output-legitimacy, a sectoral approach, and a hierarchical or top-down approach.

Environmental management of UGI was assessed based on strategies aligned with adaptive co-management (ACM) using environmental policies related to UGI, residents' experiences, and ecological knowledge to inform planning and environmental management process and outcomes. Results capture what comes about from ACM effects entail consequences and results from ACM. The result shows the conventional environmental planning approach in terms of non-inclusion of the participation of residents in planning; the inclusion of residents' experience and ecological knowledge in the planning and management of GI development is less significant; and the positive relationship between results and effects.

The analysis of legal frameworks, policies, institutions, and organizational arrangements was assessed using document review and analysis. The result helps to understand policy approach changes from the National Urban Planning Institute in 1987 to the decentralization of urban spatial planning (national, regional, and local development plan), developing of national UGI standards and their implementations; changes in environmental policy from 1997 encapsulated from 1992 Rio Conference on National Conservation Strategy to the environmental policy of 2012 on building a climate resilient green economy.

The result also helps to identify the major policy gaps. Such include the absence of a specific legal framework and policy on GI management and urban forest. Environmental policy and legislations are general guidelines that lack specific regulations in the management of green open spaces and community/neighborhood green spaces. GI policy in urban policy-making, planning, and the environment is fragmented. The gap is identified **in** Ethiopian National Urban Green Infrastructure Standard (NUGIS) and its implementation. The NUGIS is not allowed any activities within 6 meters from the edge of a river; however, Crop and horticultural growing and informal settlements are found within 6 meters from the edge of a river.

Regarding the coordination mechanisms, the vertical and horizontal coordination mechanisms were assessed across different organizations at the federal, city, sub-city, and *woreda* levels. It was depicted that there is no strong coordination mechanism among organizations in sharing of information, joint planning, implementation, monitoring, and evaluation. The governmental structure includes a hierarchy of organs at the national, regional, city, sub-city, and woreda levels. Although the government has tried to develop the above urban policies, institutions, rules, and regulations, the system often fails to develop UGI planning and management in an organized and inclusive manner.

The assessment of institutions and organizational arrangements was undertaken in several organizations at the federal, regional, and local levels. The assessment results are categorized into mandates, stakeholder engagements, and coordination mechanisms. The institutional/organizational arrangements concerned with contextual factors were related to the uncertainty associated with leadership turnover that provides the basis for understanding how decisions are made at different levels of government. The result helps to identify the need to develop additional policies and rules on GI management as situations which cause GI management problems are continuing to increase; the governmental structure includes a hierarchy of organs at the city, sub-city and woreda levels; institutional arrangement in terms of the power, function and governance system and implementation capacity of the federal system, regional and local levels; inadequate mechanisms for coordination between AACPPO and land development and management, has resulted in overlaps and inefficiency in the implementation of plans; a lack of coordination between the planning commission, land management, and environmental protection create green spaces land invasion; blurred power relationships between the environmental protection offices and land management create the allocation some of green spaces for other uses; the horizontal coordination between WGDA and land management (land tenure) at sub-city level is somewhat blurred in terms of the provision of green space title deeds; and the relationship from the federal in terms of policymaking to regional level and to city level implementing policies shows the vertical structure, coordination and communication from federal to the local level. The traditional structure of city departments is considered a sectoral language, which traps knowledge in sectoral silos and is a barrier to UGI planning and management.

The third aim is to explain the extent of green space land use and land cover change, and green space fragmentation. Green space land use and land cover change show the trend of the conversion of green spaces to dominantly built-up areas. Land use and land cover changes were used to analyze the depletion of green spaces that provide input for the decision-making of UGI management and planning. Green space fragmentation was measured and analyzed using selected landscape metrics and fragstat analysis. The result help to identify the extent of fragmentation and its impact on landscape connectivity and loss of habitat.

The fourth aim was to assess urban residents' perceptions of the role of city government in the management of community green space and the ecosystem service benefits of green infrastructure. The methods employed include both quantitative and qualitative research design. The result help to identify residents' levels of knowledge regarding environmental knowledge and ecosystem service benefits of green infrastructure and key factors affecting residents' willingness to manage community green spaces. The result also helps to identify differences in the perception of residents from urban areas that are attributed to the governance practices, the need to enhance community participation in community green spaces management; the interference of local government or politicians in affecting community green spaces; and obtaining the perception of residents allows for the more appropriate management and plans to be made.

5.6. Conclusion and recommendation

5.6.1. Conclusion

Based on the general findings and objectives, the following conclusions were drawn:

MUDC, in its Urban Planning Preparation and Implementation Strategy (UPIS-2014) document, developed specific standards for the location, capacity, and accessibility of GI. However, the above policies, supported by international, national, and regional regulations, are not enough to ensure the implementation of standards at the national, regional, and local levels. UGI planning that incorporates UGI principles will bring sustainable natural, economic, and social development to the country. The multiple benefits of UGI (social, environmental, and economic) are one possible way of increasing the importance that political leaders and policy-makers in other policy sectors attach to spatial planning and climate change issues.

However, GI in urban areas can be said in a precarious condition. This is generally due to a multiplicity of factors. These factors include poor implementation of GI principles, laxity in the enforcement of planning, weak governance practices, top-down and sectoral approach, poor coordination among stakeholders, using an authoritarian model of output-legitimacy, lack of awareness about UGI principles, top-down organizational arrangements, poor land management, poor park governance, absence of specific legal framework and policy on GI management and urban forest, limited cooperation between organizations, unclear responsibilities, blurred power relationship, lack of check and balance, less political commitment, and gaps in policy arrangement and planning.

In addition, the authoritarian model of output-legitimacy continues to play a role in the current system of government, leading to the power imbalances among actors responsible for governing GI management and planning, resulting in the deterioration of GI, the adaption of the authoritarian model of output-legitimacy also create resistance or reluctance of political leaders to use and convert green spaces that are used for other purposes which inhibit UGI accessibly. The trend of converting green spaces to built-up areas increased from 1986 to the present.

The results also revealed that inadequate horizontal coordination mechanisms for coordination between organizations have resulted in overlaps and inefficiency in the implementation of plans; the institutional arrangements in the environmental sector have been unstable because of frequent restructuring; there is a lack of skilled human resources in key departments such as park and forest management; and lack of law enforcement led clearing the forest areas to the informal settlement expansion, which reflects the need to strengthening law enforcement, create a conducive environment for the participation of actors, creating awareness or training for experts and experience sharing. In addition, restructuring the level of government and clear management responsibilities of public land ownership and avoiding vertical overlap responsibilities. Besides, residents willingness can be considered as an opportunity GI implementations.

On the basis of three regimes, the Ethiopian governance system and changes related to UGI planning and management are described. During the Emperor's regime (1855-19740), a hierarchical political structure, the appointments are based on loyalty with hierarchical and market-based approach. During the *Durge* regime with its hierarchical model, a Marxist-Leninist political trajectory that was adopted from Soviet models was implemented from 1974 to 1991. The current governance system, from 1992, is a top-down, sectoral approach and state-led development model with an authoritarian model of output-legitimacy of Eastern agencies and market-based approach.

In this study, it is argued that in order to understand/the future of the processes of sustainable UGI development and the governing of the urban areas, we need to move away from the traditional /top-down approach to be informed by multilevel/hybrid governance can be the way to urban sustainability in general sustainable UGI development in terms of its planning and management can determine the sustainable development of urban areas, the multilevel/hybrid governance of urban areas is significant for the sustainable development of urban areas.

Among the UGI principles, creating ecological networks and connectivity principles focused on incorporating river buffers in the future plan of the city and developing its management will be used to develop landscape suitability for habitat movement, which will require establishing one department at different tiers of government and creating collaboration with other actors (the community, government, NGO's, and environmental group/activist). Using the potential and preferences of residents could also bring about meaningful green infrastructure management that will demand collaborative participation in the management and planning of green infrastructure.

Finally, institutions, governance arrangements, policies, legislations, green space management models, and urban spatial planning approaches shape the nature of UGI planning and management in urban areas. UGI development requires greater attention to detailed plan implementation and a strong commitment to improved inter-agency and inter-governmental coordination and regulatory enforcement.

5.6.2. Recommendation

A new framework for future UGI development was proposed based on the general objectives, methods, findings, and conclusions. The new framework (Figure 5.1) includes three pillars that influence UGI development in a country.

Towards a new strategic framework for future UGI development

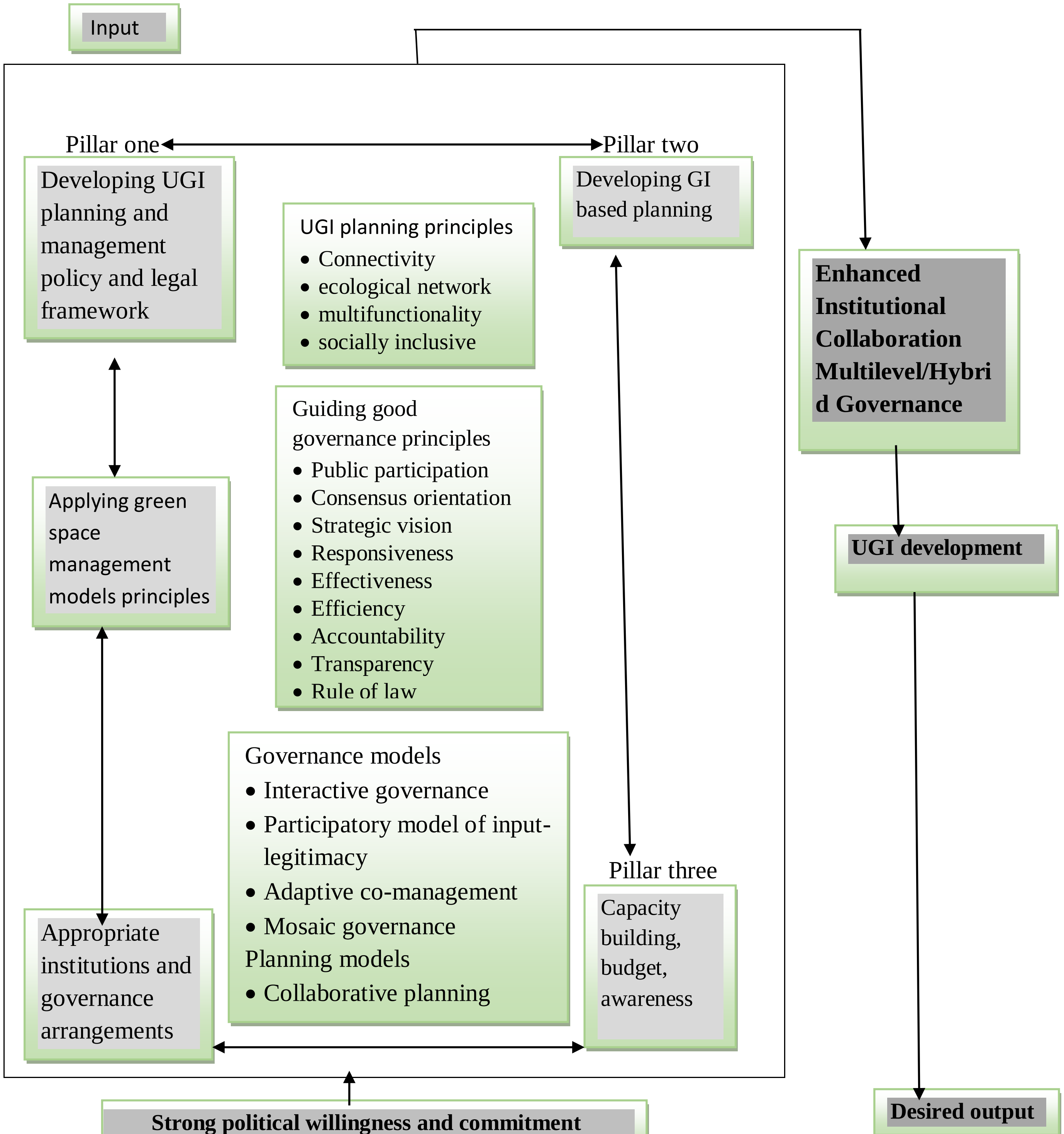


Figure 5-1: New framework for governance of UGI planning and management

This proposed framework incorporates the pillars (or inputs) to achieve good statutory land governance, including a) **Pillar one,** which comprises a country's UGI planning and management policy and legal framework, the application of green space management models, and institutional and governance framework; b) **Pillar two** comprises developing GI based planning using UGI standards; and c) **Pillar three** is capacity building and awareness. All these pillars are interrelated and, therefore, should work as a whole and not as separate components.

UGI planning, management policy, and legal framework and the application of green space management models depend on strong institutional and governance frameworks. Similarly, developing GI-based planning is based on strong UGI planning and management policy, legal framework, and strong institutional and governance framework. In addition, the success of pillar one depends on GI-based planning, capacity building, and awareness. Both pillars can best interact with UGI planning principles, good governance principles, and planning models. Their success is based on strong political willingness and commitment because the government controls the land.

Urban area's future governance of UGI planning and management

For urban areas of Ethiopia to create and sustain the future governance of UGI planning and management, urban authorities learn from their past and take steps to improve policy and planning by taking into consideration;

(1) With a population growth that will be increased for the future, urban areas must brace for the urbanization pressure of UGI, the urban areas must the opportunities for economic growth by leveraging urbanization transformation through multilevel governance instead of focusing on East Asian model.

(2) The multifunctional nature of green infrastructure that creates positive impacts on human health, mitigates climate change and saves energy should be a basis for initiating related policies and setting adequate standards for its inclusion in planning at national, regional and local levels. Adopting UGI standards developed by the national government in the spatial plan, which stipulates 30%, 30%, and 40% for UGS, road, and built up, need to be implemented/enforced. It is suggested that adopting and mainstreaming clear concept, functions, and principles of GI in planning and policies is important to integrate GI into spatial planning and to create connectivity between humans with nature; to increase the potential of urban planning to utilize UGI to address social, economic, health and ecological benefits; and for sustainable use of natural resources in urban areas.

(3) Community engagement in maintaining and management of green spaces must be embedded in all aspects of governance, urban policy-making, and planning. Urban residents firstly are aware of the problems their cities encounter, and secondly, be given a voice to address their concerns. The residents best know the issues they face at ground level. The connection between residents and GI officers in urban areas is a useful tool for a mutually beneficial attempt in the planning and management of urban areas. Urban residents could be empowered to become a part of the institution by opening government doors to civic organizations interested in working together to improve green space management. Socially inclusive principles also create a sense of belonging and ownership of the city with interactive public spaces for cultural expression that could be harnessed through civic engagement and community participation. Governments and other stakeholders have solicited the participation of local people by decentralizing decision-making processes.

(4) The sustainable development of UGI will be guided by good governance as a political driving force that will integrate planning, land management, and environmental policies and ensure all actors share responsibilities which will require the participation of professionals, NGOs, religious organizations, civil society, and community-based organizations, and the users with the government actors.

(5) There is a need for enhanced institutional collaboration for capacity development to integrate GI planning and management. This will help to avoid duplication and fragmentation of activities.

(6) The importance of strategic planning for the management process is generally considered as policy support setting out the responsibility and priority of management for developing UGI.

(7) Applying UGI principles can guide future UGI development efforts not only in Ethiopia but also in the cities of the Global South, particularly in African cities with similar contexts.

Further, sustainable urban governance depends on the ability of key stakeholders in cities to put together the appropriate hybrid governance paradigms and GI-based planning to enable the future development of UGI. This will require an integrative approach; the participation of professionals, NGOs, religious organizations, civil society and community-based organizations, and the users with the government actors. GI also needs the involvement of natural, planning, and social science professionals.

Policy and strategy implications

- The following policy and strategic measures are proposed by the author to be effected by the government and other stakeholders at different levels towards the development of UGI and creating the potential of participatory integrated GI planning.
- There is a need for commitment of the government with other stakeholders and working very closely with communities through a participatory approach to reverse the current trend of LULC changes and convert green spaces used for other purposes.
- Adopting western model of governance will help to minimize the conversion of UGS through creating a participatory approach between and among organizations responsible for UGI planning and management. Particularly, urban land administration and management offices need checks and balances in case of political interferences that affect UGI development in general.
- Adopting principles of good governance in multilevel/hybrid governance to enhance the cooperation among institutions/ organizational arrangements with a focus on horizontal coordination and participation will bring the future moves from government to governance and avoid political interference that undermines UGI development.
- Future planning interventions need to adopt UGI planning principles at the micro-level and create urban planning policy debate and decision-making to incorporate UGI principles.
- Sustainable urban planning requires the move from a traditional approach to communicative, collaborative planning approaches
- Create large contiguous or connected areas that contain critical habitats by implementing land-use and management practices.

- Creating policy integration which links policymakers from different policy domains and levels of government that avoid the interferences of politicians will contribute to improvements in the management of GS at the tactical policy level and incorporating monitoring and evaluation activities is also vital.
- The need to build institutions that are responsible at all levels and strengthen institutional and human capacity at various levels equipped with sufficient skilled manpower and financial resources.
- The need to provide sufficient authority to local government organizations to work with NGOs, the private sector, and the community to accomplish significant governing tasks.
- In order to link environmental policy to urban planning, land administration, and management, the vertical administrative structure must be made horizontal, ordinary bureaucratic thinking must be eliminated, and organizational culture must be changed.
- Using the potential and preferences of residents will bring about meaningful green infrastructure management that will demand collaborative participation in the management and planning of green infrastructure
- The management and maintenance of community green spaces require land ownership. Therefore, issuing title deeds for all green spaces will increase access to green spaces.
- The need to focus on the future management of church forests will contribute to sustainable future urban forest management through strengthening stakeholder cooperation vital to forest biodiversity and sustaining cultural values.
- Rather than the top-down approach, the gap between policy and standards for UGI implementation needs a multi-level and hybrid governance approach that has consequences for sustainability. Such as the need to revisit plans and policies that focus on GI planning and

management, the competencies of politically affiliated bureaucracy, and the ways in which competencies and authority are shared between other tiers of governance, and bureaucrats must be accountable for implementation but not subject to political interference that undermines UGI development. Further research is needed to assess the ecosystem services of urban green infrastructure towards climate change adaptation and energy plans and ecosystem services of green infrastructure related to spatial accessibility.

References

Abagissa, J., 2019. Governance and Leadership Practices and Challenges in Ethiopia. The Case of Dukem Town, Oromia Regional state. *American Journal of Social Research*, *1*.

Abbink, J., 2006. Discomfiture of democracy? The 2005 election crisis in Ethiopia and its aftermath. *African affairs*, *105*(419), pp.173-199.

Abbot, J., 2012. Green infrastructure for sustainable urban design in Africa.

Abebe, M.T. and Megento, T.L., 2016. The City of Addis Ababa From 'forest City'to'urban Heat Island' Assessment of Urban Green Space Dynamics. *Journal of Urban and Environmental Engineering*, *10*(2), pp.254-262.

Abo-El-Wafa, H., Yeshitela, K. and Pauleit, S., 2017. The use of urban spatial scenario design model as a strategic planning tool for Addis Ababa. *Landscape and Urban Planning*.

Abo-El-Wafa, H., Yeshitela, K. and Pauleit, S., 2018. The use of urban spatial scenario design model as a strategic planning tool for Addis Ababa. *Landscape and Urban Planning*, *180*, pp.308-318.

Adams, D. and Watkins, C., 2002. *Greenfields, brownfields and housing development*. Oxford: Blackwell Science.

Addis Ababa City Plan Preparation Program Office (AACPPO) 2017, Addis Ababa, Ethiopia.

Addis Ababa and the Surrounding Oromia Special Zone Integrated Development Plan Project (AAOIDPP), 2013. Green space planning of Addis Ababa.

Addis Ababa Rivers Riversides Climate Change Adaptation Project Office (2017a) Addis Ababa Rivers and riversides management board discussion report

Addis Ababa Rivers Riversides Climate Change Adaptation Project Office (2017b) 100 K.M. 100 meter river cleaning rally project

African Development Bank, 2005. Gender, Poverty and Environmental Indicators on African Countries: African Development Bank volume vi, Development Research Department.

Agere, S., 2000. *Promoting good governance: Principles, practices and perspectives* (Vol. 11). Commonwealth Secretariat.

Ahern, J., 1995. Greenways as a planning strategy. *Landscape and urban planning*, *33*(1), pp.131-155.

Ahern, J.F., 2002. *Greenways as strategic landscape planning: theory and application*. sn.

Ahern, J.F., 2004. Greenways in the USA: theory, trends and prospects. *Ecological networks an greenways. Concept, design, implementation. Cambridge University Press, Cambridge, UK*, pp.34-55.

Ahern, J., 2007. Green infrastructure for cities: the spatial dimension. In. In *Cities of the future: towards integrated sustainable water and landscape management. IWA Publishing*.

Ahern, J., 2011. From fail-safe to safe-to-fail: Sustainability and resilience in the new urban world. *Landscape and urban Planning*, *100*(4), pp.341-343.

Ahern, J.F., 2013. Urban landscape sustainability and resilience: the promise and challenges of integrating ecology with urban planning and design. *Landscape Ecology*, *28*(6), pp.1203-1212.

Ahern, J., Cilliers, S. and Niemelä, J., 2014. The concept of ecosystem services in adaptive urban planning and design: A framework for supporting innovation. *Landscape and Urban Planning*, *125*, pp.254-259.

Alem, G., 2021. Urban Plans and Conflicting Interests in Sustainable Cross-Boundary Land Governance, the Case of National Urban and Regional Plans in Ethiopia. *Sustainability*, *13*(6), p.3081.

Allmendinger, P. and Tewdwr-Jones, M. eds., 2002. *Planning futures: new directions for planning theory*. Psychology Press.

Allmendinger, P. and Tewdwr-Jones, M., 2002. The communicative turn in urban planning: Unravelling paradigmatic, imperialistic and moralistic dimensions. *Space and polity*, *6*(1), pp.5-24.

Alexander, A., 2009. *Britain's New Towns: Garden cities to sustainable communities*. Routledge.

Allan, C. and Stankey, G.H., 2009. *Adaptive environmental management* (Vol. 351). New York: Springer.

Allard, S.W. and Small, M.L., 2013. Reconsidering the urban disadvantaged: The role of systems, institutions, and organizations.

Alkire, S., Roche, J.M., Ballon, P., Foster, J., Santos, M.E. and Seth, S., 2015. *Multidimensional poverty measurement and analysis*. Oxford University Press, USA.

Amaratunga, D., Baldry, D., Sarshar, M. and Newton, R., 2002. Quantitative and qualitative research in the built environment: application of “mixed” research approach. *Work study*.

Ambrose-Oji, B., Buijs, A., Gerőházi, E., Mattijssen, T., Száraz, L., van der Jagt, A.P.N., Hansen, R., Rall, E., Andersson, E., Kronenberg, J. and Rolf, W., 2017. Innovative governance for urban green infrastructure: A guide for practitioners. *Work Package 6: Innovative Governance for Urban Green Infrastructure Planning and Implementation GREEN SURGE Deliverable 6.3*.

Amwata, D.A., Eshetu, Z., Mungai, C., Solomon, D. and Radeny, M., 2020. *Review of policies and frameworks on climate change, agriculture, food and nutrition security in Ethiopia*.

Amdetsion, D., 2017. Utility Service Provision from Planning Perspective (The case of Debre Birhan Town, ANRS, Ethiopia. *International Journal of Scientific & Engineering Research* 8 (8),pp.1-75.

Aminrad, Z., Zakaria, S.Z.B.S. and Hadi, A.S., 2011. Influence of age and level of education on environmental awareness and attitude: case study on Iranian students in Malaysian Universities. *The Social Sciences*, *6*(1), pp.15-19.

Arcury, T.A. and Johnson, T.P., 1987. Public environmental knowledge: A statewide survey. *The Journal of Environmental Education*, *18*(4), pp.31-37.

Anders, G., 2008. The Normativity of Numbers: World Bank and IMF Conditionality1. *PoLAR: Political and Legal Anthropology Review*, *31*(2), pp.187-202.

Anguelovski, I. and Carmin, J., 2011. Something borrowed, everything new: innovation and institutionalization in urban climate governance. *Current opinion in environmental sustainability*, *3*(3), pp.169-175.

Andersson, E., Barthel, S., Borgström, S., Colding, J., Elmqvist, T., Folke, C. and Gren, Å., 2014. Reconnecting cities to the biosphere: stewardship of green infrastructure and urban ecosystem services. *Ambio*, *43*(4), pp.445-453.

Aredo, D., 2010. The Iddir: An informal insurance arrangement in Ethiopia. *Savings and Development*, pp.53-72.

Armitage, D., Marschke, M. and Plummer, R., 2008. Adaptive co-management and the paradox of learning. *Global environmental change*, *18*(1), pp.86-98.

Armitage, D., Berkes, F. and Doubleday, N. eds., 2010. *Adaptive co-management: collaboration, learning, and multi-level governance*. UBC Press.

Armitage, D., de Loë, R. and Plummer, R., 2012. Environmental governance and its implications for conservation practice. *Conservation Letters*, *5*(4), pp.245-255.

Arts, B., Leroy, P. and Van Tatenhove, J., 2006. Political modernisation and policy arrangements: a framework for understanding environmental policy change. *Public organization review*, *6*(2), pp.93-106.

Arsiso, B.K., Tsidu, G.M., Stoffberg, G.H. and Tadesse, T., 2018. Influence of urbanization-driven land use/cover change on climate: The case of Addis Ababa, Ethiopia. *Physics and Chemistry of the Earth, Parts A/B/C*, *105*, pp.212-223.

Artmann, M., Bastian, O. and Grunewald, K., 2017. Using the concepts of green infrastructure and ecosystem services to specify Leitbilder for compact and green cities—the example of the landscape plan of Dresden (Germany). *Sustainability*, *9*(2), p.198.

Arts, B.J.M., 2006. Forest, institutions, discourses: a discursive-institutional analysis of global forest politics.

Arts, B., Leroy, P., eds. 2006. *Institutional dynamics in environmental governance*. Dordrecht: Springer.

Arts, B. and Buizer, M., 2009. Forests, discourses, institutions: A discursive-institutional analysis of global forest governance. *Forest policy and economics*, *11*(5-6), pp.340-347.

Arts, B., 2012. Forests policy analysis and theory use: Overview and trends. *Forest Policy and Economics*, *16*, pp.7-13.

Arts, B., Leroy, P. and Van Tatenhove, J., 2006. Political modernization and policy arrangements: a framework for understanding environmental policy change. *Public organization review*, *6*(2), pp.93-106.

Arts, B., Visseren-Hamakers, I. 2012. Forest governance: a state of the art review. In: B. Arts, S. van Bommel, M. Ros-Tonen, G. Verschoor, eds. *Forest–people interactions: understanding community forestry and biocultural diversity*, 241–257. Wageningen: Academic Publishers.Dordrecht: Springer Science+Business Media.

Argaw, T., 2015. Opportunities of Botanical Garden in Environmental and Development Education to Support School-Based Instruction in Ethiopia. *Journal of Biology, Agriculture and Healthcare, 5*(15), p.92.

Arnouts, R.C., 2010. *Regional nature governance in the Netherlands: four decades of governance modes and shifts in the Utrechtse Heuvelrug and Midden-Brabant.*

Arnouts, R., van der Zouwen, M. and Arts, B., 2012. Analysing governance modes and shifts—Governance arrangements in Dutch nature policy. *Forest policy and economics*, *16*, pp.43-50.

Ayana, A.N., Arts, B. and Wiersum, K.F., 2013. Historical development of forest policy in Ethiopia: Trends of institutionalization and deinstitutionalization. *Land Use Policy*, *32*, pp.186-196.

Ayana, A.N., 2014. *Forest governance dynamics in Ethiopia: histories, arrangements, and practices*. Wageningen University and Research.

Ayele, A., 2019. Revisiting ethnic politics and the federal system's conflict management capacity in post-1995 Ethiopia. *African Journal of Governance and Development*, *8*(1), pp.35-52.

Ayenew, M., 2002. Decentralization in Ethiopia. *The Challenge of Democracy from Below*, p.130.

Azagew, S. and Worku, H., 2020. Accessibility of urban green infrastructure in Addis-Ababa city, Ethiopia: current status and future challenge. *Environmental Systems Research*, *9*(1), pp.1-20.

Azagew, S. and Worku, H., 2020. Status and Challenges of Urban Green Infrastructure Access in Rapidly Urbanizing Cities of Africa: the Case of Addis Ababa City, Ethiopia.

Bache, I., 1998. *Politics of European Union Regional Policy: Multi-Level Governance or Flexible Gatekeeping?* (Vol. 3). A&C Black.

Bach, J.N., 2011. Abyotawi democracy: neither revolutionary nor democratic, a critical review of EPRDF's conception of revolutionary democracy in post-1991 Ethiopia. *Journal of Eastern African Studies*, *5*(4), pp.641-663.

Baird, J., Plummer, R., Haug, C. and Huitema, D., 2014. Learning effects of interactive decision-making processes for climate change adaptation. *Global Environmental Change*, *27*, pp.51-63.

Baekgaard, M., Blom-Hansen, J. and Serritzlew, S., 2015. When politics matters: The impact of politicians' and bureaucrats' preferences on salient and nonsalient policy areas. *Governance*, *28*(4), pp.459-474.

Balram, S., Dragicevic, S. and Meredith, T., 2003. Achieving effectiveness in stakeholder participation using the GIS-based collaborative spatial Delphi methodology. *Journal of Environmental assessment policy and management*, *5*(03), pp.365-394.

Balram, S. and Dragicevic, S., 2005. Attitudes toward urban green spaces: integrating questionnaire survey and collaborative GIS techniques to improve attitude measurements. *Landscape and urban planning*, *71*(2-4), pp.147-162.

Barau, A.S., 2015. Perceptions and contributions of households towards sustainable urban green infrastructure in Malaysia. *Habitat international*, *47*, pp.285-297.

Banda, T.D. and Kumarasamy, M., 2020. Application of Multivariate Statistical Analysis in the Development of a Surrogate Water Quality Index (WQI) for South African Watersheds. *Water*, *12*(6), p.1584.

Bang, H., Jensen, M.D. and Nedergaard, P., 2015. 'We the People'versus 'We the Heads of States': the debate on the democratic deficit of the European Union. *Policy Studies*, *36*(2), pp.196-216.

Baro, F., Bugter, R., Gómez-Baggethun, E., Hauck, J., Kopperoinen, L., Liquete, C., Potschin, P. (2015): Green Infrastructure. In: Potschin, M. and K. Jax (eds): OpenNESS Ecosystem Service Reference Book. EC FP7 Grant Agreement no.308428. Available via: www.openness-project.EU/library/reference-book

Bass, S., Wang, S.S., Ferede, T. and Fikreyesus, D., 2013. Making growth green and Inclusive: The case of Ethiopia.

Bastian, O., 2013. The role of biodiversity in supporting ecosystem services in Natura 2000 sites. *Ecological indicators*, *24*, pp.12-22.

Baptiste, A.K., Foley, C. and Smardon, R., 2015. Understanding urban neighborhood differences in willingness to implement green infrastructure measures: a case study of Syracuse, NY. *Landscape and Urban Planning*, *136*, pp.1-12.

Barbara, L. 2011. Guidelines for protected areas legislation. Gland, Switzerland: IUCN.

Baro, F., Bugter, R., Gómez-Baggethun, E., Hauck, J., Kopperoinen, L., Liquete, C., Potschin, P. (2015): Green Infrastructure. In: Potschin, M. and K. Jax (eds): OpenNESS Ecosystem Service Reference Book. EC FP7 Grant Agreement no.308428. Available via: www.openness-project.eu/library/reference-book

Barona, C.O., Devisscher, T., Dobbs, C., Aguilar, L.O., Baptista, M.D., Navarro, N.M., da Silva Filho, D.F. and Escobedo, F.J., 2020. Trends in urban forestry research in Latin America & the Caribbean: a systematic literature review and synthesis. *Urban Forestry & Urban Greening*, *47*, p.126544.

Bane, J., Nune, S., Mekonnen, A. and Bluffstone, R., 2007, September. Policies to increase forest cover in Ethiopia. In *Proceedings of a Policy Workshop organized by Environmental Economics Policy Forum for Ethiopia (EEPFE) and Ethiopian Development Research Institute (EDRI), Addis Ababa* (pp. 18-19).

Bekele, M., 2003. Forest property rights, the role of the state, and institutional exigency: the Ethiopian experience.

Bekele, S. and Regassa, T., 2012. Democratization in a Developmental State: The Case of Ethiopia Issues, Challenges, and Prospects.

Benedict, M.A. and McMahon, E.T., 2002. Green infrastructure: smart conservation for the 21st century. *Renewable Resources Journal*, *20*(3), pp.12-17.

Benedict, M.A., and McMahon, E.T., 2012. *Green infrastructure: linking landscapes and communities*. Island press.

Bekalo, M.T., 2009. *Spatial metrics and Landsat data for urban landuse change detection: case of Addis Ababa, Ethiopia* (Doctoral dissertation).

Beauregard, R.A., 1987. PROGRESS REPORT: THE OBJECT OF PLANNING. *Urban geography*, *8*(4), pp.367-373.

Beauregard, R.A., 1991. Without a net: Modernist planning and the postmodern abyss. *Journal of Planning Education and Research*, *10*(3), pp.189-194.

Benedict, M.A. and McMahon, E.T., 2002. Green infrastructure: smart conservation for the 21st century. *Renewable resources journal*, *20*(3), pp.12-17.

Benedict, M. A., & McMahon, E. T. (2006). Green infrastructure: Linking landscapes and communities. Urban Land (Vol. June). Washington, DC: Island Press.

Bennett, N.J., 2016. Using perceptions as evidence to improve conservation and environmental management. *Conservation Biology*, *30*(3), pp.582-592.

Binder, C., Hinkel, J., Bots, P. and Pahl-Wostl, C., 2013. Comparison of frameworks for analyzing social-ecological systems. *Ecology and Society*, *18*(4).

Bjerkli, C.L., 2015. Power in waste: Conflicting agendas in planning for integrated solid waste management in Addis Ababa, Ethiopia. *Norsk Geografisk Tidsskrift-Norwegian Journal of Geography*, *69*(1), pp.18-27.

Berkes, F., 2009. Evolution of co-management: role of knowledge generation, bridging organizations and social learning. *Journal of environmental management, 90*(5), pp.1692-1702.

Berhane, Z. and Tefera, S., 2018. Does Federalism Reduce Ethnic Conflict? Evidence From the Ethiopian Experience. *Ethiopian Journal of the Social Sciences and Humanities*, *14*(1), pp.105-131.

Bishaw, B., 2001. Deforestation and land degradation in the Ethiopian highlands: a strategy for physical recovery. *Northeast African Studies*, pp.7-25.

Blakely, E.J., 2008. *Dialogues in Urban Planning: Towards Sustainable Regions*. Sydney University Press.

Blaschke, P., Chapman, R., Gyde, E., Howden-Chapman, P., Ombler, J., Pedersen Zari, M., Perry, M. and Randal, E., 2019. Green Space in Wellington's Central City: Current provision, and design for future wellbeing. *A Report for Wellington City Council; New Zealand Centre for Sustainable Cities: Wellington, New Zealand*.

Brautigam, D., 2011. China in Africa: Seven Myths. *Elcano Royal Institute ARI Series*, *23*, pp.20011-8.

Breen, A., Giannotti, E., Flores Molina, M.A. and Vásquez, A., 2020. From'Government to Governance'? A Systematic Literature Review of Research for Urban Green Infrastructure Management in Latin America. *Frontiers in Sustainable Cities, 2,* p.52.

Brauman, K.A., Daily, G.C., Duarte, T.K.E. and Mooney, H.A., 2007. The nature and value of ecosystem services: an overview highlighting hydrologic services. *Annu. Rev. Environ. Resour.*, *32*, pp.67-98.

Breuste, J., 2006. Urban development and urban environment in Germany. *The Geographer, Delhi*, *49*(2), pp.1-14.

Brink, E., Aalders, T., Ádám, D., Feller, R., Henselek, Y., Hoffmann, A., Ibe, K., Matthey-Doret, A., Meyer, M., Negrut, N.L. and Rau, A.L., 2016. Cascades of green: a review of ecosystem-based adaptation in urban areas. *Global environmental change*, *36*, pp.111-123.

Bridge, G. and Perreault, T., 2009. Environmental governance. *A companion to environmental geography*, pp.475-497.

Boano, F., Caruso, A., Costamagna, E., Ridolfi, L., Fiore, S., Demichelis, F., Galvao, A., Pisoeiro, J., Rizzo, A. and Masi, F., 2020. A review of nature-based solutions for greywater treatment: Applications, hydraulic design, and environmental benefits. *Science of the total environment*, *711*, p.134731.

Bobbio, L., 2019. Designing effective public participation. *Policy and Society*, *38*(1), pp.41-57.

Bodin, O. and Crona, B.I., 2009. The role of social networks in natural resource governance: What relational patterns make a difference?. *Global environmental change*, *19*(3), pp.366-374.

Bodin, O. and Prell, C. eds., 2011. *Social networks and natural resource management: uncovering the social fabric of environmental governance*. Cambridge University Press.

Bogdan, R. and Biklen, S.K., 1997. *Qualitative research for education*. Boston, MA: Allyn & Bacon.

Bolliger, J. and Silbernagel, J., 2020. Contribution of connectivity assessments to Green Infrastructure (GI). *ISPRS International Journal of Geo-Information*, *9*(4), p.212.

Bonett, D.G. and Wright, T.A., 2015. Cronbach's alpha reliability: Interval estimation, hypothesis testing, and sample size planning. *Journal of Organizational Behavior*, *36*(1), pp.3-15.

Bowen, K.J. and Lynch, Y., 2017. The public health benefits of green infrastructure: the potential of economic framing for enhanced decision-making. *Current Opinion in Environmental Sustainability*, *25*, pp.90-95.

Boyd, J. and Banzhaf, S., 2007. What are ecosystem services? The need for standardized environmental accounting units. *Ecological economics*, *63*(2-3), pp.616-626.

Bokhari, S.A., Saqib, Z., Ali, A. and Zaman-Ul-Haq, M., 2018. Perception of residents about urban vegetation: A comparative study of planned versus semi-planned cities of Islamabad and Rawalpindi. *Pakistan. Journal of Ecosystem & Ecography*, *8*(251), p.2.

Boyle, C., 2014. *Greening cities: A review of green infrastructure*. Transforming Cities.

Boitani, L., Falcucci, A., Maiorano, L. and Rondinini, C., 2007. Ecological networks as conceptual frameworks or operational tools in conservation. *Conservation biology*, *21*(6), pp.1414-1422.

Bolliger, J. and Silbernagel, J., 2020. Contribution of connectivity assessments to green infrastructure (GI). *ISPRS International Journal of Geo-Information*, *9*(4), p.212.

Bollier, D., 2012. The Future of International Environmental Law: A Law of the Ecological Commons. *International Environmental Law and World Order: A Problem-Oriented Coursebook. Minnesota: West Publishing. Retrieved*, *28*, p.2017.

Borrini, G., Dudley, N., Jaeger, T., Lassen, B., Neema, P., Phillips, A. and Sandwith, T., 2013. Governance of protected areas: from understanding to action. Best practice protected area guidelines series, (20).

Borrini-Feyerabend, G., Farvar, M.T., Renard, Y., Pimbert, M.P. and Kothari, A., 2013. *Sharing power: A global guide to collaborative management of natural resources*. Routledge.

Bowen, K.J. and Lynch, Y., 2017. The public health benefits of green infrastructure: the potential of economic framing for enhanced decision-making. *Current Opinion in Environmental Sustainability*, *25*, pp.90-95.

Boyd, J. and Banzhaf, S., 2007. What are ecosystem services? The need for standardized environmental accounting units. *Ecological economics*, *63*(2-3), pp.616-626.

Brian, M., 1969. Urban and regional planning: a systems approach.

Bridge, G. and Perreault, T., 2009. *Environmental governance* (pp. 475-497). Malden: Wiley-Blackwell.

Brink, E. and Wamsler, C., 2018. Collaborative governance for climate change adaptation: mapping citizen–municipality interactions. *Environmental Policy and Governance*, *28*(2), pp.82-97.

Bryman, A., 1984. The debate about quantitative and qualitative research: a question of method or epistemology? *British journal of Sociology*, pp.75-92.

Bryman, A. and Burgess, B. eds., 2002. *Analyzing qualitative data*. Routledge.

Brunckhorst, D.J., 2002. Institutions to sustain ecological and social systems. *Ecological Management & Restoration*, *3*(2), pp.108-116.

Buchel, S. and Frantzeskaki, N., 2015. Citizens' voice: A case study about perceived ecosystem services by urban park users in Rotterdam, the Netherlands. *Ecosystem Services*, *12*, pp.169-177.

Bush, J., Aye, L. and Hes, D., 2015. Cooling cities with green space: a policy analysis framework.

Bush, J., 2020. The role of local government greening policies in the transition towards nature-based cities. *Environmental Innovation and Societal Transitions*, *35*, pp.35-44.

Buijs, A., Hansen, R., Van der Jagt, S., Ambrose-Oji, B., Elands, B., Rall, E.L., Mattijssen, T., Pauleit, S., Byrne, J.A., Lo, A.Y. and Jianjun, Y., 2015. Residents' understanding of the role of green infrastructure for climate change adaptation in Hangzhou, China. *Landscape and Urban Planning*, *138*, pp.132-143.

Buijs, A.E., Mattijssen, T.J., Van der Jagt, A.P., Ambrose-Oji, B., Andersson, E., Elands, B.H. and Møller, M.S., 2016. Active citizenship for urban green infrastructure: fostering the diversity and dynamics of citizen contributions through mosaic governance. *Current opinion in environmental sustainability*, *22*, pp.1-6.

Buizer, I.M., Elands, B.H., Mattijssen, T.J.M., Jagt, A.P.N., Ambrose, B., Geroházi, E. and Santos, E., 2015. *The governance of urban green spaces in selected EU-cities: Policies, Practices, Actors, Topics* (No. D6. 1 EU FP7). EU.

Bulkeley, H., Betsill, M.M., 2005. Rethinking sustainable cities: multilevel governance and the 'urban' politics of climate change. Environmental Politics 14,42–63.

Buxton, J.A., 2018. Attitudes Toward Green Infrastructure Strategies for More Livable and Sustainable Communities.

Byrd, C., Andersson, E., Kronenberg, J., Hansen, R. and Buijs, A., 2017. Understanding and promoting the values of urban green infrastructure: A learning module. *Green surge project Deliverable*, *4*.

Cameron, K., 2012. *Positive leadership: Strategies for extraordinary performance*. Berrett-Koehler Publishers.

Cavan, G., 2012. Green infrastructure maps for selected case studies and a report with an urban green infrastructure mapping methodology adapted to African cities.

Cavan, G., Lindley, S., Jalayer, F., Yeshitela, K., Pauleit, S., Renner, F., Gill, S., Capuano, P., Nebebe, A., Woldegerima, T. and Kibassa, D., 2014. Urban morphological determinants of temperature regulating ecosystem services in two African cities. *Ecological indicators*, *42*, pp.43-57.

Carreiro, M.M., Song, Y.C. and Wu, J. eds., 2007. *Ecology, planning, and management of urban forests: International perspective*. Springer Science & Business Media.

Cattell, Raymond B., and Joseph Jaspers. "A general plasmode (No. 30-10-5-2) for factor analytic exercises and research." *Multivariate Behavioral Research Monographs* (1967).

Crabtree, B.F. and Miller, W.L., 1992. Doing qualitative research. In *Annual North American Primary Care Research Group Meeting, 19th, May, 1989, Quebec, PQ, Canada*. Sage Publications, Inc.

Central Statistical Agency, 2007. *Population and Housing Census Report-Country*. Addis Ababa, Ethiopia

Central Statistical Authority (CSA), 2011. Ethiopian Demographic and Health Survey 2000. Addis Ababa, Ethiopia

Central Statistical Agency, 2012. Inter-Censal Population Survey. Addis Ababa, Ethiopia.

Central Statistical Agency, 2017. Statistical abstract. Addis Ababa, Ethiopia

Creswell *Understanding Mixed Methods Research* (2006)

Cear, E. and Ekbom, A., 2013. Ethiopia environmental and climate change policy brief. *Sida's Helpdesk for Environment and Climate Change*.

Chan, C., 2007. China in Africa-spreading the wealth. *Canada Asia Commentary*, *44*, pp.1-8.

Chan, K.M., Satterfield, T. and Goldstein, J., 2012. Rethinking ecosystem services to better address and navigate cultural values. *Ecological economics*, *74*, pp.8-18.

Chan, K.M. and Vu, T.T., 2017. A landscape ecological perspective of the impacts of urbanization on urban green spaces in the Klang Valley. *Applied Geography*, *85*, pp.89-100.

Cheshmehzangi, A., Butters, C., Xie, L. and Dawodu, A., 2021. Green Infrastructures for Urban Sustainability: Issues, Implications, and Solutions for Underdeveloped Areas. *Urban Forestry & Urban Greening*, p.127028.

Cheru, F., 2014. Structural Transformation in Ethiopia: the urban dimension.

Chen, B. and Iannone III, B.V., 2020. [FR431] FRAGSTATS: A Free Tool for Quantifying and Evaluating Spatial Patterns: FOR362/FR431, 6/2020. *EDIS*, *2020*(6), pp.9-9.

Chi, W., Shi, W. and Kuang, W., 2015. Spatio-temporal characteristics of intra-urban land cover in the cities of China and USA from 1978 to 2010. *Journal of Geographical Sciences*, *25*(1), pp.3-18.

Chhotray, V. and Stoker, G., 2009. Governance in Public Administration and Political Science. In *Governance Theory and Practice* (pp. 16-52). Palgrave Macmillan, London.

Chuenpagdee, R. and Jentoft, S., 2011. Situating poverty: a chain analysis of small-scale fisheries. In *Poverty Mosaics: Realities and Prospects in Small-Scale Fisheries* (pp. 27-42). Springer, Dordrecht.

Chuenpagdee, R. and Mahon, R., 2013. Approaches and Tools for Examining Governability. In *Governability of Fisheries and Aquaculture* (pp. 265-278). Springer, Dordrecht.

Cilliers, E.J., 2009. Bridging the green-value-gap: a South African approach. *Int J Soc Human Sc, 3*, pp.615-620.cosystem services in two African cities. *Ecological indicators*, *42*, pp.43-57.

Cilliers, E.J., 2010. Future directions in Urban Planning and Space Usage. *Interdisciplinary Themes Journal*, *1*(1).

Cilliers, S., Cilliers, J., Lubbe, R. and Siebert, S., 2013. Ecosystem services of urban green spaces in African countries—perspectives and challenges. *Urban Ecosystems*, *16*(4), pp.681-702.

Cilliers, J. and Cilliers, S., 2015. From green to gold: A South African example of valuing urban green spaces in some residential areas in Potchefstroom. *Town and Regional Planning*, *67*, pp.1-12.

Cilliers, E.J. 2016. Planning for Green Infrastructure: Options for South African Cities. South African Cities Network. Johannesburg, South Africa.

Cilliers, S.S., Siebert, S.J., Du Toit, M.J., Barthel, S., Mishra, S., Cornelius, S.F. and Davoren, E., 2017. Garden ecosystem services of Sub-Saharan Africa and the role of health clinic gardens as social-ecological systems. *Landscape and Urban Planning*.

Clark, J., 2003. Fear in fear of crime. Psychiatry, Psychology and Law 102, 267–282.

Clapham, C., 1990. State, society and political institutions in revolutionary Ethiopia. *IDS Bulletin*, *21*(4), pp.35-45.

Clapham, C., 2000. War and state formation in Ethiopia and Eritrea. *Critique Internationale, Fall*, p.110.

CLUVA (Green Infrastructure: An essential foundation for sustainable urban futures in Africa), 2013. CLUVA Report (www.cluva.eu).

Creswell, J.W. and Plano Clark, V.L., 2006. Understanding mixed methods research. *Designing and conducting mixed methods research*, pp.1-19.

Creswell, J.W. and Miller, D.L., 2000. Determining validity in qualitative inquiry. *Theory into practice*, *39*(3), pp.124-130.

Crompton, J.L., 2006. The Genesis of the Proximate Principle in the Development of Urban Parks in England. *Annals of Leisure Research*, *9*(3-4), pp.214-244.

Cochran, W.W. and Lord Jr, R.D., 1963. A radio-tracking system for wild animals. *The Journal of Wildlife Management*, pp.9-24.

Cofie, O.O., Van Veenhuizen, R. and Drechsel, P., 2003. Contribution of urban and peri-urban agriculture to food security in sub-Saharan Africa. *Africa Day of the 3rd WWF in Kyoto*, *3*.

Colding, J., 2011. The role of ecosystem services in contemporary urban planning.

Colding, J. and Barthel, S., 2013. The potential of ‘Urban Green Commons’ in the resilience building of cities. *Ecological economics*, *86*, pp.156-166.

Condon, M., 2012. China in Africa: What the policy of nonintervention adds to the Western development dilemma. *PRAXIS: The Fletcher Journal of Human Security*, *27*.

Cooper, L.M., 2010. Network analysis in CEA, ecosystem services assessment and green space planning. *Impact Assessment and Project Appraisal*, *28*(4), pp.269-278.

Costanza, R., d'Arge, R., De Groot, R., Farber, S., Grasso, M., Hannon, B., Limburg, K., Naeem, S., O’Neil, R.V., Paruelo, J. and Raskin, R.G., 1997. The value of the world's ecosystem services and natural capital. *nature*, *387*(6630), pp.253-260.

Costanza, R., De Groot, R., Sutton, P., Van der Ploeg, S., Anderson, S.J., Kubiszewski, I., Farber, S. and Daba, B. and Mulu, F., 2017. Incorporating ‘‘Democratic Developmental State Ideology’’into Ethiopia’s Ethnic Federalism–A Contradiction? *Üniversitepark Bülten*, *6*(1), p.109.

Colding, J., Gren, A. and Barthel, S., 2020. The incremental demise of urban green spaces. *Land*, *9*(5), p.162.

Cottrell, S.P., 2003. Influence of sociodemographics and environmental attitudes on general responsible environmental behavior among recreational boaters. *Environment and behavior*, *35*(3), pp.347-375.

Coutts, C. and Hahn, M., 2015. Green infrastructure, ecosystem services, and human health. *International journal of environmental research and public health*, *12*(8), pp.9768-9798.

Cuce, E., 2017. Thermal regulation impact of green walls: An experimental and numerical investigation. *Applied energy*, *194*, pp.247-254.

Daily, G.C., 1997. Introduction: what are ecosystem services. *Nature’s services: Societal dependence on natural ecosystems*, *1*(1).

Daba, B. and Mulu, F., 2017. Incorporating ‘‘Democratic Developmental State Ideology’’into Ethiopia’s Ethnic Federalism–A Contradiction? *Üniversitepark Bülten*, *6*(1), p.109.

Dadi, D., Azadi, H., Senbeta, F., Abebe, K., Taheri, F. and Stellmacher, T., 2016. Urban sprawl and its impacts on land-use change in Central Ethiopia. *Urban Forestry & Urban Greening*, *16*, pp.132-141.

Dadi, D., Stellmacher, T., Azadi, H., Abebe, K. and Senbeta, F., 2018. The impact of industrialization on land use and livelihoods in Ethiopia: Agricultural land conversion around Gelan and Dukem town, Oromia region. *Socio-Ecological Change in Rural Ethiopia: Understanding Local Dynamics in Environmental Planning and Natural Resource Management*, pp.37-59.

Dahiya, B. and Das, A., 2020. New urban agenda in Asia-Pacific: governance for sustainable and inclusive cities. In *New Urban Agenda in Asia-Pacific* (pp. 3-36). Springer, Singapore.

Darkhani, F., Tahir, O.M. and Ibrahim, R., 2019. Sustainable urban landscape management: An insight into urban green space management practices in three different countries. *Journal of Landscape Ecology*, *12*(1), pp.37-48.

Damtie, M., 2010. Legal and institutional issues for environment in Ethiopia in 2008. *Edward S.(ed.)*.

Davies, C., McGloin, C., MacFarlane, R. and Roe, M., 2006. Green infrastructure planning guide project. *Final Report*.

Davies, J.S., 2002. Urban regime theory: A normative-empirical critique. *Journal of urban affairs*, *24*(1), pp.1-17.

Davies, C., MacFarlane, R., McGloin, C. and Roe, M., 2006. Green infrastructure planning guide. *Project: Final Report*.

Davies, C., Hansen, R., Rall, E., Pauleit, S., Lafortezza, R., De Bellis, Y., Santos, A. and Tosics, I., 2015. Green infrastructure planning and implementation. The status of European green space planning and implementation based on an analysis of selected European city-regions. *GREEN SURGE PROJECT, Deliverable*, *5*.

Davies, C. and Lafortezza, R., 2017. Urban green infrastructure in Europe: Is greenspace planning and policy-compliant? *Land Use Policy*, *69*, pp.93-101.

Delafons, J., 1998. Reforming the British planning system 1964-5: the Planning Advisory Group and the genesis of the Planning Act of 1968. *Planning Perspectives*, *13*(4), pp.373-387.

Delmas, M.A. and Young, O.R. eds., 2009. *Governance for the environment: New perspectives*. Cambridge University Press.

De Bellis, Y., Santos, A., Tosics, I., Davies, C., Hansen, R., Rall, E., Pauleit, S. and Lafortezza, R., 2015. Green infrastructure planning and implementation.

de Boer, S., 2006. Diffusion or diversity in cultural heritage preservation? Comparing policy arrangements in Norway, Arizona and The Netherlands. In *Institutional dynamics in environmental governance* (pp. 161-181). Springer, Dordrecht.

Degife, A., Worku, H., Gizaw, S. and Legesse, A., 2019. Land use land cover dynamics, its drivers and environmental implications in Lake Hawassa Watershed of Ethiopia. *Remote Sensing Applications: Society and Environment*, *14*, pp.178-190.

De Groot, R.S., Wilson, M.A. and Boumans, R.M., 2002. A typology for the classification, description and valuation of ecosystem functions, goods and services. *Ecological economics*, *41*(3), pp.393-408.

De Groot, R.S., Alkemade, R., Braat, L., Hein, L. and Willemen, L., 2010. Challenges in integrating the concept of ecosystem services and values in landscape planning, management and decision making. *Ecological complexity*, *7*(3), pp.260-272.

De Gruijter, D.N.M. and Van der Kamp, L.J., Th.(2008). *Statistical test theory for the behavioral sciences*.

Dennis, M. and James, P., 2016. User participation in urban green commons: Exploring the links between access, voluntarism, biodiversity and well being. *Urban Forestry & Urban Greening*, *15*, pp.22-31.

Deininger, K., Selod, H. and Burns, A., 2011. *The Land Governance Assessment Framework: Identifying and monitoring good practice in the land sector*. The World Bank.

Deininger, K, Selod, H & Burns, A 2012, *The land governance assessment framework: identifying and monitoring good practice in the land sector*. Washington: The World Bank

Dejen, A.D., Yitagesu, A.B. and Aysassa, D.G., 2021. Implementation and Evaluation of Urban Green Space Supply for Debre Berhan Town, Ethiopia.

Demas, R.R., 2010. Moment of truth: Development in Sub-Saharan Africa and critical alterations needed in application of the Foreign Corrupt Practices Act and other anti-corruption initiatives. *Am. U. Int'l L. Rev.*, *26*, p.315.

Denzin, N.K., 2017. *The research act: A theoretical introduction to sociological methods*. Transaction publishers.

de Souza, D.T. and Torres, P.H.C(2021) Greening and Just Cities: Elements for Fostering a South–North Dialogue Based on a Systematic Literature.

Depietri, Y. and McPhearson, T., 2017. Integrating the grey, green, and blue in cities: nature-based solutions for climate change adaptation and risk reduction. In *Nature-Based Solutions to Climate Change Adaptation in Urban Areas* (pp. 91-109). Springer, Cham.

De Vries, S., Verheij, R.A., Groenewegen, P.P. and Spreeuwenberg, P., 2003. Natural environments—healthy environments? An exploratory analysis of the relationship between greenspace and health. *Environment and planning A*, *35*(10), pp.1717-1731.

Desa, U.N., 2014. World urbanization prospects, the 2011 revision. *Population Division, Department of Economic and Social Affairs, United Nations Secretariat*.

DeVellis, R. F., 2003. *Scale Development.* (2nd edn). Thousand Oaks, CA: Sage Publications.

Deribew, K.T., 2020. Spatiotemporal analysis of urban growth on forest and agricultural land using geospatial techniques and Shannon entropy method in the satellite town of Ethiopia, the western fringe of Addis Ababa city. *Ecological Processes*, *9*(1), pp.1-16.

Dissanayake, D.M.S.L.B., Morimoto, T., Murayama, Y. and Ranagalage, M., 2019. Impact of landscape structure on the variation of land surface temperature in sub-Saharan region: A case study of Addis Ababa using Landsat data (1986–2016). *Sustainability*, *11*(8), p.2257.

DiGaetano, A. and Lawless, P., 1999. Urban governance and industrial decline: Governing structures and policy agendas in Birmingham and Sheffield, England, and Detroit, Michigan, 1980-1997. *Urban affairs review*, *34*(4), pp.546-577.

DiGaetano, A. and Strom, E., 2003. Comparative urban governance: An integrated approach. *Urban affairs review*, *38*(3), pp.356-395.

Dipeolu, A.A., Ibem, E.O., Fadamiro, J.A. and Fadairo, G., 2021. Factors influencing residents' attitude towards urban green infrastructure in Lagos Metropolis, Nigeria. *Environment, Development and Sustainability*, *23*(4), pp.6192-6214.

Dickinson, D.C. and Hobbs, R.J., 2017. Cultural ecosystem services: Characteristics, challenges and lessons for urban green space research. *Ecosystem Services*, *25*, pp.179-194.

Doornbos, M., 2001. 'Good governance': The rise and decline of a policy metaphor?. *Journal of Development studies*, *37*(6), pp.93-108.

Doornbos, M., 2001. 'Good governance': The rise and decline of a policy metaphor?. *Journal of Development studies*, *37*(6), pp.93-108.

Doornbos, M., 2006. 'Good Governance': The Metamorphoses of a Policy Metaphor. In *Global Forces and State Restructuring* (pp. 73-92). Palgrave Macmillan, London.

Dowall, D.E., Clarke, G. and Clarke, G., 1996. *A framework for reforming urban land policies in developing countries*. Washington, DC. World Bank.

Du Toit, M.J., Cilliers, S.S., Dallimer, M., Goddard, M., Guenat, S., and Cornelius, S.F., 2018. Urban green infrastructure and ecosystem services in sub-Saharan Africa. *Landscape and Urban Planning*, *180*, pp.249-261.

Dunlap, R.E., 2008. The new environmental paradigm scale: From marginality to worldwide use. *The Journal of environmental education*, *40*(1), pp.3-18.

Dunteman, G.H., 1989. *Principal components analysis* (No. 69). Sage.

Dudley, Nigel, ed. *Guidelines for applying protected area management categories*. Iucn, 2008.

Duit, A. and Galaz, V., 2008. Governance and complexity—emerging issues for governance theory. *Governance*, *21*(3), pp.311-335.

Eagles, P.F., 2007. Governance models for parks, recreation, and tourism. In *Transforming parks and protected areas* (pp. 51-73). Routledge.

Eagles, P.F., 2008. Investigating governance within the management models used in park tourism. In Tourism and Travel Research Association Canada Conference (Vol. 12).

Eagles, P.F., 2009. Governance of recreation and tourism partnerships in parks and protected areas. *Journal of sustainable tourism*, *17*(2), pp.231-248.

Eagles, P., Havitz, M., McCutcheon, B., Buteau-Duitschaever, W. and Glover, T., 2010. The perceived implications of an outsourcing model on governance within British Columbia provincial parks in Canada: A quantitative study. Environmental Management, 45(6), pp.1244-1256.

Edgar, L., Marshall, C. and Bassett, M., 2006. *Partnerships: Putting good governance principles in practice*. Ottawa: Institute on Governance.

Erena, D., Berhe, A., Hassen, I., Mamaru, T. and Soressa, Y., 2017. City profile: addis Ababa. *Report Prepared in the SES (Social Inclusion and Energy Management for Informal Urban Settlements) Project, Funded by the Erasmus+ Program of the European Union*.

EC–European Commission, 2013. Building a green infrastructure for Europe. *Publications office of the European Union, Luxembourg*.

EC–European Commission, 2013. Green infrastructure (GI)—enhancing Europe's natural capital. *European Commission, Brussels*.

ECE, U., 1996. Land administration guidelines. *With special reference to countries in transition. Geneva, Switzerland, United Nations/Economic Commission for Europe*.

Eckerberg, K. and Joas, M., 2004. Multi-level Environmental Governance: a concept under stress?. *Local Environment*, *9*(5), pp.405-412.

Edgar, L., Marshall, C. and Bassett, M., 2006. *Partnerships: Putting good governance principles in practice*. Ottawa: Institute on Governance.

Eisenman, T.S., 2013. Frederick Law Olmsted, green infrastructure, and the evolving city. *Journal of Planning History*, *12*(4), pp.287-311.

Eisenman, T.S., 2013. Frederick Law Olmsted, green infrastructure, and the evolving city. *Journal of Planning History*, *12*(4), pp.287-311.

Egusquiza, A., Cortese, M. and Perfido, D., 2019, August. Mapping of innovative governance models to overcome barriers for nature based urban regeneration. In *IOP Conference Series: Earth and Environmental Science* (Vol. 323, No. 1, p. 012081). IOP Publishing.

Ehnert, F., Kern, F., Borgström, S., Gorissen, L., Maschmeyer, S. and Egermann, M., 2018. Urban sustainability transitions in a context of multi-level governance: A comparison of four European states. *Environmental Innovation and Societal Transitions*, *26*, pp.101-116.

Enemark, S., 2005. The land management perspective: building the capacity. In *ITC Lustrum Conference on Spatial Information for Civil Society. Enschede, the Netherlands, International Institute for Geo-information Science and Earth Observation (ITC*.

Enemark, S., 2005, June. Understanding the land management paradigm. In *FIG Commission 7, Symposium on Innovative Technologies for Land Administration* (pp. 19-25).

Enemark, S. and FIG, P., 2009, May. Facing the global agenda-focus on land governance. In *Proceedings of the FIG Working Week*.

England, N., 2009. *Green infrastructure guidance*. Natural England.

Environmental Protection Authority of Ethiopia (EPA, 197). Environmental Policy. Federal Democratic Republic of Ethiopia, Addis Ababa

Environmental Protection Authority of Ethiopia (EPA, 2012). National Report of Ethiopia. In *The United Nations Conference on Sustainable Development (Rio 20+)*. Federal Democratic Republic of Ethiopia, Addis Ababa

Ensminger, J. and Knight, J., 1997. Changing social norms: Common property, bride wealth, and clan exogamy. *Current anthropology*, *38*(1), pp.1-24.

Elder, N., Thomas, A.H. and Arter, D., 1988. *The consensual democracies?: the government and politics of the Scandinavian states*. B. Blackwell.

Ellis, G., 1988. In search of a development paradigm: two tales of a city. *The Journal of Modern African Studies*, *26*(4), pp.677-683.

Ellis, P.D., 2010. *The essential guide to effect sizes: Statistical power, meta-analysis, and the interpretation of research results*. Cambridge university press.

Elmqvist, T., Maltby, E., Barker, T., Mortimer, M., Perrings, C., Aronson, J., De Groot, R., Fitter, A., Mace, G., Norberg, J. and Pinto, I.S., 2010. Biodiversity, ecosystems and ecosystem services. *TEEB Ecological and Economic Foundations. Earthscan, London*, pp.41-111.

Elmqvist, T., Maltby, E., Barker, T., Mortimer, M., Perrings, C., Aronson, J., De Groot, R., Fitter, A., Mace, G., Norberg, J. and Pinto, I.S., 2010. Biodiversity, ecosystems and ecosystem services. *TEEB Ecological and Economic Foundations. Earthscan, London*, pp.41-111.

Elmqvist, T., Fragkias, M., Goodness, J., Guneralp, B., Marcotullio, P.J., McDonald, R.I., Parnell, S., Schewenius, M., Sendstad, M., Seto, K.C. and Wilkinson, C. eds., 2013. *Urbanization, biodiversity and ecosystem services: challenges and opportunities: a global assessment*. Springer.

Ethiopian Forestry Action Program (EFAP), 1994. The Challenge for Development.

EPGDC (2019), Environmental Protection and Green Development Commission. Addis Ababa, Ethiopia

EPA. 2012. National Report of Ethiopia, the United Nations Conference on Sustainable Development (Rio+20). Federal Democratic Republic of Ethiopia, Addis Ababa

Eriksson, O., Cousins, S.A. and Bruun, H.H., 2002. Land-use history and fragmentation of traditionally managed grasslands in Scandinavia. *Journal of vegetation science*, *13*(5), pp.743-748.

Ernstson, H., 2013. The social production of ecosystem services: A framework for studying environmental justice and ecological complexity in urbanized landscapes. *Landscape and urban planning*, *109*(1), pp.7-17.

EPA,2012. Environmental Protection Authority of Ethiopia. Addis Ababa, Ethiopia

Epstein, G., Vogt, J.M., Mincey, S.K., Cox, M. and Fischer, B., 2013. Missing ecology: integrating ecological perspectives with the social-ecological system framework. *International Journal of the Commons*, *7*(2), pp.432-453.

Eshetu, S.B., Yeshitela, K. and Shibire, S., 2021. Urban Green Space Planning, Policy Implementation, and Challenges: The Case of Addis Ababa. *Sustainability*, *13*(20), p.11344.

Eyob, T., 2011. Challenges and problems of urban forest development in Addis Ababa, Ethiopia Trees, people and the built environment Addis Ababa Environmental Protection Authority, Addis Ababa, Ethiopia.

Fabos, J.G., 1985. Land-use planning: From global to local challenge.

Fabos, J.G., 1995. Introduction and overview: the greenway movement, uses and potentials of greenways.

Fabos, J.G., 2004. Greenway planning in the United States: its origins and recent case studies. *Landscape and urban planning*, *68*(2-3), pp.321-342.

Faber, D., 2008. *Capitalizing on environmental injustice: the polluter-industrial complex in the age of globalization*. Rowman & Littlefield Publishers.

Fainstein, S.S., 2000. New directions in planning theory. *Urban affairs review*, *35*(4), pp.451-478.

Faehnle, M., 2014. Collaborative planning of urban green infrastructure: Need, quality, evaluation, and design.

Faehnle, M., Backlund, P., Tyrvainen, L., Niemela, J. and Yli-Pelkonen, V., 2014. How can residents' experiences inform the planning of urban green infrastructure? Case Finland. *Landscape and Urban Planning*, *130*, pp.171-183.

FAO, 1985. Tree Growing by Rural People. FAO, Forestry Paper 64. FAO, Rome

FAO (2018). The State of the World's Forests 2018. Rome: FAO

FDRE, 1995. The Constitution of the Federal Democratic Republic of Ethiopia. Federal Negarit Gazeta, first year No. 1, Addis Ababa

Federal Democratic Republic of Ethiopia (FDRE), Constitution of the Federal Democratic Republic of Ethiopia. Addis Ababa, 1995.

Federal Urban Planning Institute (FUPI), 2006. Report on Hawassa Integrated Development Plan. Addis Ababa, Ethiopia.

Federal Democratic Republic of Ethiopia (FDRE), Ethiopian Building Proclamation, Proclamation No. 624/2009, Addis Ababa, 2009.

Federal Democratic Republic of Ethiopia (FDRE), 2010.Growth and transformation plan 2010/11–2014/15.Ministry of Finance and Economic Development. Addis Ababa, Ethiopia

Federal Democratic Republic of Ethiopia,2015. Ethiopian Development Research Institute (EDRI) and the Global Green Growth Institute (GGGI), A report by New Climate Economy partnership. Addis Ababa, Ethiopia.

Federal Democratic Republic of Ethiopia (FDRE),2016. Ethiopia's Forest Reference Level Submission to the UNFCCC

Federal Democratic Republic of Ethiopia Country Environmental Analysis (CEA) 2017. Ethiopia Realizing Green Transformation. Addis Ababa, Ethiopia.

Ferreira, V., Barreira, A.P., Loures, L., Antunes, D. and Panagopoulos, T., 2020. Stakeholders' engagement on nature-based solutions: A systematic literature review. *Sustainability*, *12*(2), p.640.

Fetene, A. and Worku, H., 2013. Planning for the conservation and sustainable use of urban forestry in Addis Ababa, Ethiopia. *Urban forestry & urban greening*, *12*(3), pp.367-379.

Feris, L.A., 2010. The role of good environmental governance in the sustainable development of South Africa. *Potchefstroom Electronic Law Journal/Potchefstroomse Elektroniese Regsblad*, *13*(1), pp.72-99.

Feyisa, G.L., Dons, K. and Meilby, H., 2014. Efficiency of parks in mitigating urban heat island effect: An example from Addis Ababa. *Landscape and Urban Planning*, *123*, pp.87-95.

Feyisa, A., Negash, M. and Melka, Y., 2022. Urban green infrastructure affects woody plant diversity and carbon stock in Hawassa city in Ethiopia. *Arboricultural Journal*, pp.1-15.

Field A. (2000) Discovering Statistics Using SPSS for Windows. Sage, London.

Field, A., 2013. *Discovering statistics using IBM SPSS statistics*. sage.

Firth, C., Maye, D. and Pearson, D., 2011. Developing “community” in community gardens. *Local Environment*, *16*(6), pp.555-568.

Firehock, K., 2013. *Evaluating and Conserving Green Infrastructure Across the Landscape: A Practitioner's Guide*.

Fischer, F., 1998. Beyond empiricism: policy inquiry in post positivist perspective. *Policy studies journal*, *26*(1), pp.129-146.

Fisher, B., Turner, R.K. and Morling, P., 2009. Defining and classifying ecosystem services for decision making. *Ecological economics*, *68*(3), pp.643-653.

Fiseha, A., 2015. Emergence of Territorially Based Cleavages and Constitutional Responses in Ethiopia: Implications for the Horn of Africa?. *Federalism and Local Government in Ethiopia*, p.12.

Flick, U., von Kardoff, E. and Steinke, I. eds., 2004. *A companion to qualitative research*. Sage.

Flick, U., 2018. *An introduction to qualitative research*. Sage Publications Limited.

Fluhrer, T., Chapa, F. and Hack, J., 2021. A Methodology for Assessing the Implementation Potential for Retrofitted and Multifunctional Urban Green Infrastructure in Public Areas of the Global South. *Sustainability*, *13*(1), p.384.

Flyvbjerg, B., 2001. *Making social science matter: Why social inquiry fails and how it can succeed again*. Cambridge university press.

Flyvbjerg, B. and Richardson, T., 2004. *Planning and Foucault: in search of the dark side of planning theory*. Aalborg Universitetsforlag.

Food and Agriculture Organization (FAO) of the United Nations 2018 An international journal of forestry and forest industries

Folke, C., Carpenter, S., Elmqvist, T., Gunderson, L., Holling, C.S. and Walker, B., 2002. Resilience and sustainable development: building adaptive capacity in a world of transformations. *AMBIO: A journal of the human environment*, *31*(5), pp.437-440.

Folke, C., Colding, J. and Berkes, F., 2003. Synthesis: building resilience and adaptive capacity in social-ecological systems. *Navigating social-ecological systems: Building resilience for complexity and change*, *9*(1), pp.352-387.

Folke, C., T. Hahn, P. Olsson, and J. Norberg. 2005. Adaptive governance of social-ecological systems. *Annual Review of Environment and Resources* 30:441-473.

Foster, J., Lowe, A. and Winkelman, S., 2011. The value of green infrastructure for urban climate adaptation. *Center for Clean Air Policy*, *750*(1), pp.1-52.

Folke, C., Colding, J. and Berkes, F., 2003. Synthesis: building resilience and adaptive capacity in social-ecological systems. *Navigating social-ecological systems: Building resilience for complexity and change*, *9*(1), pp.352-387.

Ford, J.K., MacCallum, R.C. and Tait, M., 1986. The application of exploratory factor analysis in applied psychology: A critical review and analysis. *Personnel psychology*, *39*(2), pp.291-314.

Frantzeskaki, N. and Tilie, N., 2014. The dynamics of urban ecosystem governance in Rotterdam, The Netherlands. Ambio, 43(4), pp.542-555.

Fuller, R.A. and Gaston, K.J., 2009. The scaling of green space coverage in European cities. *Biology letters*, *5*(3), pp.352-355.

Gashu, K. and Gebre-Egziabher, T., 2018. Spatiotemporal trends of urban land use/land cover and green infrastructure change in two Ethiopian cities: Bahir Dar and Hawassa. *Environmental Systems Research*, *7*(1), p.8.

Gashu, K. and Gebre-Egziabher, T., 2019. Barriers to green infrastructure development and planning in two Ethiopian cities: Bahir Dar and Hawassa. *Urban Ecosystems*, *22*(4), pp.657-669.

Gashu, K., Gebre-Egziabher, T. and Wubneh, M., 2020. Local communities' perceptions and use of urban green infrastructure in two Ethiopian cities: Bahir Dar and Hawassa. *Journal of Environmental Planning and Management*, *63*(2), pp.287-316.

Gargiulo, C., Tulisi, A. and Zucaro, F., 2017. Climate change-oriented urban green network design: a decision support tool. In *Network design and optimization for smart cities* (pp. 255-278).

Gebretsadik, Z.M., 2014. Watershed degradation and the growing risk of erosion in Hawassa-Zuria

District, Southern Ethiopia. *Journal of flood risk management*, *7*(2), pp.118-127.

Gebremariam, F.M. and Bayu, A.M., 2017. Ethiopia: a democratic developmental state. *ILIRIA International Review*, *7*(2), pp.153-170.

Geoffrey, M., 2019. Essential of Research design and methodology.

Gill, S.E., Handley, J.F., Ennos, A.R. and Pauleit, S., 2007. Adapting cities for climate change: the role of the green infrastructure. *Built environment*, *33*(1), pp.115-133.

Gliem, J.A. and Gliem, R.R., 2003. Calculating, interpreting, and reporting Cronbach's alpha reliability coefficient for Likert-type scales. Midwest Research-to-Practice Conference in Adult, Continuing, and Community Education.

Girma, Y., Terefe, H., Pauleit, S. and Kindu, M., 2019. Urban green spaces supply in rapidly urbanizing countries: The case of Sebeta Town, Ethiopia. *Remote Sensing Applications: Society and Environment*, *13*, pp.138-149.

Given, L.M. ed., 2008. *The Sage encyclopedia of qualitative research methods*. Sage publications.

Glasson, J., 1978. *An introduction to regional planning: concepts, theory and practice*. Hutchinson.

Gradinaru, S.R., and Hersperger, A.M., 2018. Green infrastructure in strategic spatial plans: Evidence from European urban regions. *Urban for Urban Green*, pp.1-12.

Grey, G. W., and F. J. Deneke. "Urban forestry, Wiley New York." *New York* (1986).

Gregory, R., Ohlson, D. and Arvai, J., 2006. Deconstructing adaptive management: criteria for applications to environmental management. *Ecological applications*, *16*(6), pp.2411-2425.

Gren, Å., Folke, C., Elmqvist, T., Colding, J., Borgstrom, S., Barthel, S. and Andersson, E., 2016. Reconnecting Cities to the Biosphere: Stewardship of Green Infrastructure and Urban Ecosystem Services. In *Sustainable Cities* (pp. 29-46). Apple Academic Press.

Green, O.O., Garmestani, A.S., Albro, S., Ban, N.C., Berland, A., Burkman, C.E., Gardiner, M.M., Gunderson, L., Hopton, M.E., Schoon, M.L. and Shuster, W.D., 2016. Adaptive governance to promote ecosystem services in urban green spaces. *Urban ecosystems*, *19*(1), pp.77-93

Graham, J., Plumptre, T.W. and Amos, B., 2003. *Principles for good governance in the 21st century*. Ottawa: Institute on governance.

Gliem, J.A. and Gliem, R.R., 2003. Calculating, interpreting, and reporting Cronbach's alpha reliability coefficient for Likert-type scales. Midwest Research-to-Practice Conference in Adult, Continuing, and Community Education.

Graham, J., Amos, B. and Plumptre, T.W., 2003. Governance principles for protected areas in the 21st century (pp. 1-2). Ottawa: Institute on Governance, Governance Principles for Protected Areas.

Goodfellow, T., 2015. Taxing the urban boom: property taxation and land leasing in Kigali and Addis Ababa.

Goodness, J. and Anderson, P.M., 2013. Local assessment of Cape Town: navigating the management complexities of urbanization, biodiversity, and ecosystem services in the Cape Floristic Region. In *Urbanization, biodiversity and ecosystem services: challenges and opportunities* (pp. 461-484). Springer, Dordrecht.

Goodness, J., Andersson, E., Anderson, P.M. and Elmqvist, T., 2016. Exploring the links between functional traits and cultural ecosystem services to enhance urban ecosystem management. *Ecological Indicators*, *70*, pp.597-605.

Gomez-Baggethun, E., De Groot, R., Lomas, P.L. and Montes, C., 2010. The history of ecosystem services in economic theory and practice: from early notions to markets and payment schemes. *Ecological economics*, *69*(6), pp.1209-1218.

Gomez-Baggethun, E. and Barton, D.N., 2013. Classifying and valuing ecosystem services for urban planning. *Ecological economics*, *86*, pp.235-245.

Gomez-Baggethun, E., Gren, Å., Barton, D.N., Langemeyer, J., McPhearson, T., O'Farrell, P., Andersson, E., Hamstead, Z. and Kremer, P., 2013. Urban ecosystem services. In *Urbanization, biodiversity and ecosystem services: Challenges and opportunities* (pp. 175-251). Springer, Dordrecht.

Golafshani, N., 2003. Understanding reliability and validity in qualitative research. *The qualitative report*, *8*(4), pp.597-606.

Gouldson, A.P., Colenbrander, S., Sudmant, A., Godfrey, N., Millward-Hopkins, J., Fang, W. and Zhao, X., 2015. Accelerating low carbon development in the World's cities.

Gunaratne, S.A., 2006. Public sphere and communicative rationality: Interrogating Habermas's eurocentrism. *Journalism & Communication Monographs*, *8*(2), pp.93-156.

Guerry, A.D., Polasky, S., Lubchenco, J., Chaplin-Kramer, R., Daily, G.C., Griffin, R., Ruckelshaus, M., Bateman, I.J., Duraiappah, A., Elmqvist, T. and Feldman, M.W., 2015. Natural capital and ecosystem services informing decisions: From promise to practice. *Proceedings of the National Academy of Sciences*, *112*(24), pp.7348-7355.

Guitart, D., Pickering, C. and Byrne, J., 2012. Past results and future directions in urban community gardens research. *Urban forestry & urban greening*, *11*(4), pp.364-373.

Guerry, A.D., Polasky, S., Lubchenco, J., Chaplin-Kramer, R., Daily, G.C., Griffin, R., Ruckelshaus, M., Bateman, I.J., Duraiappah, A., Elmqvist, T. and Feldman, M.W., 2015. Natural capital and ecosystem services informing decisions: From promise to practice. *Proceedings of the National Academy of Sciences*, *112*(24), pp.7348-7355.

Guba, E.G. and Lincoln, Y.S., 1994. Competing paradigms in qualitative research. *Handbook of qualitative research*, *2*(163-194), p.105.

Haase, D., Larondelle, N., Andersson, E., Artmann, M., Borgström, S., Breuste, J., Gomez-Baggethun, E., Gren, Å., Hamstead, Z., Hansen, R. and Kabisch, N., 2014. A quantitative review of urban ecosystem service assessments: concepts, models, and implementation. *Ambio, 43*(4), pp.413-433.

Habtu, A., 2005. Multiethnic federalism in Ethiopia: A study of the secession clause in the constitution. *Publius: The Journal of Federalism*, *35*(2), pp.313-335.

Habitat, U.N., 2002. Urban Governance Indicators: A Sourcebook.

Habitat, U.N., 2002. The global campaign on urban governance. *Concept paper HS/650 E*, *2*.

Habitat, U.N., 2006. State of the World's Cities. The Millennium Development Goals and Urban Sustainability.

Habitat, U.N., 2016. World cities report 2016. Urbanization and development–emerging futures. New York: UN-Habitat.

Habitat, U.N., 2016. Urbanization and development emerging futures. *World cities report*.

Hanna, K.S., Clark, D.A. and Slocombe, D.S. eds., 2007. *Transforming parks and protected areas: Policy and governance in a changing world*. Routledge.

Haq, S.M.A., 2011. Urban green spaces and an integrative approach to sustainable environment. Journal of environmental protection, 2(05), p.601.

Hayes, T.M., 2006. Parks, people, and forest protection: an institutional assessment of the effectiveness of protected areas. *World Development*, *34*(12), pp.2064-2075.

Haile, F., 1989. Women fuelwood carriers and the supply of household energy in Addis Ababa. *Canadian Journal of African Studies/La Revue canadienne des études africaines*, *23*(3), pp.442-451.

Hall, P., 1983. The Anglo-American connection: Rival rationalities in planning theory and practice, 1955–1980. *Environment and Planning B: Planning and Design*, *10*(1), pp.41-46.

Handley, J., Pauleit, S. and Gill, S., 2007. Landscape, sustainability, and the city. In *Landscape and sustainability* (pp. 167-195). Spon Press.

Hansen, R. and Pauleit, S., 2014. From multifunctionality to multiple ecosystem services? A conceptual framework for multifunctionality in green infrastructure planning for urban areas. *Ambio*, *43*(4), pp.516-529.

Hansen, R., Rolf, W., Rall, E., Pauleit, S., Erlwein, S., Fohlmeister, S., Santos, A., Luz, A.C., Branquinho, C., Santos-Reis, M. and Gerohazi, E., 2016. *Advances urban green infrastructure planning and implementation: innovative approaches and strategies from European cities*. The University of Copenhagen.

Hansen, R., Rall, E., Chapman, E., Rolf, W., Pauleit, S. (eds., 2017). *Urban Green Infrastructure planning guide GREEN SURGE*

Haines-Young, R. and Potschin, M., 2010. The links between biodiversity, ecosystem services and human well-being. *Ecosystem Ecology: a new synthesis*, *1*, pp.110-139.

Hajjar, R., Jarvis, D.I. and Gemmill-Herren, B., 2008. The utility of crop genetic diversity in maintaining ecosystem services. *Agriculture, Ecosystems & Environment*, *123*(4), pp.261-270.

Haines-Young, R. and Potschin, M., 2012. Common international classification of ecosystem services (CICES, Version 4.1). *European Environment Agency*, *33*, p.107.

Haile, F., 1989. Women fuelwood carriers and the supply of household energy in Addis Ababa. *Canadian Journal of African Studies/La Revue canadienne des études africaines*, *23*(3), pp.442-451.

Haile, F., 1991. *Women fuel wood carriers in Addis Ababa and the Peri-Urban Forest: report to International Development Research Centre (IDRC) and National Urban Planning Institute (NUPI)*. International Labour Office, Geneva, CH.

Hajer, M.A., 1995. The politics of environmental discourse: ecological modernization and the policy process.

Hajer, M., Hajer, M.A., Wagenaar, H., Goodin, R.E. and Barry, B. eds., 2003. *Deliberative policy analysis: understanding governance in the network society*. Cambridge University Press.

Hajjar, R., Jarvis, D.I. and Gemmill-Herren, B., 2008. The utility of crop genetic diversity in maintaining ecosystem services. *Agriculture, Ecosystems & Environment*, *123*(4), pp.261-270.

Hartje, V., Klaphake, A. and Schliep, R., 2003. The international debate on the ecosystem approach. *BFN-Bundesamt fur Naturschutz (Federal Agency for Nature Conservation), Bonn.*

Hartig, T., Mitchell, R., De Vries, S. and Frumkin, H., 2014. Nature and health. *Annual review of public health*, *35*, pp.207-228.

Harris, N., 2002. Collaborative planning. *Planning futures: New directions for planning theory*, pp.21-43.

Harris, R.W., Clark, J.R. and Matheny, N.P., 2004. Arboriculture: integrated management of landscape trees. *Shrubs and Vines*.

Hardy, D., 2003. *From garden cities to new towns: Campaigning for town and country planning 1899-1946*. Routledge.

Hardin, G., 1968. The tragedy of the commons. *science*, *162*(3859), pp.1243-1248.

Harvey, D., 1989. From managerialism to entrepreneurialism: the transformation in urban governance in late capitalism. *Geografiska Annaler: Series B, Human Geography*, *71*(1), pp.3-17.

Haase, D., Frantzeskaki, N. and Elmqvist, T., 2014. Ecosystem services in urban landscapes: practical applications and governance implications. *Ambio*, *43*(4), pp.407-412.

Healey, P., 1997. *Collaborative planning: Shaping places in fragmented societies*. Macmillan International Higher Education.

Healey, P., 2003. Collaborative planning in perspective. *Planning theory*, *2*(2), pp.101-123.

Hermann, A., Schleifer, S. and Wrbka, T., 2011. The concept of ecosystem services regarding landscape research: a review. *Living Reviews in Landscape Research*, *5*(1), pp.1-37.

Helms, J.E., Henze, K.T., Sass, T.L. and Mifsud, V.A., 2006. Treating Cronbach's alpha reliability coefficients as data in counseling research. *The counseling psychologist*, *34*(5), pp.630-660.

Hennessey, T.M., 1994. Governance and adaptive management for estuarine ecosystems: The case of Chesapeake Bay.

Herslund, L., Backhaus, A., Fryd, O., Jørgensen, G., Jensen, M.B., Limbumba, T.M., Liu, L., Mguni, P., Mkupasi, M., Workalemahu, L. and Yeshitela, K., 2017. Conditions and opportunities for green infrastructure–Aiming for green, water-resilient cities in Addis Ababa and Dar es Salaam. *Landscape and Urban Planning*.

Herslund, L., Backhaus, A., Fryd, O., Jorgensen, G., Jensen, M.B., Limbumba, T.M., Liu, L., Mguni, P., Mkupasi, M., Workalemahu, L. and Yeshitela, K., 2018. Conditions and opportunities for green infrastructure–Aiming for green, water-resilient cities in Addis Ababa and Dar es Salaam. *Landscape and urban planning*, *180*, pp.319-327.

Heynen, N., 2006. Green urban political ecologies: toward a better understanding of inner-city environmental change. *Environment and Planning A*, *38*(3), pp.499-516.

Helms, J.E., Henze, K.T., Sass, T.L. and Mifsud, V.A., 2006. Treating Cronbach's alpha reliability coefficients as data in counseling research. *The counseling psychologist*, *34*(5), pp.630-660.

Hilal, A.H. and Alabri, S.S., 2013. Using NVivo for data analysis in qualitative research. *International interdisciplinary journal of education*, *2*(2), pp.181-186.

Horst, A.,2006. Rehabilitation of urban forests in Addis Ababa. *Journal of the Drylands*, *1*(2), pp.108-117.

Hope Sr, K.R., 2009. Climate change and poverty in Africa. *International Journal of Sustainable Development & World Ecology*, *16*(6), pp.451-461.

Howard, E., 1902. Garden cities of tomorrow. London: S. Sonnenschein & Co., Ltd

Hout, W., 2007. *The politics of aid selectivity: Good governance criteria in World Bank, US and Dutch development assistance* (Vol. 60). Routledge.

Holling, C.S., 1978. *Adaptive environmental assessment and management*. John Wiley & Sons.

Hubacek, K. and Kronenberg, J., 2013. Synthesizing different perspectives on the value of urban ecosystem services. *Landscape and Urban Planning*, *1*(109), pp.1-6.

Huang, X., Zhao, D., Brown, C.G., Wu, Y. and Waldron, S.A., 2010. Environmental issues and policy priorities in China: a content analysis of government documents. *China: An international journal*, *8*(02), pp.220-246.

Huang, C., Yang, J., Clinton, N., Yu, L., Huang, H., Dronova, I. and Jin, J., 2021. Mapping the maximum extents of urban green spaces in 1039 cities using dense satellite images. *Environmental Research Letters*, *16*(6), p.064072.

Hung, M.C. and Wu, Y.H., 2005. Mapping and visualizing the Great Salt Lake landscape dynamics using multi-temporal satellite images, 1972–1996. *International Journal of Remote Sensing*, *26*(9), pp.1815-1834.

Ignatieva, M., Stewart, G.H. and Meurk, C., 2011. Planning and design of ecological networks in urban areas. *Landscape and ecological engineering*, *7*(1), pp.17-25.

Innes, J.E., 1996. Planning through consensus building: A new view of the comprehensive planning ideal. *Journal of the American planning association*, *62*(4), pp.460-472.

Irani, Z., Ezingeard, J.N., Grieve, R.J. and Race, P., 1999. A case study strategy as part of an information systems research methodology: a critique. *International Journal of Computer Applications in Technology*, *12*(2-5), pp.190-198.

Institute of Biodiversity Conservation and Research, 2005. *National biodiversity strategy and action plan*. Government of the Federal Democratic Republic of Ethiopia.

Israel, G.D., 1992. Determining sample size.

Janka, D.G., 2013. The Place of Environmental Protection in the Growth and Transformation Plan of the Federal Democratic Republic of Ethiopia. *Oromia Law Journal*, *2*(2), pp.1-31.

Jalata, G.G., 2014. Development assistance from the South: Comparative analysis of Chinese and Indian to Ethiopia. *Chinese Studies*, *3*(01), p.24.

Jacobson, S.K. and Marynowski, S.B., 1997. Public Attitudes and Knowledge about Ecosystem Management on Department of Defense Land in Florida: Actidudes Públicas y Conocimiento del Manejo de Ecosistemas de las Tierras del Departamento de Defensa en Florida. *Conservation biology*, *11*(3), pp.770-781.

James, P., Tzoulas, K., Adams, M.D., Barber, A., Box, J., Breuste, J., Elmqvist, T., Frith, M., Gordon, C., Greening, K.L. and Handley, J., 2009. Towards an integrated understanding of green space in the European built environment. *Urban Forestry & Urban Greening*, *8*(2), pp.65-75.

Jongman, R.H., 2004. The context and concept of ecological networks. In *Ecological networks and greenways; concept, desing, implementation* (pp. 7-33).

Jansson, Å. and Nohrstedt, P., 2001. Carbon sinks and human freshwater dependence in Stockholm County. *Ecological Economics*, *39*(3), pp.361-370.

Jansson, M. and Lindgren, T., 2012. A review of the concept ‘management ‘about urban landscapes and green spaces: Toward a holistic understanding. *Urban forestry & urban greening*, *11*(2), pp.139-145.

Janssen, S.K., van Tatenhove, J.P., Otter, H.S. and Mol, A.P., 2015. Greening flood protection—an interactive knowledge arrangement perspective. *Journal of Environmental Policy & Planning*, *17*(3), pp.309-331.

Jansson, M., Vogel, N., Fors, H. and Randrup, T.B., 2019. The governance of landscape management: new approaches to urban open space development. *Landscape Research*, *44*(8), pp.952-965.

Jax, K., Barton, D.N., Chan, K.M., De Groot, R., Doyle, U., Eser, U., Görg, C., Gómez-Baggethun, E., Griewald, Y., Haber, W. and Haines-Young, R., 2013. Ecosystem services and ethics. *Ecological Economics*, *93*, pp.260-268.

Joshi, A., Kale, S., Chandel, S. and Pal, D.K., 2015. Likert scale: Explored and explained. *British Journal of Applied Science & Technology*, *7*(4), p.396.

Javed, N. and Riaz, S., 2020. Issues in urban planning and policy: the case study of lahore, Pakistan. In *New Urban Agenda in Asia-Pacific* (pp. 117-162). Springer, Singapore.

Jax, K., Barton, D.N., Chan, K.M., De Groot, R., Doyle, U., Eser, U., Görg, C., Gómez-Baggethun, E., Griewald, Y., Haber, W. and Haines-Young, R., 2013. Ecosystem services and ethics. *Ecological Economics*, *93*, pp.260-268.

Jebena, B.A., 2015. Ethnic Federalism and Democratic Developmental State in Ethiopia: Some Points of Contradiction. *International Journal of Political Science and Development*, *3*(7), pp.291-300.

Jentoft, S., Chuenpagdee, R., Bundy, A. and Mahon, R., 2010. Pyramids and roses: Alternative images for the governance of fisheries systems. *Marine Policy*, *34*(6), pp.1315-1321.

Jessop, B., 1997. Capitalism and its future: remarks on regulation, government, and governance. *Review of International Political Economy*, *4*(3), pp.561-581.

Jessop, B., 1998. The rise of governance and the risks of failure: The case of economic development. *International social science journal*, *50*(155), pp.29-45.

Jim, C.Y. and Chen, W.Y., 2006. Perception and attitude of residents toward urban green spaces in Guangzhou (China). *Environmental management*, *38*(3), pp.338-349.

Jolliffe, I.T. and Cadima, J., 2016. Principal component analysis: a review and recent developments. *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences*, *374*(2065), p.20150202.

Jongman, R.H. and Pungetti, G., 2004. Introduction: ecological networks and greenways. In *Ecological networks and greenways; concept, desing, implementation* (pp. 1-6). Cambridge University Press.

Johnson, R.B. and Onwuegbuzie, A.J., 2004. Mixed methods research: A research paradigm whose time has come. *Educational researcher*, *33*(7), pp.14-26.

Jongman, R.H., Kulvik, M. and Kristiansen, I., 2004. European ecological networks and greenways. *Landscape and urban planning*, *68*(2-3), pp.305-319.

Jongman, R.H. and Pungetti, G., 2004. Introduction: ecological networks and greenways. In *Ecological networks and greenways; concept, desing, implementation* (pp. 1-6). Cambridge University Press.

Kabisch, N., 2015. Ecosystem service implementation and governance challenges in urban green space planning—The case of Berlin, Germany. Land use policy, 42, pp.557-567.

Kabisch, N., Strohbach, M., Haase, D. and Kronenberg, J., 2016. Urban green space availability in European cities. *Ecological indicators*, *70*, pp.586-596.

Kabisch, N., Korn, H., Stadler, J. and Bonn, A., 2017. *Nature-based solutions to climate change adaptation in urban areas: Linkages between science, policy, and practice*. Springer Nature.

Kabisch, N., Korn, H., Stadler, J. and Bonn, A., 2017. Nature-based Solutions to Climate Change Adaptation in Urban Areas. *Theory and Practice of Urban Sustainability Transitions*.

Kaiser, H.F., 1960. The application of electronic computers to factor analysis. *Educational and psychological measurement*, *20*(1), pp.141-151.

Kaiser, H.F., 1991. Coefficient alpha for a principal component and the Kaiser-Guttman rule. *Psychological reports*, *68*(3), pp.855-858.

Kato, S., 2011. Green infrastructure for Asian cities: the spatial concepts and planning strategies. In *Journal of the 2011 international symposium on city planning* (Vol. 2011, pp. 161-170). Korea Planners Association.

Kambites., & Owen, S.2006. Renewed Prospects for Green Infrastructure Planning in the UK Planning, *Journal of Practice & Research*, 21(4), 483 – 496.

Kavaliauskas, P., 2008. A concept of sustainable development for regional land use planning: Lithuanian experience. *Technological and economic development of economy*, *14*(1), pp.51-63.

Kassaye, K.D., Amberbir, A., Getachew, B. and Mussema, Y., 2006. A historical overview of traditional medicine practices and policy in Ethiopia. *Ethiopian Journal of Health Development*, *20*(2), pp.127-134.

Kjær, A.M. (2004) Governance, Polity Press, Cambridge and Malden, MA.

Keeley, J. and Scoones, I., 2000. Knowledge, power and politics: the environmental policy-making process in Ethiopia. *The Journal of Modern African Studies, 38*(1), pp.89-120.

Kaufmann, D. and Kraay, A., 2007. *Governance indicators: where are we, where should we be going?*. The World Bank.

Kearns, A. and Paddison, R., 2000. New challenges for urban governance. *Urban studies*, *37*(5-6), pp.845-850.

Kearney, J., Berkes, F., Charles, A., Pinkerton, E. and Wiber, M., 2007. The role of participatory governance and community-based management in integrated coastal and ocean management in Canada. *Coastal Management*.

Knill, C., Debus, M. and Heichel, S., 2010. Do parties matter in internationalised policy areas? The impact of political parties on environmental policy outputs in 18 OECD countries, 1970–2000. *European journal of political research*, *49*(3), pp.301-336.

Kirstein, W. and Netzband, M., 2001. Landscape metrics as a tool for the comparison of different urban regions. *Remote Sensing of Urban Areas/Fernerkundung in urbanen Räumen. Regensburger Geographische Schriften*, (35).

Koc, C.B., Osmond, P., and Peters, A. 2016. A Green Infrastructure Typology Matrix to Support Urban Microclimate Studies. *Procedia Engineering* (169): 183 – 190.

Koc, C.B., Osmond, P. and Peters, A., 2017. Towards a comprehensive green infrastructure typology: a systematic review of approaches, methods and typologies. *Urban ecosystems*, *20*(1), pp.15-35.

Kohler-Koch, B. and Rittberger, B., 2006. The governance turn in EU studies. *J. Common Mkt. Stud.*, *44*, p.27.

Knebel, N. and Kolhatkar, M., 2009. The Dilemma of Urban Governance in Africa Between Western and Eastern Development Models: A Case Study from Addis Ababa. In *International Conference City Futures* (Vol. 9).

Kohler-Koch, B. and Rittberger, B., 2006. The governance turn in EU studies. *J. Common Mkt. Stud.*, *44*, p.27.

Kooiman, J., 2003. Societal governance. In *Demokratien in Europa* (pp. 229-250). VS Verlag für Sozialwissenschaften, Wiesbaden.

Kooiman, J., Bavinck, M., Chuenpagdee, R., Mahon, R. and Pullin, R., 2008. Interactive governance and governability: an introduction. *The journal of transdisciplinary environmental studies*, *7*(1), pp.1-11.

Kooiman, J., 2010. Governance and governability. In *The New Public Governance?* (pp. 88-102). Routledge.

Koontz, T.M., Gupta, D., Mudliar, P. and Ranjan, P., 2015. Adaptive institutions in social-ecological systems governance: A synthesis framework. *Environmental Science & Policy*, *53*, pp.139-151.

Konijnendijk, C.C., Nilsson, K., Randrup, T.B. and Schipperijn, J. eds., 2005. *Urban forests and trees: a reference book*. Springer Science & Business Media.

Kothari, C.R., Research Methodology: Methods and Techniques. 1985. *Parakashan, New Delhi, India*.

Horst, A., 2006. Rehabilitation of urban forests in Addis Ababa. *Journal of the Drylands*, *1*(2), pp.108-117.

Koroso, N.H., Zevenbergen, J.A. and Lengoiboni, M., 2019. Land institutions' credibility: analyzing the role of complementary institutions. *Land use policy*, *81*, pp.553-564.

Koroso, N.H., Zevenbergen, J.A. and Lengoiboni, M., 2020. Urban land use efficiency in Ethiopia: An assessment of urban land use sustainability in Addis Ababa. *Land Use Policy*, *99*, p.105081.

Koroso, N.H., Lengoiboni, M. and Zevenbergen, J.A., 2021. Urbanization and urban land use efficiency: Evidence from regional and Addis Ababa satellite cities, Ethiopia. *Habitat International*, *117,* p.102437.

Koroso, N.H., Lengoiboni, M. and Zevenbergen, J.A., 2021. Urbanization and urban land use efficiency: Evidence from regional and Addis Ababa satellite cities, Ethiopia. *Habitat International*, *117,* p.102437.

Kopiński, D., Polus, A. and Taylor, I., 2011. Contextualizing Chinese engagement in Africa. *Journal of Contemporary African Studies*, *29*(2), pp.129-136.

Kowe, P., Mutanga, O. and Dube, T., 2021. Advancements in the remote sensing of landscape pattern of urban green spaces and vegetation fragmentation. *International Journal of Remote Sensing*, *42*(10), pp.3797-3832.

Krasny, M.E. and Tidball, K.G., 2009. Community gardens as contexts for science, stewardship, and civic action learning. *Cities and the Environment*, *2*(1), pp.1-18.

Krasny, M.E., 2009. A response to Scott's concerns about the relevance of environmental education research: applying social–ecological systems thinking and consilience to defining research goals. *Environmental Education Research*, *15*(2), pp.189-198.

Krause, B., Culmsee, H., Wesche, K., Bergmeier, E. and Leuschner, C., 2011. Habitat loss of floodplain meadows in north Germany since the 1950s. *Biodiversity and Conservation*, *20*(11), pp.2347-2364.

Krejcie, R.V. and Morgan, D.W., 1970. Determining sample size for research activities. *Educational and psychological measurement*, *30*(3), pp.607-610.

Krott, M., 2005. *Forest policy analysis*. Springer Science & Business Media.

Kusters, K., De Graaf, M., Buck, L., Galido, K., Maindo, A., Mendoza, H., Nghi, T.H., Purwanto, E. and Zagt, R., 2020. Inclusive landscape governance for sustainable development: assessment methodology and lessons for Civil Society Organizations. *Land*, *9*(4), p.128.

Kuang, W., 2019. Mapping global impervious surface area and green space within urban environments. *Science China Earth Sciences*, *62*(10), pp.1591-1606.

Lall, S.V., Henderson, J.V. and Venables, A.J., 2017. *Africa's cities: Opening doors to the world*. World Bank Publications.

Larsen, L., Yeshitela, K., Mulatu, T., Seifu, S. and Desta, H., 2019. The impact of rapid urbanization and public housing development on urban form and density in Addis Ababa, Ethiopia. *Land*, *8*(4), p.66.

Lafortezza, R., Carrus, G., Sanesi, G. and Davies, C., 2009. Benefits and well-being perceived by people visiting green spaces in periods of heat stress. *Urban forestry & urban greening*, *8*(2), pp.97-108.

Landau, S. and Everitt, B., 2009. S (2004). A Handbook of Statistical Analyses USING SPSS.

Landscape Institute (2016) LANDSCAPE INSTITUTE (2016a), BIM for Landscape. Taylor and Francis; ProQuest, Abingdon, Ann Arbor, Michigan.

Langemeyer, J., 2015. *Urban ecosystem services: the value of green spaces in cities* (Doctoral dissertation, Stockholm Resilience Centre, Stockholm University).

Lambooy, T. and Levashova, Y., 2011. Opportunities and challenges for private sector entrepreneurship and investment in biodiversity, ecosystem services and nature conservation. *International Journal of Biodiversity Science, Ecosystem Services & Management*, *7*(4), pp.301-318.

Lal, P., Lim-Applegate, H. and Scoccimarro, M., 2002. The adaptive decision-making process as a tool for integrated natural resource management: focus, attitudes, and approach. *Conservation Ecology*, *5*(2).

Laudari, H.K., Aryal, K. and Maraseni, T., 2020. A postmortem of forest policy dynamics of Nepal. *Land Use Policy*, *91*, p.104338.

Lavie, T. and Tractinsky, N., 2004. Assessing dimensions of perceived visual aesthetics of websites. *International journal of human-computer studies*, *60*(3), pp.269-298.

LeGates, R.T. and Stout, F. eds., 2015. *The city reader*. Routledge.

Leroy, P. and Arts, B., 2006. Institutional dynamics in environmental governance. In *Institutional dynamics in environmental governance* (pp. 1-19). Springer, Dordrecht.

Lemos, M.C. and Agrawal, A., 2006. Environmental governance. *Annu. Rev. Environ. Resour.*, *31*, pp.297-325.

Lennon, M., Scott, M., Collier, M. and Foley, K., 2016. Developing green infrastructure 'thinking': devising and applying an interactive group-based methodology for practitioners. *Journal of Environmental Planning and Management*, *59*(5), pp.843-865.

Leta, S., Mekonen, A., Alemu, E., Alemu, T., Abate, Z., Yilma, E., Teshome, G., Habtemariam, H., Ragassa, C., Sahle, M. and Soromessa, T., 2017. Pollution and sanitation study for Addis Ababa rivers and riversides development plan project. *Center for Environmental Science. Addis Ababa University, Addis Ababa*.

Li, F., Zheng, W., Wang, Y., Liang, J., Xie, S., Guo, S., Li, X. and Yu, C., 2019. Urban green space fragmentation and urbanization: A spatiotemporal perspective. *Forests*, *10*(4), p.333.

Lidskog, R. and Sundqvist, G., 2004. From consensus to credibility: New challenges for policy-relevant science. *Innovation: The European Journal of Social Science Research*, *17*(3), pp.205-226.

Liere, K.D.V. and Dunlap, R.E., 1980. The social bases of environmental concern: A review of hypotheses, explanations and empirical evidence. *Public opinion quarterly*, *44*(2), pp.181-197.

Linkov, I., Satterstrom, F.K., Kiker, G.A., Bridges, T.S., Benjamin, S.L. and Belluck, D.A., 2006. From optimization to adaptation: Shifting paradigms in environmental management and their application to remedial decisions. *Integrated Environmental Assessment and Management: An International Journal*, *2*(1), pp.92-98.

Li, F., Wang, R., Paulussen, J., Lui, X., 2005. Comprehensive concept planning of urban greening based on ecological principles: a case study in Bejing, China. Landscape and Urban Planning 72, 325–336.

Littke, H., 2016. *Planning Practices of Greening: Challenges for Public Urban Green Space* (Doctoral dissertation, KTH Royal Institute of Technology).

Lindner, S., 2014. Ethiopia: Overview of corruption in land administration. *Transparency International*, *9*, pp.1-11

Lindell, I., 2008. The multiple sites of urban governance: insights from an African city. *Urban Studies*, *45*(9), pp.1879-1901.

Lindley, S. and Gill, S., 2013. Green Infrastructure: An essential foundation for sustainable urban futures in Africa.

Lindley, S. Gill, S., Cavan, C., Yeshitela, K., Nebebe, A., Woldegerima, T., Kibassa, D., Shemdoe, R., Renner, F., Buchta, K., Abo-El-Wafa, H., Printz, A., Sall, F., Coly, A., Ndour, N., Feumba, R., Zogning, M., Tonye, E., Oue ´draogo, Y., Samari, S. & Sankara, B. 2015. Green Infrastructure for Climate Adaptation in African Cities. In: Pauleit, S. et al. (eds.): Urban Vulnerability and Climate Change in Africa, Future City 4, 107-152.

Li, H., Chen, W. and He, W., 2015. Planning of green space ecological network in urban areas: an example of Nanchang, China. *International journal of environmental research and public health*, *12*(10), pp.12889-12904.

Liu, J. and Yang, W., 2013. Integrated assessments of payments for ecosystem services programs. *Proceedings of the National Academy of Sciences*, *110*(41), pp.16297-16298.

Liefferink, D., 2006. The dynamics of policy arrangements: turning round the tetrahedron. In *Institutional dynamics in environmental governance* (pp. 45-68). Springer, Dordrecht.

Lockwood, M., 2010. Good governance for terrestrial protected areas: A framework, principles and performance outcomes. Journal of environmental management, 91(3), pp.754-766.

Lockwood, M., Davidson, J., Curtis, A., Stratford, E. and Griffith, R., 2010. Governance principles for natural resource management. *Society and natural resources*, *23*(10), pp.986-1001.

Loitz, C.C., Stearns, J.A., Fraser, S.N., Storey, K. and Spence, J.C., 2017. Network analysis of inter-organizational relationships and policy use among active living organizations in Alberta, Canada. *BMC public health*, *17*(1), p.649.

Lohr, V.I., Pearson-Mims, C.H., Tarnai, J. and Dillman, D.A., 2004. How urban residents rate and rank the benefits and problems associated with trees in cities. *Journal of Arboriculture*, *30*(1), pp.28-35.

Loorbach, D., 2010. Transition management for sustainable development: a prescriptive, complexity-based governance framework. *Governance*, *23*(1), pp.161-183.

Lovell, S.T. and Taylor, J.R., 2013. Supplying urban ecosystem services through multifunctional green infrastructure in the United States. *Landscape ecology*, *28*(8), pp.1447-1463.

Lovasi, G.S., Quinn, J.W., Neckerman, K.M., Perzanowski, M.S. and Rundle, A., 2008. Children living in areas with more street trees have lower prevalence of asthma. *Journal of Epidemiology & Community Health*, *62*(7), pp.647-649.

Lukas, M., 2019. Urban governance. *The Wiley Blackwell Encyclopedia of Urban and Regional Studies*, pp.1-11.

Luzar, E.J. and Diagne, A., 1999. Participation in the next generation of agriculture conservation programs: the role of environmental attitudes. *The Journal of Socio-Economics*, *28*(3), pp.335-349.

Magel, H. and Wehrmann, B., 2001. Applying good governance to urban land management–why and how. *Zeitschrift für Vermessungswesen (ZfV)*, *126*(6), pp.310-316.

Mahon, R. and McConney, P., 2013. A network perspective on governing interactions. In *Governability of Fisheries and Aquaculture* (pp. 301-314). Springer, Dordrecht.

Marshall, M.N., 1996. Sampling for qualitative research. *Family practice*, *13*(6), pp.522-526.

Marks, G., 1993. Structural policy and multilevel governance in the EC. *The Maastricht debates and beyond , 392* .

Maes, J., Zulian, G., Günther, S., Thijssen, M. and Raynal, J., 2019. Enhancing resilience of urban ecosystems through green infrastructure (EnRoute). *Publications Office of the European Union: Luxembourg*, pp.1-115.

March, J.G. and Olsen, J.P., 1983. The new institutionalism: Organizational factors in political life. *American political science review*, *78*(3), pp.734-749.

Mas, J.F., 1999. Monitoring land-cover changes: a comparison of change detection techniques. *International journal of remote sensing*, *20*(1), pp.139-152.

Martins, H. and Borges, J.G., 2007. Addressing collaborative planning methods and tools in forest management. *Forest ecology and management*, *248*(1-2), pp.107-118.

Martín-Lopez, B., Iniesta-Arandia, I., García-Llorente, M., Palomo, I., Casado-Arzuaga, I., Del Amo, D.G., Gómez-Baggethun, E., Oteros-Rozas, E., Palacios-Agundez, I., Willaarts, B. and González, J.A., 2012. Uncovering ecosystem service bundles through social preferences. *PLoS one*, *7*(6).

Maryudi, A., 2016. Choosing timber legality verification as a policy instrument to combat illegal logging in Indonesia. *Forest Policy and Economics*, *68*, pp.99-104.

Matthews, T., Lo, A.Y. and Byrne, J.A., 2015. Reconceptualizing green infrastructure for climate change adaptation: Barriers to adoption and drivers for uptake by spatial planners. *Landscape and Urban Planning*, *138*, pp.155-163.

Mahjabeen, Z., Shrestha, K.K. and Dee, J.A., 2003. Rethinking community participation in urban planning: The role of disadvantaged groups in Sydney metropolitan strategy. *Australasian Journal of Regional Studies, The*, *9*(1), p.45.

Mahmood, I.P. and Rufin, C., 2005. Government's dilemma: The role of government in imitation and innovation. *Academy of Management Review*, *30*(2), pp.338-360.

Manejo de Ecosistemas de las Tierras del Departamento de Defensa en Florida. *Conservation biology*, *11*(3), pp.770-781.

Markakis, J., 2003. Anatomy of a Conflict: Afar & Ise Ethiopia. *Review of African Political Economy*, *30*(97), pp.445-453

Magnuszewski, P., Sendzimir, J. and Kronenberg, J., 2005. Conceptual modeling for adaptive environmental assessment and management in the Barycz Valley, Lower Silesia, Poland. *International Journal of Environmental Research and Public Health*, *2*(2), pp.194-203.

Mansor, M., Said, I. and Mohamad, I., 2017. Experiential Contacts with Green Infrastructure's Diversity and Well-Being of Urban Community. *Asian Journal of Environment-Behaviour Studies*, *2*(2), pp.65-79.

Maric, I., Crncevic, T. and Cvetić, J., 2015. Green infrastructure planning for cooling urban communities: Overview of the contemporary approaches with special reference to Serbian experiences. *Spatium*, (33), pp.55-61.

McDonald, L., Allen, W., Benedict, M. and O'connor, K., 2005. Green infrastructure plan evaluation frameworks. *Journal of Conservation Planning*, *1*(1), pp.12-43.

McDaniels, T.L. and Gregory, R., 2004. Learning as an objective within a structured risk management decision process.

McGarigal, K., 2002. FRAGSTATS User Guidelines Versión 3.

McEvoy, P. and Richards, D., 2006. A critical realist rationale for using a combination of quantitative and qualitative methods. *Journal of research in nursing*, *11*(1), pp.66-78.

McMahon, E.T., 2000. Green Infrastructure. Planning Commissioners Journal.

McGarigal, K., 1995. *FRAGSTATS: spatial pattern analysis program for quantifying landscape structure* (Vol. 351). US Department of Agriculture, Forest Service, Pacific Northwest Research Station.

McGarigal, K., Cushman, S.A., Neel, M.C. and Ene, E., 2002. FRAGSTATS: spatial pattern analysis program for categorical maps. *Computer software program produced by the authors at the University of Massachusetts, Amherst. Available at the following web site: www. umass. edu/landeco/research/fragstats/fragstats. html*, *6*.

McGarigal, K., Cushman, S.A. and Ene, E., 2012. FRAGSTATS v4: spatial pattern analysis program for categorical and continuous maps. *Computer software program produced by the authors at the University of Massachusetts, Amherst. http://www. umass. edu/landeco/research/fragstats/fragstats. html*, *15*.

McGuirk, P.M., 2001. Situating communicative planning theory: context, power, and knowledge. *Environment and Planning A*, *33*(2), pp.195-217.

McLoughlin, J.B., 1969. *Urban & regional planning: a systems approach*. Faber and Faber.

McPhearson, T., Pickett, S.T., Grimm, N.B., Niemela, J., Alberti, M., Elmqvist, T., Weber, C., Haase, D., Breuste, J. and Qureshi, S., 2016. Advancing urban ecology toward a science of cities. *BioScience*, *66*(3), pp.198-212.

Mehretu, A., 2012. Ethnic federalism and its potential to dismember the Ethiopian state. *Progress in Development Studies*, *12*(2-3), pp.113-133.

Mell, I.C., 2009, March. Can green infrastructure promote urban sustainability?. In *Proceedings of the institution of civil engineers-engineering sustainability* (Vol. 162, No. 1, pp. 23-34). Thomas Telford Ltd.

Mell, I.C., 2008, June. Green infrastructure: concepts and planning. In *FORUM ejournal* (Vol. 8, No. 1, pp. 69-80).

Mell, I., 2016. *Global green infrastructure: lessons for successful policy-making, investment and management*. Routledge.

Mensah, C.A., 2014. Urban green spaces in Africa: nature and challenges. *International Journal of Ecosystem*, *4*(1), pp.1-11.

Mensah, C.A., 2016. The State of Green Spaces in Kumasi City (Ghana): Lessons for Other African Cities. *Journal of Urban and Regional Analysis*, *8*(2), p.159.

Mekuria, W., Haileslassie, A., Tengberg, A. and Zazu, C., 2021. Stakeholders interest and influence and their interactions in managing natural resources in Lake Hawassa catchment, Ethiopia. *Ecosystems and People*, *17*(1), pp.87-107.

Mitchell, R. and Popham, F., 2008. Effect of exposure to natural environment on health inequalities: an observational population study. *The lancet*, *372*(9650), pp.1655-1660.

Milliken, S., 2018. Ecosystem services in urban environments. In *Nature Based Strategies for Urban and Building Sustainability* (pp. 17-27). Butterworth-Heinemann.

Millennium Ecosystem Assessment (MEA) 2005. General Synthesis Report. Island Press, Washington DC.

Ministry of Urban Development and Construction (MoUDC),2006. Urban Good Governance Package report. Addis Ababa, Ethiopia.

Ministry of Finance and Economic Development (MoFED), 2006. Ethiopia: Building on Progress A Plan for Accelerated and Sustained Development to End Poverty (PASDEP)(2005/06–2009/10.

Ministry of Urban Development and, Housing (MoUDH) 2012. Urban Planning, Sanitaion and Beautification Bureau Structure Plan Manual. Addis Ababa, Ethiopia.

Ministry of Urban Development and Construction(MoUDC),2015. Urban Green Infrastructure Standard Manual. Addis Ababa, Ethiopia.

Ministry of Urban Development and, Housing (MoUDH) 2015. Development of open green spaces in communal housing areas Manual No.14/2016.Addis Ababa, Ethiopia.

Ministry of Urban Development and Housing(MoUDH), 2016. Rivers and river buffer green infrastructure design standard implementation. Manual No.17/2016.Addis Ababa, Ethiopia

Ministry of Urban Development and Housing(MoUDH), 2016. Recreational Parks Development and Management Manual No.13/2016. Addis Ababa, Ethiopia

Mincey, S.K., Hutten, M., Fischer, B.C., Evans, T.P., Stewart, S.I. and Vogt, J.M., 2013. Structuring institutional analysis for urban ecosystems: A key to sustainable urban forest management. *Urban Ecosystems*, *16*(3), pp.553-571.

Miller, Robert W., Richard J. Hauer, and Les P. Werner. *Urban forestry: planning and managing urban greenspaces*. Waveland press, 2015.

Million, B., 2011. Forest plantations and woodlots in Ethiopia. In *African Forest Forum* (Vol. 1, No. 12, pp. 11-15).

Mittal, I. and Gupta, R.K., 2015. Natural Resources Depletion and Economic Growth in Present Era. *SOCH-Mastnath Journal of Science & Technology (BMU, Rohtak)(ISSN: 0976-7312)*, *10*(3).

Molla, M.B., Ikporukpo, C.O. and Olatubara, C.O., 2017. Utilization patterns of urban green infrastructure in southern Ethiopia. *Journal of Applied Sciences and Environmental Management*, *21*(7), pp.1227-1236.

Molla, M.B., Ikporukpo, C. and Olatubara, C., 2018. The spatio-temporal pattern of urban green spaces in southern Ethiopia. *Am. J. Geogr. Inform. Syst*, *7*, pp.1-14.

Molla, M.B., Ikporukpo, C.O. and Olatubara, C.O., 2019. Evaluating Policy and Legal Frameworks of Urban Green Infrastructure Development in Ethiopia. *Journal of Environmental Assessment Policy and Management*, *21*(03), p.1950016.

Molla, M.B., 2020. The role of stakeholders in improving management practices of urban green infrastructure in Southern Ethiopia. *Planning Practice & Research*, *35*(2), pp.220-230.

Monteiro, R. and Ferreira, J.C., 2020. Green Infrastructure Planning as a Climate Change and Risk Adaptation Tool in Coastal Urban Areas. *Journal of Coastal Research*, *95*(SI), pp.889-893.

Monteiro, R., Ferreira, J.C. and Antunes, P., 2020. Green Infrastructure Planning Principles: An Integrated Literature Review. *Land*, *9*(12), p.525.

MOFED. 2010. Growth and Transformation Plan: 2010/11-2014/15. Volume I: Main Text. Addis Ababa: Ministry of Finance and Economic Development (MoFED). Available at: http://www.mofed.gov.et/index.php?option=com_content&view=article&id=14&Itemid=94

MOFED. 2010. Growth and Transformation Plan: 2010/11-2014/15.Policy Matrix

Morgan, P. and Zheng, Y., 2019. Old bottle new wine? The evolution of China's aid in Africa 1956–2014. *Third World Quarterly*, *40*(7), pp.1283-1303.

More, T.A., 2005, January. From public to private: Five concepts of park management and their consequences. In The George Wright Forum (Vol. 22, No. 2, pp. 12-20). George Wright Society.

Molla, M.B., 2020. The role of stakeholders in improving management practices of urban green infrastructure in Southern Ethiopia. *Planning Practice & Research*, *35*(2), pp.220-230.

Molin, J. F., 2014. Parks, People and Places – Place-based Governance in Urban Green Space Maintenance (Ph.D. Thesis). University of Copenhagen, Copenhagen.

Molotch, H., 2009. Urban deals in comparative perspective. In *Beyond the city limits: Urban policy and economic restructuring in comparative perspective* (pp. 175-198). Temple University Press.

Mpofu, T.P., 2013. Environmental challenges of urbanization: a case study for open green space management. Research Journal of Agricultural and Environmental Management, 2(4), pp.105-110.

Mulugeta, M., 2013. The need for policy framework for urban/peri-urban agriculture in Ethiopia: a reflection. *Ethiopian Journal of the Social Sciences and Humanities*, *9*(1), pp.79-110.

Mulugeta, G., 2012. The Ethiopian environmental regime versus international standards: Policy, Legal, and Institutional Frameworks. *Haramaya Law Review*, *1*(1), pp.43-72.

Mushinge, A., 2017. *Role of land governance in improving tenure security in Zambia: towards a strategic framework for preventing land conflicts* (Doctoral dissertation, Technische Universität München).

Naess, P., 2001. Urban planning and sustainable development. *European Planning Studies*, *9*(4), pp.503-524.

Natural England Land use Consultants. 2009. Green Infrastructure Guidance. *Natural England, NE176*.

National Urban Planning Institute (NUPI),1994,

Na Xiu Maria Ignatieva Cecil Konijnendijk Van Den Bosch the Challenges of Planning and Designing Urban Green Networks in Scandinavian and Chinese Cities

Naumann, S., Anzaldua, G., Berry, P., Burch, S., Davis, M., Frelih-Larsen, A., Gerdes, H. and Sanders, M., 2011. Assessment of the potential of ecosystem-based approaches to climate change adaptation and mitigation in Europe. *Final report to the European Commission, DG Environment*.

Negassa, A., 2014. *Forest governance dynamics in Ethiopia Histories, arrangements, and practices* (Doctoral dissertation, Wageningen University).

Ngan, G., 2004. Green Roof Policies: Tools for Encouraging Sustainable Design, 1-45. *British Columbia Society of Landscape Architects (BCSLA)*.

Neumayer, E., 2003. *The pattern of aid giving: the impact of good governance on development assistance*. Routledge.

Newig, J. and Fritsch, O., 2009. Environmental governance: participatory, multi-level–and effective?. *Environmental policy and governance*, *19*(3), pp.197-214.

Newell, J.P., Seymour, M., Yee, T., Renteria, J., Longcore, T., Wolch, J.R. and Shishkovsky, A., 2013. Green Alley Programs: Planning for a sustainable urban infrastructure?. *Cities*, *31*, pp.144-155.

Necha, T., Serbeh-Yiadom, K.C., Melesse, Asfaw., 2014. Towards an Efficient Implementation of the Land Lease Policy of Ethiopia: A case-study of Hawassa.

Niemelä, J., Saarela, S.R., Söderman, T., Kopperoinen, L., Yli-Pelkonen, V., Väre, S. and Kotze, D.J., 2010. Using the ecosystem services approach for better planning and conservation of urban green spaces: a Finland case study. *Biodiversity and Conservation*, *19*(11), pp.3225-3243.

Nowak, D.J., Kronenberg, J. and de Groot, R., 2015. Benefits of restoring ecosystem services in urban areas T Elmqvist, H Seta la 2, SN Handel 3, S van der Ploeg 4. *Current Opinion in Environmental Sustainability*, *14*, pp.101-108.

Nowak, D.J. and Dwyer, J.F., 2007. Understanding the benefits and costs of urban forest ecosystems. In *Urban and community forestry in the northeast* (pp. 25-46). Springer, Dordrecht.

Noblet, C.L., Anderson, M. and Teisl, M.F., 2013. An empirical test of anchoring the NEP scale in environmental ethics. *Environmental Education Research*, *19*(4), pp.540-551.

Nune, S., 2008. Ethiopian Government efforts to increase forest cover: a policy oriented discussion paper. In *Policies to increase forest cover in Ethiopia, Proceeding of Policy Workshop, Environment for Development—Environmental Economics Policy Forum for Ethiopia, Ethiopian Development Research Institute, Global Hotel, Addis Ababa*.

Nutley, S., 2003. Bridging the policy-research divide: reflections and lessons from the United Kingdom. Edited version of a keynote address to the National Institute for Governance. Conference (2003: Canberra). *Canberra Bulletin of Public Administration*, (108), p.19.

Office for the Revision of Addis Ababa Master Plan(ORAAMP), 2002.Addis Ababa, Ethiopia

Osborn, T.A., 2006. *Teaching world languages for social justice: A sourcebook of principles and practices*. Routledge.

Osborne, S.P. ed., 2010. *The new public governance: Emerging perspectives on the theory and practice of public governance*. Routledge.

Ostrom, E., 2005. Understanding institutional diversity Princeton University press. *New Jersey*, pp.393-432.

Ostrom, E., 2007. A diagnostic approach for going beyond panaceas. *Proceedings of the national Academy of sciences*, *104*(39), pp.15181-15187.

Ostrom, E., 2009. A general framework for analyzing sustainability of social-ecological systems. *Science*, *325*(5939), pp.419-422.

Owens, S., 1997. THE ABERCROMBIE LECTURE: ‘Giants in the path': planning, sustainability and environmental values. *Town Planning Review*, *68*(3), p.293.

Olsson, P., Folke, C. and Berkes, F., 2004. Adaptive comanagement for building resilience in social–ecological systems. *Environmental management*, *34*(1), pp.75-90.

Onwuegbuzie, A.J., Turner, L.A. and Johnson, R.B., 2007. Toward a definition of mixed methods research. *Journal of mixed methods research*, *1*(2), pp.112-133.

Ogunbode, C.A., 2013. The NEP scale: measuring ecological attitudes/worldviews in an African context. *Environment, development and sustainability*, *15*(6), pp.1477-1494.

Okpala, D., 2009. Regional overview of the status of urban planning and planning practice in Anglophone (Sub-Saharan) African countries.

Pankhurst, R., 1961. Menelik and the foundation of Addis Ababa. *The Journal of African History*, *2*(1), pp.103-117.

Palmer, D., Fricska, S. and Wehrmann, B., 2009. *Towards improved land governance*. UN-HABITAT.

Pallant, J., 2011. Survival manual. *A step by step guide to data analysis using SPSS*, *4*.

Patton, M.Q., 2002. Two decades of developments in qualitative inquiry: A personal, experiential perspective. *Qualitative social work*, *1*(3), pp.261-283.

Park, M.S., 2015. Inter-Korean Forest Cooperation 1998–2012: A Policy Arrangement Approach. *Sustainability*, *7*(5), pp.5241-5259.

Park, M.S. and Youn, Y.C., 2013. Development of urban forest policy-making toward governance in the Republic of Korea. *Urban forestry & urban greening*, *12*(3), pp.273-281.

Pauleit, S., Liu, L., Ahern, J. and Kazmierczak, A., 2011. Multifunctional green infrastructure planning to promote ecological services in the city.

Pauleit, S., Hansen, R., Rall, E.L., Zolch, T., Andersson, E., Luz, A.C., Szaraz, L., Tosics, I. and Vierikko, K., 2017. Urban landscapes and green infrastructure. In *Oxford Research Encyclopedia of Environmental Science*.

Pauleit, S., Ambrose-Oji, B., Andersson, E., Anton, B., Buijs, A., Haase, D., Elands, B., Hansen, R., Kowari, I., Kronenberg, J. and Mattijssen, T., 2019. Advancing urban green infrastructure in Europe: Outcomes and reflections from the GREEN SURGE project. *Urban Forestry & Urban Greening*, *40*, pp.4-16.

Pauleit, S., El Wafa, H.A. and Pribadi, D.O., 2019. PERI-URBAN AGRICULTURE: lessons learnt from.

Pauleit, S., Hansen, R., Rall, E.L. and Rolf, W., 2020. Urban green infrastructure: Strategic planning of urban green and blue for multiple benefits. In *The Routledge Handbook of Urban Ecology* (pp. 931-942). Routledge.

Pauleit, S., Vasquéz, A., Maruthaveeran, S., Liu, L. and Cilliers, S.S., 2021. Urban green infrastructure in the Global South. *Urban ecology in the Global South. Springer, Cham*, pp.107-143.

Palmer, D., Fricska, S. and Wehrmann, B., 2009. Towards improved land governance. *Food and*, *781*.

Pagano, M.A. and Bowman, A.O.M., 1997. *Cityscapes and capital: The politics of urban development*. JHU Press.

Papadopoulos, Y., 2010. Accountability and multi-level governance: more accountability, less democracy? *West European Politics*, *33*(5), pp.1030-1049.

Paavola, J., 2007. Institutions and environmental governance: A reconceptualization. *Ecological economics*, *63*(1), pp.93-103.

Pett, M.A., Lackey, N.R. and Sullivan, J.J., 2003. *Making sense of factor analysis: The use of factor analysis for instrument development in health care research*. sage.

Peters, B.G. and Pierre, J., 1998. Governance without government? Rethinking public administration. *Journal of public administration research and theory*, *8*(2), pp.223-243.

Petrosillo, I., Costanza, R., Aretano, R., Zaccarelli, N. and Zurlini, G., 2013. The use of subjective indicators to assess how natural and social capital support residents' quality of life in a small volcanic island. *Ecological Indicators*, *24*, pp.609-620.

Pett, M.A., Lackey, N.R. and Sullivan, J.J., 2003. *Making sense of factor analysis: The use of factor analysis for instrument development in health care research*. sage.

Petrosillo, I., Costanza, R., Aretano, R., Zaccarelli, N. and Zurlini, G., 2013. The use of subjective indicators to assess how natural and social capital support residents' quality of life in a small volcanic island. *Ecological Indicators*, *24*, pp.609-620.

Peckham, S.C., Duinker, P.N. and Ordóñez, C., 2013. Urban forest values in Canada: Views of citizens in Calgary and Halifax. *Urban Forestry & Urban Greening*, *12*(2), pp.154-162.

Pierre, J., 1999. Models of urban governance: The institutional dimension of urban politics. *Urban affairs review*, *34*(3), pp.372-396.

Pierre, J. ed., 2000. *Debating governance: Authority, steering, and democracy*. OUP Oxford.

Pissourios, I., 2014. Top-down and bottom-up urban and regional planning: Towards a framework for the use of planning standards. *European Spatial Research and Policy*, *21*(1), pp.83-99.

Plieninger, T., Dijks, S., Oteros-Rozas, E. and Bieling, C., 2013. Assessing, mapping, and quantifying cultural ecosystem services at community level. *Land use policy*, *33*, pp.118-129.

Plummer, R. and Armitage, D., 2007. A resilience-based framework for evaluating adaptive co-management: linking ecology, economics and society in a complex world. *Ecological economics*, *61*(1), pp.62-74.

Plummer, R., 2009. The adaptive co-management process: an initial synthesis of representative models and influential variables. *Ecology and Society*, *14*(2).

Plummer, R. and Fennell, D.A., 2009. Managing protected areas for sustainable tourism: prospects for adaptive co-management. *Journal of Sustainable Tourism*, *17*(2), pp.149-168.

Plummer,J 2012, *Diagnosing Corruption in Ethiopia: Perceptions, Realities, and the Way Forward*. Washington, DC: World Bank.

Plummer, R., Armitage, D.R. and De Loë, R.C., 2013. Adaptive comanagement and its relationship to environmental governance. *Ecology and Society*, *18*(1).

Plummer, R., Schultz, L., Armitage, D., Bodin, O., Crona, B. and Baird, J., 2014. Developing a diagnostic approach for adaptive co-management and considering its implementation in biosphere reserves. *The Beijer Institute of Ecological Economics, Beijer Discussion Paper*, (245), p.19.

Plummer, R., Baird, J., Armitage, D., Bodin, O. and Schultz, L., 2017. Diagnosing adaptive comanagement across multiple cases. *Ecology and Society*, *22*(3).

President's Council on Sustainable Development and United States. President, 1999. *Towards a Sustainable America: Advancing Prosperity, Opportunity, and a Healthy Environment for the 21st Century*. The Council.

Proclamation No. 295/2002 environmental protection organs establishment. Addis Ababa, Ethiopia

Proclamation No. 1/1995, The Constitution of the Federal Democratic Republic of Ethiopia; Federal Negarit Gazeta of the FDRE, 21st August, 1995.

Proclamation No. 94/1994. A Proclamation for Forest and Wildlife Conservation and Development. Addis Ababa, Ethiopia

Proclamation No. 9/1995. A Proclamation to Provide for the Establishment of the Environmental Protection Authority. Addis Ababa, Ethiopia

Proclamation No. 192/1980. A Proclamation to Provide for the Conservation and Development of the Forrest and Wildlife Resources. Addis Ababa, Ethiopia

Proclamation no. 295/2002. A Proclamation for Environmental Protection Organs Establishment Proclamation. Addis Ababa, Ethiopia

Proclamation No. 542/ 2007. A Proclamation to Provide for the Development, Conservation and Utilization of Forests. Addis Ababa, Ethiopia

Proclamation No. 574/2008. A Proclamation to provide Federal Urban Planning. Addis Ababa, Ethiopia

Proclamation No.1065/2018. A Proclamation for forest Development, Conservation, and Utilization. Addis Ababa, Ethiopia

Proclamation No.64/2019. A Proclamation for the re-establishment of environmental protection and green development commission. Addis Ababa, Ethiopia

Poulantzas, N., 1978. Towards a democratic socialism. *New Left Review*, *109*, pp.75-87.

Provan, K.G. and Kenis, P., 2008. Modes of network governance: Structure, management, and effectiveness. *Journal of public administration research and theory*, *18*(2), pp.229-252.

Qureshi, S., Breuste, J.H. and Jim, C.Y., 2013. Differential community and the perception of urban green spaces and their contents in the megacity of Karachi, Pakistan. Urban Ecosystems, 16(4), pp.853-870.

Randolph, J., 2004. *Environmental land use planning and management*. Island Press.

Randrup, T.B. and Persson, B., 2009. Public green spaces in the Nordic countries: development of a new strategic management regime. Urban Forestry & Urban Greening, 8(1), pp.31-40.

Ratcliffe, J.W., 1983. Notions of validity in qualitative research methodology. *Knowledge*, *5*(2), pp.147-167.

Rahmato, D., 2001. Environmental change and state policy in Ethiopia: Lessons from past experience. Forum for Social Studies.

Raustiala, K. and Victor, D.G., 1996. Biodiversity since Rio: the future of the Convention on Biological Diversity. *Environment: Science and policy for sustainable development*, *38*(4), pp.16-45.

Rauwald, K.S. and Moore, C.F., 2002. Environmental attitudes as predictors of policy support across three countries. *Environment and behavior*, *34*(6), pp.709-739.

Redman, C.L., Grove, J.M. and Kuby, L.H., 2004. Integrating social science into the long-term ecological research (LTER) network: social dimensions of ecological change and ecological dimensions of social change. *Ecosystems*, *7*(2), pp.161-171.

Reyers, B., Biggs, R., Cumming, G.S., Elmqvist, T., Hejnowicz, A.P. and Polasky, S., 2013. Getting the measure of ecosystem services: a social-ecological approach. *Frontiers in Ecology and the Environment*, *11*(5), pp.268-273.

Reyes, A., Reyes, A. and Daigle, C., 2020. Looking Back to Look Forward: Evolution of the Habitat Agenda and Prospects for Implementation of the New Urban Agenda. *Current Urban Studies*, *8*(2), pp.337-363.

Resnick, D., 2021. The politics of urban governance in sub-Saharan Africa. *Regional & Federal Studies*, *31*(1), pp.139-161.

Reyers, B., Biggs, R., Cumming, G.S., Elmqvist, T., Hejnowicz, A.P. and Polasky, S., 2013. Getting the measure of ecosystem services: a social–ecological approach. *Frontiers in Ecology and the Environment*, *11*(5), pp.268-273.

Riechers, M., Barkmann, J. and Tscharntke, T., 2016. Perceptions of cultural ecosystem services from urban green. *Ecosystem Services*, *17*, pp.33-39.

Rigolon, A., Browning, M.H., Lee, K. and Shin, S., 2018. Access to urban green space in cities of the Global South: A systematic literature review. *Urban Science*, *2*(3), p.67.

Ritchie, J., Lewis, J., Nicholls, C.M. and Ormston, R. eds., 2013. *Qualitative research practice: A guide for social science students and researchers*. sage.

Roe, M. and Mell, I., 2013. Negotiating value and priorities: evaluating the demands of green infrastructure development. *Journal of Environmental Planning and Management*, *56*(5), pp.650-673.

Rolf, W., Hansen, R., Rall, E.L., Pauleit, S., Reil, R., Buijs, A., Ambrose-Oji, B., Gerőházi, É. 2016.Workshop on innovative strategy development in each of the ULL, Ljubljana, 26-29
January 2016. EU FP7 project GREEN SURGE, Milestone 36. University of Copenhagen, Copenhagen.

Rolf, W., Peters, D., Lenz, R. and Pauleit, S., 2018. Farmland–an Elephant in the Room of Urban Green Infrastructure? Lessons learned from connectivity analysis in three German cities. *Ecological indicators*, *94*, pp.151-163.

Rotberg, R.I. ed., 2009. *China into Africa: Trade, aid, and influence*. Brookings Institution Press.

Roberts, D., Boon, R., Diederichs, N., Douwes, E., Govender, N., Mcinnes, A., Mclean, C., O'Donoghue, S. and Spires, M., 2012. Exploring ecosystem-based adaptation in Durban, South Africa: "learning-by-doing" at the local government coal face. *Environment and Urbanization*, *24*(1), pp.167-195.

Rhodes, R.A., 1997. *Understanding governance: Policy networks, governance, reflexivity and accountability*. Open University.

Rounsevell, M.D.A., Dawson, T.P. and Harrison, P.A., 2010. A conceptual framework to assess the effects of environmental change on ecosystem services. *Biodiversity and Conservation*, *19*(10), pp.2823-2842.

Ryan, A.B., 2006. Post-positivist approaches to research. *Researching and Writing your Thesis: a guide for postgraduate students,* pp.12-26.

Ruffeis, D., Loiskandl, W., Awulachew, S.B. and Boelee, E., 2010. Evaluation of the environmental policy and impact assessment process in Ethiopia. *Impact Assessment and Project Appraisal*, *28*(1), pp.29-40.

Runhaar, H., Olafsson, A.S. and Møller, M.S., 2019. Mosaic governance for urban green infrastructure: Upscaling active citizenship from a local government perspective. *Urban Forestry & Urban Greening*, *40*, pp.53-62.

Sabatier, P.A., 1998. The advocacy coalition framework: revisions and relevance for Europe. *Journal of European public policy*, *5*(1), pp.98-130.

Sandberg, L.A., Bardekjian, A. and Butt, S. eds., 2014. *Urban forests, trees, and greenspace: A political ecology perspective*. Routledge.

Sandstrorm, U.G., 2002. Green infrastructure planning in urban Sweden. *Planning practice and research*, *17*(4), pp.373-385.

Sandstrom, A., Crona, B. and Bodin, Ö., 2014. Legitimacy in co‐management: The impact of preexisting structures, social networks and governance strategies. *Environmental Policy and Governance*, *24*(1), pp.60-76.

Sadidy, J., Firouzabadi, P.Z. and Entezari, A., 2009. The Use of Radarsat And Landsat Image Fusion Algorithms And Different Supervised Classification Methods To Improve Landuse Map Accuracy–Case Study: Sari Plain–Iran. *Department of Geography, Tarbiat Moallem Sabzevar University*, *7*.

Sahle, M., Saito, O. and Reynolds, T.W., 2021. Nature's contributions to people from church forests in a fragmented tropical landscape in southern Ethiopia. *Global Ecology and Conservation*, *28*, p.e01671.

Sanesi, G., Lafortezza, R., Bonnes, M. and Carrus, G., 2006. Comparison of two different approaches for assessing the psychological and social dimensions of green spaces. *Urban Forestry & Urban Greening*, *5*(3), pp.121-129.

Santiso, C., 2001. Good governance and aid effectiveness: The World Bank and conditionality. *The Georgetown public policy review*, *7*(1), pp.1-22.

Santiso, C., 2001. International co-operation for democracy and good governance: moving towards a second generation? *The European Journal of Development Research*, *13*(1), pp.154-180.

Sanbata, H., Asfaw, A. and Kumie, A., 2014. Indoor air pollution in slum neighbourhoods of Addis Ababa, Ethiopia. *Atmospheric Environment*, *89*, pp.230-234.

Sarkissian, W., 2005. Stories in a park: Giving voice to the voiceless in Eagleby, Australia. *Planning theory & practice*, *6*(1), pp.103-117.

Sarantakos, S., 1998. Surveys: mail questionnaires. In *Social research* (pp. 223-245). Palgrave, London.

Salbitano, F., Borelli, S., Conigliaro, M. and Yujuan, C., 2016. *Guidelines on urban and peri-urban forestry*. FAO.

Salet, W. and Thornley, A., 2003. metropolitan regions. *Metropolitan governance and spatial planning: comparative case studies of European city-regions*, p.3.

Sarporiti, N., 2006. Managing national parks: how public-private partnerships can aid conservation.

Scott, A.J. and Roweis, S.T., 1977. Urban planning in theory and practice: a reappraisal. *Environment and Planning A*, *9*(10), pp.1097-1119.

Scott, M., Collier, M., Foley, K. and Lennon, M., 2014. Delivering ecosystems services via spatial planning: Reviewing the possibilities and implications of a green infrastructure approach.

Scott, R., Ross, I. and Hawkins, P.M., 2016. Fecal sludge management: diagnostics for service delivery in urban areas-report of a FSM study in Hawassa, Ethiopia.

Schon, D.A., 1984. *The reflective practitioner: How professionals think in action* (Vol. 5126). Basic books.

Schmidt, M.G., 1996. When parties matter: A review of the possibilities and limits of partisan influence on public policy. *European Journal of Political Research*, *30*(2), pp.155-183.

Schmidt, V.A., 2013. Democracy and legitimacy in the European Union revisited: Input, output and 'throughput'. *Political Studies*, *61*(1), pp.2-22.

Schmitter, P., 2004. 'Neo-neofunctionalism', in A. Wiener and T. Diez (eds), European Integration Theory, Oxford: Oxford University Press, pp. 45–74

Scott, D. and Willits, F.K., 1991. *Environmental concern of Pennsylvania citizens: Data from a statewide survey* (No. 1898-2017-1049).

Scott, M., Collier, M., Foley, K. and Lennon, M., 2013. Delivering ecosystems services via spatial planning-reviewing the possibilities and implications of a green infrastructure approach. *UCD University College of Dublin*.

Scott, A.J. and Roweis, S.T., 1977. Urban planning in theory and practice: a reappraisal. *Environment and planning A*, *9*(10), pp.1097-1119.

Scott, R.E., Ross, I. and Hawkins, P.M., 2016. Fecal sludge management: diagnostics for service delivery in urban areas-report of a FSM study in Hawassa, Ethiopia.

Schell, C., 1992. The value of the case study as a research strategy. *Manchester Business School*, *2*, pp.1-15.

Schwandt, T.A., 1997. *Qualitative inquiry: A dictionary of terms*. Sage Publications, Inc.

Schwandt, T.A., 2001. Dictionary of qualitative inquiry. In *Dictionary of qualitative inquiry* (pp. xxxiv-281).

Schewenius, M., McPhearson, T. and Elmqvist, T., 2014. Opportunities for increasing resilience and sustainability of urban social–ecological systems: Insights from the URBES and the cities and biodiversity outlook projects. *Ambio*, *43*(4), pp.434-444.

Schäffler, A. and Swilling, M., 2013. Valuing green infrastructure in an urban environment under pressure—The Johannesburg case. *Ecological Economics*, *86*, pp.246-257.

Scott, N. and Marzano, G., 2015. Governance of tourism in OECD countries. *Tourism Recreation Research*, *40*(2), pp.181-193.

Seifu, S. and Stellmacher, T., 2021. Accessibility of public recreational parks in Addis Ababa, Ethiopia: A GIS based analysis at sub-city level. *Urban Forestry & Urban Greening*, *57*, p.126916.

Selman, P., 2002. Multi-function landscape plans: a missing link in sustainability planning?. *Local Environment*, *7*(3), pp.283-294.

Selman, P., 2004. Community participation in the planning and management of cultural landscapes. *Journal of environmental planning and management*, *47*(3), pp.365-392.

Selman, P., 2009. Planning for landscape multifunctionality. *Sustainability: science, practice and policy*, *5*(2), pp.45-52.

Said, I. and Mansor, M., 2011, July. green infrastructure in cities and towns in Southeast Asian countries: quest for research. In *Second International Seminar on Sustainable Development (Jakarta, Indonesia), http://www. medinanet. org/index*.

Sahle, M., Saito, O. and Reynolds, T.W., 2021. Nature's contributions to people from church forests in a fragmented tropical landscape in southern Ethiopia. *Global Ecology and Conservation*, *28*, p.e01671.

Shanko, M. and Rouse, J., 2005. The human and livelihoods cost of fuel-switching in Addis Ababa. *Boiling Point*, *51*, pp.31-33.

Singh, K., 2007. *Quantitative social research methods*. Sage.

Siyoum, M., Astatkie, A., Tenaw, Z., Abeje, A. and Melese, T., 2020. Respectful family planning service provision in Sidama zone, Southern Ethiopia. *Plos one*, *15*(9), p.e0238653.

Sinnett, D., 2015. Green infrastructure and biodiversity in the city: Principles and design. *Handbook on Green Infrastructure: Planning, Design and Implementation*, pp.87-101.

Snall, T., Lehtomaki, J., Arponen, A., Elith, J. and Moilanen, A., 2016. Green infrastructure design based on spatial conservation prioritization and modeling of biodiversity features and ecosystem services. *Environmental management*, *57*(2), pp.251-256.

Sisay, H., 2012, May. Urban Land Policy Vis-à-vis Tenure Security and the Environment: A Case Study of Addis Ababa, Ethiopia. In *FIG Working Week* (pp. 6-10).

Sinnett, D., Smith, N. and Burgess, S. eds., 2015. Handbook on green infrastructure: planning, design and implementation. Edward Elgar Publishing.

Siraj, M., Zhang, K., Xiao, W., Bilal, A., Gemechu, S., Geda, K., Yonas, T. and Xiaodan, L., 2018. Does participatory forest management save the remnant forest in Ethiopia?. *Proceedings of the National Academy of Sciences, India Section B: Biological Sciences*, *88*(1), pp.1-14.

Shipley, R. and Kovacs, J., 2005. Principles for the Governance of Heritage Conservation Sector in Canada: Lessons from International Experience. Paper presented for The Historic Places Program Branch, National Heritage Sites Directorate Parks Canada.

Shrestha, K.K. and Dee, J., 2008. Planning for sustainable development:' wicked problems' at Sydney's Malabar Headland. *Dialogues in Urban Planning: Towards Sustainable Regions*, pp.3-26.

Space, C.A.B.E., 2003. Planning green infrastructure. *CABE Space, London*.

Smith, C., 2009. The plan of Chicago. In *The Plan of Chicago*. University of Chicago Press.

Spaargaren, G., 1997. The ecological modernization of production and consumption: essays in environmental sociology.

Stake, R. E. 2006. *Multiple case study analysis*. The Guilford Press.

Stankey, G.H., 2005. *Adaptive management of natural resources: theory, concepts, and management institutions* (Vol. 654). US Department of Agriculture, Forest Service, Pacific Northwest Research Station.

Stevens, J.P., 2012. *Applied multivariate statistics for the social sciences*. Routledge.

Stringer, L.C., Dougill, A.J., Fraser, E., Hubacek, K., Prell, C. and Reed, M.S., 2006. Unpacking “participation” in the adaptive management of social-ecological systems: a critical review. *Ecology and society*, *11*(2).

Steffek, J., 2015. The output legitimacy of international organizations and the global public interest. *IT*, *7*, p.263.

Strauss, A., & Corbin, J. (1998). *Basics of qualitative research: Techniques and procedures for developing grounded theory* (2nd ed.). Thousand Oaks, CA: Sage Publications

Sørensen, E. and Torfing, J., 2007. Introduction governance network research: Towards a second generation. In *Theories of democratic network governance* (pp. 1-21). Palgrave Macmillan, London.

Stevens, J.P., 2012. *Applied multivariate statistics for the social sciences*. Routledge.

Swanwick, C., 2009. Society's attitudes to and preferences for land and landscape. *Land use policy*, *26*, pp.S62-S75.

Svendsen, E.S., Campbell, L.K., Fisher, D.R., Connolly, J.J., Johnson, M.L., Sonti, N.F., Locke, D.H., Westphal, L.M., LeBlanc Fisher, C., Grove, J.M. and Romolini, M., 2016. Stewardship mapping and assessment project: a framework for understanding community-based environmental stewardship. *US Department of Agriculture, Forest Service, Northern Research Station.*

Tadesse, W., Tsegaye, T.D. and Coleman, T.L., 2001, July. Land use/cover change detection of the city of Addis Ababa, Ethiopia using remote sensing and geographic information system technology. In *IGARSS 2001. Scanning the Present and Resolving the Future. Proceedings. IEEE 2001 International Geoscience and Remote Sensing Symposium (Cat. No. 01CH37217)* (Vol. 1, pp. 462-464). IEEE.

Takyi, S.A. and Seidel, A.D., 2017. Adaptive management in sustainable park planning and management: case study of the city of Vancouver Parks. Journal of Urban Ecology, 3(1), p.juw009.

Tan, P.Y., Wang, J. and Sia, A., 2013. Perspectives on five decades of the urban greening of Singapore. Cities, 32, pp.24-32.

Taylor, P.D., 2006. Landscape connectivity: a return to the basics. *Connectivity conservation*, pp.29-43.

Taylor, I., 2007. Governance in Africa and Sino-African relations: Contradictions or confluence?. *Politics*, *27*(3), pp.139-146.

Tewdwr-Jones, M. and Allmendinger, P., 1998. Deconstructing communicative rationality: a critique of Habermasian collaborative planning. *Environment and planning A*, *30*(11), pp.1975-1989.

Terfa, B.K., Chen, N., Liu, D., Zhang, X. and Niyogi, D., 2019. Urban expansion in Ethiopia from 1987 to 2017: Characteristics, spatial patterns, and driving forces. *Sustainability*, *11*(10), p.2973.

Tefera, M.M., 2010. Food security attainment role of urban agriculture: a case study from Adama town, central Ethiopia. *Journal of Sustainable Development in Africa*, *12*(3), pp.223-249.

Teferi, E., Bewket, W. and Simane, B., 2016. Effects of land use and land cover on selected soil quality indicators in the headwater area of the Blue Nile basin of Ethiopia. *Environmental monitoring and assessment*, *188*(2), p.83.

Tibebu, Teshale. "Ethiopia: The" anomaly" and" paradox" of Africa." *Journal of Black Studies* 26, no. 4 (1996): 414-430.

Temesgen, S.M., 2015. Weaknesses of ethnic federalism in Ethiopia. *International Journal of Humanities and Social Science Invention*, *4*(11), pp.49-54.

Teshome-Bahiru, W., 2006. Impacts of urbanization on the traditional medicine of Ethiopia. *The Anthropologist*, *8*(1), pp.43-52.

Tesfaye, H., 2010. The challenge of Building of Democratic Developmental state. *Addis Ababa*.

Toikka, A., 2011. Governance theory as a framework for empirical research: a case study on local environmental policy-making in Helsinki, Finland. *Publications of the Department of Social Research*.

Turner, R.K., 2014. Changes in the global value of ecosystem services. *Global environmental change*, *26*, pp.152-158.

Tzoulas, K., Korpela, K., Venn, S., Yli-Pelkonen, V., Kazmierczak, A., Niemela, J. and James, P.,2007. Promoting ecosystem and human health in urban areas using Green Infrastructure: A literature review. *Landscape and urban planning*, *81*(3), pp.167-178.

Tyrvainen, L., 2001. Economic valuation of urban forest benefits in Finland. *Journal of environmental management*, *62*(1), pp.75-92.

ULG Consultants Ltd. (1987): Addis-Bah forestry development project, socio-economic study. Final report, Vol. 1, summary

Urban Plans Proclamation No. 574/2008. Federal Democratic Republic of Ethiopia.

UN, 2014. *World Urbanization Prospects: The 2014 Revision-Highlights*. UN.

UNDP, 1997. Governance for sustainable human development. UNDP.

United Nations Centre for Human Settlements (UN-HABITAT),1999. Implementing the Habitat Agenda: Adequate Shelter for All. Global Campaign for Secure Tenure. Nairobi, Kenya.

United Nations Centre for Human Settlements (Habitat 2003). *The Challenges of Slums*. Global report on human settlements. Earth Scan Publications Ltd.

United Nations Human Settlements Program (UN-HABITAT) 2008, Addis Ababa Urban Profile Nairobi, Kenya.

UN-HABITAT, G.L.T.N., 2008. Secure land rights for all.
UN-Habitat, 2014. The Evolution of National Urban Policies A Global Overview

United Nations (UN)2012. World Urbanization Prospects: The 2011 Revision. *CD-ROM Edition.*

United Nations. Economic Commission for Europe, 1996. *Guidelines on Access to Environmental Information and Public Participation in Environmental Decision-making*. UN.

UN-Habitat (2008). State of the world's cities 2008/2009, Harmonious Cities. London: Earthscan.

United Nations Centre for Human Settlements (UN-HABITAT), 2016. World Cities Report 2016. Urbanization and development: Emerging futures. Nairobi, Kenya.

UN-Habitat (2017)Support to the sustainable development of the Hawassa city cluster report

UN, 2018, United Nations Population Division. World Urbanization Prospects: 2018 Revision
(<ahref='https://www.macrotrends.net/countries/ETH/ethiopia/urbanpopulation'>Ethiopan Urban Population 1960-2022. www.macrotrends.net. Retrieved 2022-01-19.)

United Nations, Department of Economic and Social Affairs, Population Division (2019). *World Urbanization Prospects: The 2018 Revision (ST/ESA/SER.A/420)*. New York: United Nations.

Urban Plans Proclamation No. 574/2008. The Federal Democratic Republic of Ethiopia.

Uy, P.D. and Nakagoshi, N., 2007. Analyzing urban green space pattern and eco-network in Hanoi, Vietnam. *Landscape and Ecological Engineering*, *3*(2), pp.143-157.

Vidal, D.G., Maia, R., Barros, N. and Vilaça, H., 2018. The right to access urban green spaces: an (in) equality issue in the contemporary societies. In *International Congress on disability and citizenship: challenges of (a) normality in contemporary societies*.

Van Bueren, E., 2009. *Greening governance: an evolutionary approach to policy making for a sustainable built environment* (Vol. 30). Ios Press.

van den Bosch, C.C.K., 2014. From government to governance: Contribution to the political ecology of urban forestry. In *Urban Forests, Trees, and Greenspace* (pp. 53-64). Routledge.

Van Kempen, E., Devilee, J., Swart, W. and Van Kamp, I., 2014. Characterizing urban areas with good sound quality: Development of a research protocol. *Noise and health*, *16*(73), p.380.

Van der Zouwen, M., 2006. *Nature policy between trends and traditions: Dynamics in nature policy arrangements in the Yorkshire Dales, Doñana, and the Veluwe*. Eburon Uitgeverij BV.

Veenman, S., Liefferink, D. and Arts, B., 2009. A short history of Dutch forest policy: The 'de-institutionalisation'of a policy arrangement. *Forest Policy and Economics*, *11*(3), pp.202-208.

Von Breitenbach, F., 1962. National forestry development planning: A feasibility and priority study on the example of Ethiopia. *Ethiop. For. Rev*, *3*(4), pp.41-68.

Van Gossum, P., Arts, B., De Wulf, R. and Verheyen, K., 2011. An institutional evaluation of sustainable forest management in Flanders. *Land Use Policy*, *28*(1), pp.110-123.

Van Tatenhove, J., Arts, B. and Leroy, P. eds., 2013. *Political modernization and the environment: the renewal of environmental policy arrangements* (Vol. 24). Springer Science & Business Media.

Vujcic, M., Tomicevic-Dubljevic, J., Zivojinovic, I. and Toskovic, O., 2019. Connection between urban green areas and visitors' physical and mental well-being. *Urban forestry & urban greening*, *40*, pp.299-307.

Water Resilient Green Infrastructure in Africa (WGA) report, 2014. Green Area Typologies and Mapping of Green Structures in Addis Ababa and Dar es Salaam. Addis Ababa, Ethiopia.

Wassie, A. and Teketay, D., 2006. Soil seed banks in church forests of northern Ethiopia: Implications for the conservation of woody plants. *Flora-Morphology, Distribution, Functional Ecology of Plants*, *201*(1), pp.32-43.

Wallis, J. and Dollery, B., 2001. Government failure, social capital, and the appropriateness of the New Zealand model for public sector reform in developing countries. *World Development*, *29*(2), pp.245-263.

Walmsley, A., 2006. Greenways: multiplying and diversifying in the 21st century. *Landscape and urban planning*, *76*(1-4), pp.252-290.

Wamsler, C., Alkan-Olsson, J., Björn, H., Falck, H., Hanson, H., Oskarsson, T., Simonsson, E. and Zelmerlow, F., 2020. Beyond participation: when citizen engagement leads to undesirable outcomes for nature-based solutions and climate change adaptation. *Climatic Change*, *158*(2), pp.235-254.

Wang, Y., Bakker, F., De Groot, R. and Wortche, H., 2014. Effect of ecosystem services provided by urban green infrastructure on indoor environment: A literature review. *Building and environment*, *77*, pp.88-100.

Wang, D., Brown, G. and Liu, Y., 2015. The physical and non-physical factors that influence perceived access to urban parks. *Landscape and urban planning*, *133*, pp.53-66.

Wang, D., Brown, G., Zhong, G., Liu, Y. and Mateo-Babiano, I., 2015. Factors influencing perceived access to urban parks: A comparative study of Brisbane (Australia) and Zhongshan (China). *Habitat international*, *50*, pp.335-346.

Water Resilient Green Infrastructure in Africa (WGA,2014).

WGDA (2019), Watersheds, Green Areas Development Agency. Addis Ababa, Ethiopia

Welle-Strand, A. and Kjollesdal, K., 2010. Foreign aid strategies: China taking over?.

Weiss, T.G., 2000. Governance, good governance, and global governance: conceptual and actual challenges. *Third world quarterly*, *21*(5), pp.795-814.

Weimer, D.L. ed., 1995. *Institutional design* (Vol. 43). Springer Science & Business Media.

Weiler, J.H., 2012. In the face of crisis: Input legitimacy, output legitimacy and the political messianism of European integration. *Journal of European integration*, *34*(7), pp.825-841.

Weisz, H. and Steinberger, J.K., 2010. Reducing energy and material flows in cities. *Current Opinion in Environmental Sustainability*, *2*(3), pp.185-192.

Weston, B.H. and Bollier, D., 2013. *Green governance: Ecological survival, human rights, and the law of the commons*. Cambridge University Press.

Wickham, J.D., Riitters, K.H., Wade, T.G. and Vogt, P., 2010. A national assessment of green infrastructure and change for the conterminous United States using morphological image processing. *Landscape and Urban Planning*, *94*(3-4), pp.186-195.

Williams, H.E., 1970. General Systems Theory, Systems Analysis, and Regional Planning: An Introductory Bibliography. Exchange Bibliography No. 164.

Williamson, K.S., 2003. *Growing with green infrastructure*. Doylestown: Heritage Conservancy.

Williamson, I.P., 1985. Cadastres and land information systems in common law jurisdictions. *Survey Review*, *28*(217), pp.114-129.

Williams, N.S., Rayner, J.P. and Raynor, K.J., 2010. Green roofs for a wide brown land: Opportunities and barriers for rooftop greening in Australia. *Urban forestry & urban greening*, *9*(3), pp.245-251.

Willemse, L., 2010. *Community/neighborhood park use in Cape Town: A class-differentiated analysis* (Doctoral dissertation, Stellenbosch: University of Stellenbosch).

Wilson, V., 2014. Research methods: triangulation. *Evidence based library and information practice*, *9*(1), pp.74-75.

Wittemyer, G., Elsen, P., Bean, W.T., Burton, A.C.O. and Brashares, J.S., 2008. Accelerated human population growth at protected area edges. *Science*, *321*(5885), pp.123-126.

Whicker, M.L. and Miller, G.J., 1999. Levels of Data, Variables, Hypotheses, and Theory. *Handbook of research methods in public administration*, pp.21-40.

Wheeler, S.M., 2002. The new regionalism: Key characteristics of an emerging movement. *Journal of the American Planning Association*, *68*(3), pp.267-278.

White, R., 2004. Interaction with nature during the middle years: Its importance in children's development and nature's future. *Retrieved October*, *28*, p.2004.

Whitehead, T.L., 2005. Basic classical ethnographic research methods. *Cultural ecology of health and change*, *1*, pp.1-29.

Woldegiyorgis, A., 2014. The Ethiopian developmental state and its challenges. *Available at SSRN 2512907*.

Woldegerima, T.,2016. Study of the Urban Environment and Ecosystem Services of Addis Ababa: Implications for Urban Green Space Planning. A thesis submitted to the University of Addis Ababa for the degree of Ph.D. in Environmental Planning.

Woldegerima, T., Yeshitela, K. and Lindley, S., 2017. Characterizing the urban environment through urban morphology types (UMTs) mapping and land surface cover analysis: the case of Addis Ababa, Ethiopia. *Urban Ecosystems*, *20*(2), pp.245-263.

Woldesemayat, E. M. & Genovese, P. V. 2021. Urban Green Space Composition And Configuration In Functional Land Use Areas In Addis Ababa, Ethiopia, And Their Relationship With Urban Form. Land, 10, 85.

Wubneh, M., 2018. Policies and praxis of land acquisition, use, and development in Ethiopia. *Land Use Policy*, *73*, pp.170-183.

Wu, J., 2008. Toward a landscape ecology of cities: beyond buildings, trees, and urban forests. In *Ecology, planning, and management of urban forests* (pp. 10-28). Springer, New York, NY.

World Bank. 2016. *Ethiopia's Great Run: The Growth Acceleration and How to Pace It*. Washington, DC, World Bank Group, pp. 148.

World Bank, W., 2007. Strengthening Bank Group Engagement in Governance and Anticorruption. *World Bank Group strategy paper*.

World Bank, 2017. Ethiopia Country Environmental Analysis: Realizing Green Transformation.

Wright, H., 2011. Understanding green infrastructure: the development of a contested concept in England. *Local Environment*, *16*(10), pp.1003-1019.

Wolch, J., 2007. Green urban worlds. *Annals of the Association of American Geographers*, *97*(2), pp.373-384.

Xiu, N., Ignatieva, M., van den Bosch, C.K. and Zhang, S., 2020. Applying a socio-ecological green network framework to Xi'an City, China. *Landscape and Ecological Engineering*, *16*(2), pp.135-150.

Yalew, A.W., 2020. Urban Agriculture in Ethiopia: An Overview. *Regional Economic Development Research*, pp.85-92.

Yang, J., Huang, C., Zhang, Z. and Wang, L., 2014. The temporal trend of urban green coverage in major Chinese cities between 1990 and 2010. *Urban Forestry & Urban Greening*, *13*(1), pp.19-27.

Yazan, B., 2015. Three approaches to case study methods in education: Yin, Merriam, and Stake. *The qualitative report*, *20*(2), pp.134-152.

Yeshitela, K. (2015). Public recreational parks and green space development in Addis Ababa. In S. Bekele (Ed.). Public amenity services in Addis Ababa (pp. 191–213).

Addis Ababa, Ethiopia: Forum for Social Studies. [2015] www.fssethiopia.org/ publication detail. php? pubid=266.

YESHITELA, K., 2019. Urban green space development and management in a rapidly urbanizing sub-Saharan African city: the case of Addis Ababa, Ethiopia. *Ethiopian Journal of Environmental Studies & Management*, *12*(1).

Yeshitela, K., 2020. Attitude and Perception of Residents towards the Benefits, Challenges and Quality of Neighborhood Parks in a Sub-Saharan Africa City. *Land*, *9*(11), p.450.

Young, R., Zanders, J., Liebknecht, K. and Fassman-Beck, E., 2014. A comprehensive typology for mainstreaming urban green infrastructure. *Journal of hydrology*, *519*, pp.2571-2583.

Yiftachel, O., 2001. Can theory be liberated from professional constraints? On rationality and explanatory power in Flyvbjerg's Rationality and Power. *International Planning Studies*, *6*(3), pp.251-255.

Yin, R.K., 2013. Validity and generalization in future case study evaluations. *Evaluation*, *19*(3), pp.321-332.

Yin, R.K., 1994. Discovering the future of the case study. Method in evaluation research. *Evaluation practice*, *15*(3), pp.283-290.

Yin, R.K., 2003. Designing case studies. *Qualitative Research Methods*, pp.359-386.

Young, R., Zanders, J., Lieberknecht, K. and Fassman-Beck, E., 2014. A comprehensive typology for mainstreaming urban green infrastructure. *Journal of hydrology*, *519*, pp.2571-2583.

Yuan, F., Sawaya, K.E., Loeffelholz, B.C. and Bauer, M.E., 2005. Land cover classification and change analysis of the Twin Cities (Minnesota) Metropolitan Area by multitemporal Landsat remote sensing. *Remote sensing of Environment*, *98*(2-3), pp.317-328.

Zewdie, M., Worku, H. and Bantider, A., 2018. Temporal dynamics of the driving factors of urban landscape change of Addis Ababa during the past three decades. *Environmental management*, *61*(1), pp.132-146.

Zewdie, A. and Tegegne, E., 2019. Analysis of Sustainable Urban Water Front Development by Using Urban Design Principles in The Case of Addis Ababa, Bole Sub City.

Zewde, B., 1991. *A history of modern Ethiopia, 1855-1974*. Ohio Univ Pr.

Zeluel, A., Asfaw, M. and Berhe, S., 2011. Assessment of Urban Development Practices on Business Expansion in Ethiopia.

Zhao, Y., Wu, J., He, C. and Ding, G., 2017. Linking wind erosion to ecosystem services in drylands: a landscape ecological approach. *Landscape ecology*, *32*(12), pp.2399-2417.

CHAPTER SIX List of Appendices

APPENDIX A Survey questionnaires for sampled experts

Addis Ababa University

Ethiopian Institute of Architecture, Building Construction and City Development

Questionnaire for experts

Questionnaire 1

I am a Ph.D. candidate in urban and regional planning at the Ethiopian Institute of Architecture, Building Construction and City Development, Addis Ababa University. I am undertaking a research entitled, *Governance Approaches for Green Infrastructure Planning and Management in Selected Ethiopian Urban Areas*. You are one of the respondents selected to participate on the study. You are assured of full confidentiality, privacy and anonymity of all the information that will be given by you. You should therefore feel free to give me the right information. Your response is important to the success of this study. I would like to thank you for your cooperation.

Instruction: Please put (**X**) on the box for your chosen answers.

Green infrastructure planning principles

Please give your personal view on UGI planning principles, whether your city plan considered the following UGI planning principles. Please rate between 1 (strongly disagree) and 5 (strongly agree)?

	strongly agree	agree	undecided	disagree	strongly disagree
UGI green-gray integration with;					
Water channels					
Roads and bus routes					
Channeled rivers					
Drainage systems					
UGI ecological network and connectivity with;					
Power and telecommunication					
Built up areas					

Preserve a city wide and regionally linked green network
Bike-pedestrian network
Wild animals movement
Built-up and nature network
Green corridors for vulnerable areas
Multifunctionality principle of UGI provide;
To control flood
access to cultural assets
access to Agricultural products
access to Pure water
To Develop river buffer plants
Community participation
To develop habitat provision
Socially inclusive principle of UGI include;
Residents actively participate in UGI planning
Community greenspaces used for active participation
Residents have the right to administer green spaces
Residents used green spaces for greening
Cooperation to manage community greenspaces
Controlling community green spaces

The influences of policy and planning themes on UGI planning

How would you rate the influence of the following on themes considered in planning and policy-making in relation to UGI in your city? Please rate between 1 (strongly disagree) and 5 (strongly agree).

	Strongly agree	undecided	agree	disagree	Strongly disagree
National policy					
Regional policy					
Municipal policy					
City plan proclamation					
Research result					
NGOs					
GTPII					
Interference of politicians					

The influence of land use regulations on UGI development

How would you rate the impact of the following on themes considered in UGI development

Please rate between 1 (strongly disagree) and 5 (strongly agree).

	Strongly agree	undecided	agree	disagree	Strongly disagree
Preparing and improving land-use plans based on public participation					
Public input is incorporated in preparing and amending land use plans					
The report explicitly mentions public responses, and this report is publicly accessible					
Public input is not sought in preparing and amending land use plans					

Resident's land use rights and management of community green spaces

How would you rate residents' land use rights and management of community green spaces of the following themes in your city?

Please rate between (1 very low to 5 very well)

	Strongly agree	undecided	agree	disagree	Strongly disagree
Resident's rights to UGS management and maintenance are legally recognized					
All UGS are effectively protected in practice					
Protecting some UGS is difficult					
The management of all UGS is respected in practice					
Any disputes that may arise in the management of UGS are swiftly resolved					
UGS land has boundaries demarcated and surveyed and associated claims are registered.					

The management of public land

How would you rate whether public land ownership is justified and managed at the appropriate level of government on the following themes in your city?

Please rate between 1 (strongly disagree) and 5 (strongly agree)

	Strongly agree	undecided	agree	disagree	Strongly disagree
The assignment of management responsibilities for various forms of public land is sufficiently ambiguous to impact to some extent the management of assets					
It has a been a significant impact on the management of assets when there is severe ambiguity in the assignment of management responsibility for various types of public land					
The assignment of management responsibilities for various forms of public land is seriously ambiguous with a major impact on the management of assets					
Public land ownership is justified and managed at the appropriate level of government					
There is clear management responsibilities for different types of public land					

Environmental policies related to UGI

How would you evaluate the incorporation of environmental policy related to UGI?

Please rate between 1 (strongly disagree) and 5 (strongly agree)

	Strongly agree	undecided	agree	disagree	Strongly disagree
New places for additional GI					
Green networking					
Environmental pollution control					
Sustainable natural resource management					

Accessibility of ecosystem services to all places
Maintaining and developing ecological corridors
Rehabilitate previous natural places
Focus on biodiversity

Resident’s ecological knowledge

How would you view the effects of incorporating residents' ecological knowledge in your city's plan?

Please rate between 1 (strongly disagree) and 5 (strongly agree)

	Strongly agree	undecided	agree	disagree	Strongly disagree
Improving GI spatial plan					
Providing information on the effect of the previous plan on green spaces management					
Providing the necessary ecosystem service information					
Providing information on interests of residents towards green space management and maintenance					

Environmental management process

How would you view the city's environmental management impacting GI development?

Please rate between 1 (strongly disagree) and 5 (strongly agree)

	Strongly agree	undecided	agree	disagree	Strongly disagree
Open discussion among different actors					
Actors consensus					
Different ideas of actors					
Encourages new solutions					
Gives all actors an equal chance to state their opinions and have an influence on the outcome					

Learning items (cognitive, normative, and relational),

How would you rate your involvement in environmental management has increased your understanding or not?

Please rate between 1 (strongly disagree) and 5 (strongly agree)

Cognitive learning	Strongly agree	undecided	agree	disagree	Strongly disagree
The ecological conditions					
The social conditions					
Management method					
The problems and challenges of environmental management					
Normative learning					
The management process has helped me to understand the perspective of others					
My views on environmental management have led me to act in surprising or new ways					
My views on environmental management are similar to those of others involved in the management process					
Relational learning					
Increased my understanding understanding/acceptance of other actors					
Has improved my ability to work in collaboration and cooperation with other people, groups, and organizations					

Collaborative environmental management

How would you rate the extent to which the process of collaborative environmental management?

Please rate between 1 (strongly disagree) and 5 (strongly agree)

	Strongly agree	undecided	agree	disagree	Strongly disagree
Conflict resolution among actors					

Creating new collaborations with cities
Transparent, equitable, and fair decision making
Greater support for environmental management decisions from individuals who are not involved in the collaborative management process
Using informal consensus to resolve conflict

Effect items

How would you rate the extent to which the process of collaborative environmental management has effected?

Please rate between 1 (strongly disagree) and 5 (strongly agree)

	Strongly agree	undecided	agree	disagree	Strongly disagree
Enhancement of wellbeing					
Improvements in social capital					
Improvements in human capital					
Sustainable ecological management					
Sustainable economic development					

APPENDIX B

Survey questionnaires for sample residents

The role of city government in the management of green spaces

How would you rate the role of city government in the management of community green spaces

Please rate between 1 (strongly disagree) and 5 (strongly agree)

	Strongly agree	undecided	agree	disagree	Strongly disagree
Community green spaces land use right					
Green space policies					
Clear regulation and rules					
Provision of information					
Cooperation between actors					
Action by government					

Preferences for urban green spaces 1 very unnecessary to 5 very necessary

What are your preferences on the following additional or new GI types

Please rate between1 (very unnecessary) to 5 (very necessary)

	Strongly agree	undecided	agree	disagree	Strongly disagree
Access to recreational areas					
Access to street trees					
Access to community green spaces					
Access to grass strips					
Access to vegetable areas,					
Access to forest					

Ecosystem service benefits of GI

How would you rate the following ecosystem service benefits of GI

Please rate between 1 (strongly disagree) and 5 (strongly agree)

	Strongly agree	undecided	agree	disagree	Strongly disagree
Provisioning					
To produce vegetables					
Energy(fuelwood)					
Provision of medicinal plants					

House construction
The provision of water
Supporting services
Maintaining soil fertility
Nutrient cycling
Genetic diversity
Wild animal's shelter
Regulating services
Temperature regulation
Climate change mitigation
Soil protection
Habitat for biodiversity
Wind barrier
Air purification
Water flow regulation and runoff mitigation
Absorption of sound waves
Cultural services
To promote social interaction and relationships
To enhances beauty
Educational benefits
Children's cognitive development
Recreational benefit
Relieving stress
Attracting investment

APPENDIX C

Interviews questions

I. General information on urban green infrastructure

1. What do you understand the term Green Infrastructure to mean?

2. What elements constitute Green Infrastructure?

3. What does not constitute Green Infrastructure?

II. Development of green infrastructure

1. How would you describe the development of the green infrastructure concept?

2. How should Green Infrastructure be developed?

3.What factors are affecting the development of Green Infrastructure?

III. Expert panel discussion on:

The concept of green infrastructure,

The elements constitute Green Infrastructure,

The participation of actors in the planning,

Green infrastructure planning principles and challenges to incorporate green infrastructure planning principles in the plan.

Interviews with urban planning experts/officers

- Knowledge of urban green infrastructure,
- Urban planning Policy in relation with GI,
- The planning and organizational use of GI
- Community green /open spaces land use right,
- The participation of stakeholders/actors in the management and land-use planning for UGI, and
- Factors affecting the development of green infrastructure.

Interviews with environmental experts

- Knowledge of urban green infrastructure,
- The management of urban green infrastructure,
- Organizational green infrastructure use,
- The participation of stakeholders/actors in the management and

land-use planning for UGI, and

- Factors affecting the development of green infrastructure.

APPENDIX D

Criteria with Indicators

Indicators for criterion ‘Recreation’	Explanation of indicator	Type of plans		
		1984	2000	2017
Importance for everyday life	Daily use by citizens for walking, exercising, playing and social interaction.	-	-	(+)
Accessibility	Location of green space within walking distance and without barriers (e.g. roads with heavy traffic)	-	-	-
Geographical distribution	Fair distribution of green spaces in all city districts	-	-	-
Interconnectedness between	Availability of greenways between green green spaces	-	-	-
Pedagogical reason	Availability of green spaces for school excursions and for providing understanding of nature	-	-	(+)
Public health	Improves quality of life, and promote healthy habits	-	-	-
Surface water	Presence of lakes, ponds and streams improves the quality of green space	-	-	-
Appreciation	Different ways in which people appreciate parks, woods and other green spaces	-	-	-
Size of green space	Number and size of parks and other green spaces	(+)	(+)	+
Aesthetic functions	Role of parks and other green spaces to beautify the city	-	-	(+)
Public–private green spaces	Private gardens as an important complement to public green space	-	-	-
National interest	Preservation of specific green spaces of importance for the national heritage	-	-	-
Allotments	Leasehold of small plots in order to grow flowers and vegetables	-	-	-

Indicators for criterion Maintenance of biodiversity	Explanation of indicator	1984	2000	2017
Biodiversity-ecosystem level	The multiplicity of ecosystems in an urban environment	-	-	+
Biodiversity—species level	Presence of a great variety of native species in the urban environment	-	-	-
Presence of greenways	Presence of green passageways between habitats including connection with the surrounding land to facilitate migration of species	-	-	-

Valuable green cores	Green spaces with native habitats that can act as breeding grounds for species	-	-	-
Importance of surface water	Bodies of surface water increase ecosystem and species diversity	-	-	-
Green space management	Green plan has clearly stated management criteria for promoting biodiversity	-	-	-
Size of green spaces	Positive correlation between the size and number of green spaces and species	(+)	(+)	+
Habitat continuity	Older habitats develop higher species diversity compared with younger ones	-	-	-
Rare/threatened habitats or species	Importance of preserving rare/endangered habitats and species	-	-	-
Barrier effects	Man-made obstructions in the landscape that prevent migration of species between habitats	-	-	-
Biodiversity—landscape level	Variation of landscapes in the surrounding countryside	-	-	-
Scientific values	Habitats of specific scientific values	-	-	-
Fragmentation and edge effects	Effects of subdividing a continuous habitat into smaller entities, which increase the amount of ecotones and number of species, and impact on local climate	-	-	-
Representativity	Habitats representative of a particular landscape	-	-	-
Metapopulation aspects	Aggregates of patch populations in the urban landscape	-	-	-

Indicators for criterion City structure	Explanation of indicator	1984	2000	2017
Identity and character	Each city has its characteristic green spaces that citizens recognize as important and unique for their city	(+)	+	+
Structuring functions	Lines of trees, avenues and other vegetation along streets, roads and squares	-	-	-
Discerning component	A city becomes more comprehensible for the citizens because green spaces separate urban landscape in smaller districts	-	-	-
Unifying factor	Green space unites urban districts in a natural way	-	-	-
Linkage to rural hinterland	Urban green spaces provide natural link between the city and the surrounding landscape	-	-	(+)

APPENDIX E

The correlation between socio-demographic variables age, educational level, and income with perceived variables

	age	education	income
Perception towards general environmental knowledge	(-)	(+)	(-)
Perception on preferences of green spaces: Access to			
Community green space	(-)	(-)	(+)
Recreational areas	(-)	(-)	(+)
Street trees	(-)	(-)	(-)
Vegetable areas	(-)	(+)	(+)
Community green spaces	(-)	(-)	(+)
Forest	(+)	(-)	(-)
Grass strips	(-)	(-)	(+)
Perceptions of urban residents on ecosystem benefits of GI			
Provisioning ecosystem benefits			
To produce vegetables	(-)	(+)	(+)
Energy(fuelwood)	(-)	(+)	(+)
Provision of medicinal plants	(-)	(+)	(+)
House construction	(-)	(+)	(+)
The provision of water	(-)	(-)	(+)
Supporting services			
Maintaining soil fertility	(-)	(+)	(+)
Nutrient cycling	(+)	(+)	(+)
Genetic diversity	(-)	(+)	(+)
Wild animal’s shelter	(+)	(+)	(+)
Regulating services			
Temperature regulation	(-)	(+)	(-)
Climate change mitigation	(-)	(+)	(+)
Soil protection	(-)	(+)	(+)
Habitat for biodiversity	(+)	(+)	(+)

Wind barrier	(-)	(-)	(-)
Air purification	(+)	(-)	(-)
Water flow regulation and runoff mitigation	(+)	(-)	(-)
Absorption of sound waves	(-)	(-)	(+)
Cultural services			
To promote social interaction and relationships	(-)	(+)	(+)
To enhances beauty	(-)	(-)	(+)
Educational benefits	(-)	(+)	(+)
Children's cognitive development	(-)	(+)	(+)
Recreational benefit	(-)	(+)	(-)
Relieving stress	(+)	(+)	(+)
Attracting investment	(-)	(+)	(+)

APPENDIX F

Published Articles

1. Ayele, B.Y., Megento, T.L. and Habetemariam, K.Y., 2021. 'Governance of green infrastructure planning in Addis Ababa, Ethiopia'. *Land Use Policy*, *111*, p.105777. https://doi.org/10.1016/j.landusepol.2021.105777
2. Ayele, B.Y., Megento, T.L. and Habetemariam, K.Y., 2022. The governance and management of green spaces in Addis Ababa, Ethiopia. *Heliyon*, *8*(5), p. e09413, p.1-9. https://doi.org/10.1016/j.heliyon.2022.e09413
3. Ayele, B.Y., Megento, T.L. and Habetemariam, K.Y., 2022. Assessing green infrastructure spatial plans in Addis Ababa, Ethiopia. *Socio-Ecological Practice Research*, 4, pp.85-101. https://doi.org/10.1007/s42532-022-00115-9

Article under review

4. Ayele, B.Y., Megento, T.L. and Habetemariam, K.Y., 2022. Urban Forest Management in Addis Ababa, Ethiopia. A Policy Arrangement Approach. *Urban Forestry and Urban Greening,79(2023).pp.1-9* https://doi.org/10.1016/j.ufug.2022.127809