

**Managing the challenges of the Built Environment Development
Process in Ethiopian Urbanization: *The Environmental Responsiveness
Failure of the Management System in the Addis Ababa and Sebeta Urban Region.***

Author: Solomon Benti Abuna

Supervisors:

1. *Heyaw Terefe (PhD); Addis Ababa University, EiABC*
2. *Daniel Callo-concha (PhD) ; University of Bonn, ZEF*
3. *Christian Borgemeister (Professor); University of Bonn, ZEF*

Addis Ababa, Ethiopia

March 2023

This is to certify that the thesis prepared by Solomon Benti Abuna entitled: **Managing the challenges of the Built Environment Development Process in Ethiopian Urbanization: *The Environmental Responsiveness Failure of the Management System in the Addis Ababa and Sebeta Urban Region*** and submitted in fulfillment of the requirements for the degree of Doctor of Philosophy in Urban and Regional Planning complies with the regulations of the University and meets the accepted standards concerning originality and quality.

Signed by Examining Committee

Heyaw Terefe (PhD)

Supervisor

Signature

Date

Daniel Lirebo (PhD)

External Examiner

Signature

Date

Wubshet Berhanu (PhD)

Internal Examiner

Signature

Date

Birhanu Girma (PhD)

Chair Person

Signature

Date

Dagnachew Adugna (PhD)

Post-graduate office director

Signature

Date

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I, the undersigned, declare that this thesis is my own and original work and has not been presented for a degree in any other university and that all sources of material used for the thesis have been duly acknowledged, following the scientific guidelines of the University.

PhD candidate's Name: **Solomon Benti**

Signature: _____

Confirmation

The thesis can be submitted for examination with my approval as an Institute's supervisor.

Supervisor's Name: **Heyaw Terefe** (PhD)

Signature: _____

ABSTRACT

The built environment has become not only a major component of the physical environment but also one that has opportunities and challenges for the other components like the natural and working landscapes especially since the industrial revolution, which triggered rapid urbanization of the world and growth of urban centers. The literature review indicated that the main challenges were depletion and pollution of the landscapes that unless managed the built environment development process can fail to be responsive to the challenges. This research aims at studying the challenges of depletion of the natural and working landscapes in the context of rapid built environment development process, an emerging management of the process, and public ownership of land. The general objective of the research is investigating why the management of the Built Environment Development Process's responsiveness to its challenges for the natural and working landscapes in Ethiopia appears to have gaps and how the gaps can be reduced by taking Sebeta town, one of the emerging towns surrounding Addis Ababa, as a case. Both quantitative and qualitative methods including interview, focus group discussion, document review, and observation were used for the research. In addition, land use/land cover analysis based on time series satellite imageries; Participatory Geographical Information System (PGIS) were used as analysis methods. The result indicates that the built environment development process (BEDP) in the study region has significant gaps of responsiveness to the natural and working landscapes: it has led to the loss of 3,956.26ha of the landscapes from 2005 to 2018. In this process, the most affected areas include fertile agricultural lands, environmentally fragile zones including forested mountains, spaces providing cultural

and spiritual opportunities, and riverbanks. The driver for the BEDP responsiveness gaps on the natural and working landscapes is the failure management system: (i) Its in existence that has led to spontaneous BEDP .(ii) Its inadequacy in terms of gaps in urban plans and their implementation. (iii) Limited availability of national and regional land use plans, and (iv) Gaps in the implementation of the public ownership of land policy that has not contributed as much as is expected.

Keywords: *Built Environment; Environmental Responsiveness; Emerging Towns; Green Field Development; Natural and Working Landscapes; Urban Management Failures*

Dedication

This PhD thesis is dedicated to my father, Ato ***Benti Abuna Liki***, who passed away about 6 years ago. The dedication goes to him as he was seeking for me to get the title of PhD in my younger age in his life. Although my father passed away bodily, his spirit is always with me and I have been struggling to achieve his need, and finally I did it. I thank you my dear dad.

Acknowledgements

My grateful gratitude and thanks go to my advisors **Dr. Heyaw Terefe and Dr Daniel Callo-concha and Prof. *Christian Borgemeister*** for their intensive guidance and continuous advice throughout the thesis process. They devoted their valued time wherever and whenever I needed their advice, and their responses with valuable and constructive feedbacks have made me look things over carefully, as well as played a significant role in finalizing the thesis in this way.

I would like to respectfully thank the Addis Ababa University, EiABC of Ethiopia, and the University of Bonn, Center for Development Research (ZEF) of Germany who gave me opportunities to conduct this PhD in Ethiopia and Germany under the EECBP DAAD program. I have great respect and thanks for ZEF for enrolling and supporting me materially during my three rounds for a total of Eighteen (18) months stay in Germany, and the Germany Academic Exchange (DAAD) for their financial sponsor during all my stay in Germany for their meaningful contribution in the successful compilation of this thesis.

In addition, this work would not have been completed without the contribution of institutions and individuals. Among the institutions, I am thankful to the Ministry of Urban Development and Construction (MUDCo), Oromia Urban planning Institute (OUPI), the municipality of the Sebeta town and the Ethiopian institute of Architecture, Building Construction and City Development (EiABC). The contributions of individuals who have been working in the above institution in general have played a great role in providing information for their unreserved moral, information and material support. In particular my friend, Architect Ebissa Adera, an expert in the Sebeta town municipality played a

lion role in facilitating the experts who have provided the information where I required and for his full knowledge of the current situation of the town.

Lastly not least, I have positive reception and admiration to my wife W/ro Tigist Kebede and my brother Ato Yifru Benti who supported me morally, financially and motivated me to successfully complete this thesis. Staff members and colleagues Professor Hailu Worku, Dr.Mulugeta Maru, Dr Aramde Fetene, and my friends Dr. Sitotaw Haile, Dr. Mekdim Dereje are also among those who I want to appreciate for their contribution in reading and giving me feedbacks in shaping to the final version.

ACRONYMS

AAMP	<i>Addis Ababa Master Plan</i>
AAMPPO	<i>Addis Ababa Master Plan Project Office</i>
BEDP	<i>Built Environment Development Process</i>
CSA	<i>Central Statistical Authority of Ethiopia</i>
DAAD	<i>Germany Academic Exchange</i>
EECBP	<i>Ethio-German Home Grown PhD Scholarship Programmes</i>
EiABC	<i>Ethiopian institute of Architecture, Building Construction and City Development</i>
EUPP	<i>Ethiopian Urban Planning Proclamation</i>
FUPI	<i>Federal Urban Planning Institute</i>
FUPCB	<i>Federal Urban Planning Coordinating Bureau</i>
GIS	<i>Geographical Information System</i>
GTP	<i>Growth and Transformation Plan</i>
IHDP	<i>Integrated Housing Development Programme</i>
ENVI	<i>Environment for Visualizing Images</i>
LEK	<i>Local Ecological Knowledge</i>
MUDC	<i>Ministry of Urban Development and Construction</i>
MUDHo	<i>Ministry of Urban Development and Housing</i>
NLFS	<i>National Labour Force Survey</i>
NUPI	<i>National Urban Planning Institute</i>
OUI	<i>Oromia Urban Planning Institute</i>
OSZSA	<i>Oromia Special Zones Surrounding Addis Ababa city</i>
OSE	<i>Open spaces and Environmental Sensitive Area</i>
OWWDSE	<i>Oromia Water Works Design and Supervision Enterprise</i>
PASDEP	<i>Plan for Accelerated and Sustained Development to End Poverty</i>
PGIS	<i>Participatory Geographical Information System</i>
SESs	<i>Social-Ecological Systems</i>
ESAs	<i>Environmental Sensitive Areas</i>

UEM	<i>Urban Ecological Model</i>
UGB	<i>Urban Growth Boundary</i>
ULQI	<i>Urban Landscape Quality Index</i>
UMTs	<i>Urban Morphology Types</i>
UrES	<i>Urban Entitlement Stage</i>
USEPA	<i>United States Environmental Protection Agency</i>
WCED	<i>World Commission on Environment and Development</i>
ZEF	<i>Center for Development Research</i>

PUBLISHED ARTICLES:

1. Benti, S., Terefe, H., & Callo-Concha, D. (2022). Implications of overlooked drivers in Ethiopia's urbanization: curbing the curse of spontaneous urban development for future emerging towns. *Heliyon*, 8(10), e10997.
2. Benti, S., Terefe, H., & Callo-Concha, D. (2022). Managing the challenges of competing interests of different regions in setting the boundaries of neighboring urban areas: the case of Addis Ababa city administration and oromia regional state, Ethiopia. *Heliyon*, 8(10), e11024.
3. Benti, S., Terefe, H., & Callo-Concha, D. (2021). Challenges and prospects to sustain natural and working landscapes in the urban areas in Ethiopia. *Current Research in Environmental Sustainability*, 3, 100071.

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CHAPTER ONE : INTRODUCTION

1.1. Background of the Study

Globally, human settlements tend to increase in population size and physical development gradually (Antrop, 2004; Babalola, 2012; Wu, 2014), from scattered rural settlements dominated by the natural and working landscapes (*Refer page 13-14*) to more concentrated and agglomerated built-up spaces of urban areas, roughly in the order of the following succession:

Hamlet → Village → Town → City → Conurbation (A. Girma, 2013; OECD, 2016; Young, 1999). This transformation process and the consequences from rural to urban denotes urbanization (Cohen, 2006; Farrell, 2017).

Urbanization is also the process of becoming urban that triggers the increase in the number of urban areas, population and related activities (Uttara et al., 2012). Therefore, urbanization has long been associated with human development and progress (Kuddus et al., 2020). Spatially, the global north is extensively urbanized, whereas the global South's urbanization is accelerating rapidly (Manzoor H. and Iram I., 2018).

The urbanization processes constitute three interwoven spatial aspects of environment: natural, working, and built-up. The natural and working landscapes are pristine to the human life, whereas the built up components have been increasing since the industrial revolution which has triggered rapid urbanization of the world (Heaton, 2021; Wu, 2014; X. Zhang et al., 2020).

The working and built environments have the capacity to deplete the natural environment since both can release harmful elements to it, but the built environment development process impacts are likely to be most critical especially when it occurs in the context of rapid urbanization and rapid urban development process. Besides its multidimensional advantages, the impacts on the natural landscapes are more apparent in urban centers due to the increased anthropogenic activities that induced the increment and expansion of built-up spaces (Desta et al., 2012; Fetene & Worku, 2013; Haddad, 2015; Zhang et al., 2017).

Consequently, urban areas are responsible for the degradation of natural resources and have become the major environmental problems (El Araby, 2002; Lian et al., 2010; Wu, 2014; Zhang et al., 2017). For instance, they largely contribute to the decline of ecosystem services and loss of biodiversity (Zhao *et al.*, 2006; Li *et al.*, 2016; Du & Huang, 2017), become the major cause for the loss in arable and forest areas, and degradation of wetlands and other aquatic environment (Fazal, 2000; HU et al., 2007; Islam et al., 2014). The best example of urbanization trends that contribute to unmanaged land use change specially to farm land is spontaneous development (Benti et al., 2021; Tian et al., 2011).

In terms of approaches, many preceding researches have recommended sustainable urbanization that aim to reduce the ecological and social impacts, and potentially enhance the economic importance of urban areas. For instance, the World Urbanization Prospects (2018) indicated that sustainable development depends increasingly on the successful management of urban growth.

Small and medium urban centers are keys for sustainable urban development due to the fact that they connect the complex urban life with the simple and undiluted rural landscapes (Alaci, 2010), and the severity of their impacts are manageable compared to large cities as the scale of impacts tends to be limited (Abou-korin, 2014). Such urban centers have limited physical and demographic footprints but they have important ecological impacts (Terfa et al., 2020), and most of the global economy is expected to occur in them (Tola et al., 2021).

As a result, understanding urban development process and the associated effects at their early stage of development is essential to curb urban expansion and propose appropriate measures to help for sustainable urbanization (Haregeweyn et al., 2012; Terfa et al., 2020). However, according to Dube (2013), at all scales, sustainable urbanization necessitates planned urban development, established competent institutional frameworks, and proactive management and governance strategies.

The effective urban growth management approaches at the small and medium level are quite important for low- and middle-income countries, expected to be urbanized the fastest until 2050 (United Nations, 2018). One of them is Ethiopia, which has experienced fast urbanization (Alemayehu, 2019). As a result, many small and medium sized towns have urbanized, particularly those that are close to larger ones, as is the case with the Oromia Special Zones Surrounding Addis Ababa city (OSZSA) (Girma *et. al.*; Mohamed *et. al.*, 2019).

The effects of urbanization can also be managed through urban boundary demarcation (Gennaio et al., 2009). It usually includes policy measures that play a role in determining

the extent of urban expansion, and managing urban space growth orderly (J. Liu et al., 2017). Also, an urban boundary is an indicator of access to urbanization, and of great importance for spatial-temporal monitoring and analysis of urban sprawl (Ning et al., 2018); moreover, well-managed boundary controls can encourage social and climate-smart growth by encouraging mixed-use developments and reducing car dependence (Teri Shore, 2020).

Historically, the fact on the ground in many parts of the world was the 'no development' situation in which while nature was largely preserved humanity was suffering from many problems related to needs such as food, water, health, communication (Galtung, 1990; Herrmann, J. et al., 1996; Mbifung Lambi et al., 2012). The situation was replaced by the 'development' approach especially following the industrial revolution which had led to rapid urbanization and the concentration of population in urban centers and made human life without development impossible (Cannadine, 1984; Sen, 1988). However, the development approach, which was pursued in response to this demand became characterized by the destruction of nature and the threat on sustainability of life on the planet (Banerjee, 2003; UNDESA, 2013). Therefore, there has been a process of replacing it with the sustainable development approach defined as "development that satisfies the needs of the current generation without constraining the capacity of future generations to satisfy theirs"(WCED, 1987).

Human activities, specially, in the context of the private interest and the development approach are expected to have challenges for the shift to sustainability even though they may sometimes also have opportunities (Hestad, 2021; Intergovernmental Panel on

Climate Change, 2012). However, the activities may fail to be responsive to their challenges and opportunities for sustainability or its inputs unless managed. The human activity, which is the focus of study in this research is the built environment development process. The sustainability inputs for which this activity has challenges and opportunities are natural and working landscapes. The research problem is the management gap of the failure of the activity in being responsive to its opportunities and challenges for the inputs and how it can be reduced.

1.2. Problem Statement

1.2.1. Overall problem

Built environment development process in rapid urbanization has been leading to a global rapid process of urban centers development since the Industrial Revolution (Power et al., 2018). This development process was quite slow in the global south for many decades but it has increased rapidly during the past two decades, and numerous new small urban centers have emerged (Cohen, 2006; Larsen et.al., 2019; UGent, 2012), inducing changes which have strongly affected the natural landscapes in urban areas and neighboring landscapes (Meskerem et al., 2017). The African continent has experienced rapid urbanization and population growth, which has resulted in an increase in the built environment, which has significantly impacted the other components of the environment through land use changes (Arsiso et., 2018).

Over the last three decades, Ethiopia has also experienced rapid urbanization and large built-up developments in urban centers, and as a result, several cities have expanded and many satellite towns have sprung up around the major cities (Koroso et al., 2021).

Migration is one of the driving forces behind the country's rapid urbanization, with the majority of it occurring in large cities and surrounding towns (Jenberu & Admasu , 2020).

Indeed, unmanaged built-up developments as a result of the country's urban expansion are becoming a major factor in the loss of arable agricultural lands and other natural areas (Fenta et al., 2017; Mohamed & Worku, 2019). They specifically polluted water bodies (Beyene, 2009; Yohannes & Elias, 2017), and degraded green spaces and related vegetation (Assaye et al., 2017; Gebeyehu Admasu, 2015; Mersal, 2016).

Most researches in urban development issues in Ethiopia were primarily focused on the quantification of the level of urban expansion, land use changes and the impacts of unmanaged urban development primarily focusing on the capital city and other regional capitals. However, studies on the urban management gaps in the built-up development process particularly in the spatial growth of small cities/ towns and their influences were quite limited (Terfa et al., 2020).

Researches show that the urban developments in the country are characterized by spontaneity and rapidity (Matt Burdett, 2018a) that usually emerge from informal settlements (Terfa et al., 2017). Spatially, researches also show that the highest urbanization ratios with such kinds of urban development occur in the towns surrounding Ethiopia's capital city, Addis Ababa (Benti et al., 2021; Matt Burdett, 2018a; Terfa et al., 2017).

The towns in the Oromia Special Zone surrounding Finfinnee /or Addis Ababa/ experienced spontaneously emerging and accelerated built-up development trends

(Mohamed & Worku, 2019; Terfa et al., 2020). Some researchers related this with their proximity to Addis Ababa, the capital city and its persisting pressure on the surrounding towns (Meskerem Z. et al., 2017). For example, in the towns of Sebeta, Burayu, Gelan and Dukem, Legatafo, and Sululta, have been experiencing urban development management gaps that led to the expansion of informal settlements at an alarming rate, occupying more than 30 % of the existing settlements (Lirebo, 2006; ORAAMP, 2001). For instance, in Sebeta town, more than 51 % of the residential area is covered by informal settlements (Chaka, 2018), and the town also exhibits unplanned and dispersed developments and sprawling built up development over farmlands and natural landscapes (Solomon and Hailu, 2015).

1.2.2. Research Gap

The sustainability of development is a public interest issue. However, researches on the relationship between the built environment development process and land based resources like natural and working landscapes are dominated by data mainly from the context of ownership of land by private interests. This study is done in the context of public ownership of land; a situation that has prevailed in Ethiopia since 1974.

Many researches emphasize that urbanization offers many opportunities but unless managed it is likely to present many challenges and also fail to deliver on the opportunities in the areas of jobs, housing, basic services, urban form, alike. That clearly indicates that the most central issue in urban transition research is the management aspect, presenting the opportunity for integrating research in the field and for standardizing the conceptual framework in the researches. However, there is gap in exploiting that opportunity. This research aims to fill

that gap by contributing to similar efforts by a group of research projects at the Institute managed by the thesis's local advisor.

In addition, during the colonial era, urban planning in Ethiopia was focused on sanitary conditions formal aspects of the urban development process. Later, the rapid urbanization has led to including the socio-economic (or land and property development market) aspects. But it does not appear to have led to the shift to the regionalist and environmentalist approaches especially in Ethiopia. As a result, the urban development process and its failure management system appear to have gaps of responsiveness to the natural and working landscapes. However, studies on the impacts of these gaps and how they can be reduced are quite scarce.

1.3. Objectives of the study

1.3.1. General Objective

The general objective of this research is to investigate why the Built Environment Development Process (BEDP) appears to have responsiveness gaps on the Natural and Working Landscape (NWL) in the Sebeta-Addis Ababa urban region and how the gaps can be reduced.

1.3.2. Specific Objectives

1. To investigate the challenges and prospects to sustain the NWL in urban areas in Ethiopia.
2. To investigate the challenges of the built environment development process on the sustainable transformation of the NWL in Sebeta town and its environs.

3. To explore the drivers of the built environment development process and associated responsiveness gaps on the NWLs.
4. To develop NWL responsive urban development framework for emerging towns in Ethiopia

1.4. Research Questions

1.4.1. General Research Question

Why the Built Environment Development Process (BEDP) in Ethiopia, particularly to Sebeta-Addis Ababa urban region, appearing unresponsive to natural and working landscapes and how to enhance the landscapes?

1.4.2. Specific Research Questions

1. What are the challenges and prospects to sustain the NWL in the urban areas of Ethiopia?
 - 1.1. What are the challenges to sustain the NWL in the process of urban development in the country?
 - 1.2. What are potential prospects to sustain the landscapes in the urbanization process in the country?
2. What are the challenges of the built environment development process on the sustainable transformation of NWL in Sebeta town?
 - 2.1. What land use/land cover related to NWL have been changed to built-up spaces?
 - 2.2. Which areas of the study region have been mostly affected in the process?

3. What are the potential drivers of the built environment development process and their associated responsiveness gaps on the NWLs?
 - 3.1. What are the drivers for the inception and intensification of the development of built environment?
 - 3.2. Which responsiveness gaps on the NWLs have occurred in the process?
 - 3.3. Which management system gaps have contributed to the irresponsiveness of the process on the NWLs?
4. What types of NWL responsive urban spatial development frameworks can be viable for emerging towns in Ethiopia?

1.5. Scope of the Study

The spatial scope of this study is framed within Ethiopia's urban centers, with a particular emphasis on the country's capital city and surrounding towns. To address the objectives (1-2), an in-depth spatial analysis was conducted on Sebeta, an emerging town in the Oromia Special Zone surrounding Addis Ababa, for containing the largest boundary overlaps with the capital and high development pressures.

The research's thematic focus, on the other hand, is on concerns relating to the natural and working landscapes in Ethiopia's urban planning process, and how these landscapes have been taken into account in the urban centers of the country, as well as the causes of their degradation. Furthermore, the study recommended natural and working landscape responsive urban planning framework that can be replicable for other urban centers in the country.

The temporal scope of the study is freely available Satellite imageries of the 2005, 2008 and 2018 of the Sebeta town and its region, that were used to generate and analyze the time-series land use/land cover changes in the study areas.

1.6. Significance of the Study

This study contributes to distinguishing challenges to sustain the natural and working landscapes in Ethiopia's urban development process, as well as paving the way for better integration of all the urban landscapes.

In addition to this, this paper is expected to contribute to a new body of global knowledge by demonstrating how traditional societal activities and the way of life of rural communities play a significant role in the establishment and development of urban centers as well as determine their growth patterns.

Moreover, in the increasing urbanization trends particularly in the global south where high rate of urbanization is evident, this research is believed to have a milestone scientific contribution by showing how unmanaged urban boundary setting of urban areas administered by different administrative regions can lead to social, ecological and economic challenges.

Therefore, this research will help future researchers, planners and policy makers alike working on the identification of challenges and better integration of the natural and working landscapes in the Ethiopian urban development process, as well as the development of frameworks to improve Ethiopia's current urban planning approaches in terms of urban landscape transition. The result of this research will benefit academia in

particular, as it will enable them to tackle the challenges and prospects for integrating natural and working landscapes in urban areas; to identify the driving factors for the genesis of spontaneous urbanization and the increment of built-up spaces in urban centers, and the roles of urban boundaries in the urbanization process.

1.7. Ethical consideration

This study was carried out in accordance with all applicable research ethics. All data that was reviewed was acknowledged and cited as per the required guideline. Interviews were conducted with the interviewers' permission, with no personal information disclosed and only their responses themed according to the research objective. All institutions and individuals who participated in the research as data sources are acknowledged properly.

1.8. Structure of the Thesis

The thesis is organized into Six chapters. Chapter one deals with all the *introduction* section including: the background of the study, the problem statement, objectives, research questions, scope and significance of the research. Chapter two details all the necessary *literature review* that supported the research. Chapter three includes all the general *methods and materials* deployed for this research and particularly encompass detail methodologies for each specific objective. Chapter four includes all *results* that are detailed for each specific objective. Chapter five shows the *proposed natural and working landscape responsive urban development framework* for future emerging towns in Ethiopia. The final, Chapter six presents the *conclusion and recommendations* based on lessons of this research.

CHAPTER TWO : LITERATURE REVIEW

2.1. Conceptual Review

2.1.1. The Built Environment, Natural and Working Landscapes

The physical environment is composed of three major elements (Figure 2.1): the built environment, and the natural and working landscapes (Tom Daniels & Katherine, 2003). Natural Landscapes are usually spaces that are pristine to an area (County, 2016). They include vegetation masses, water bodies, and original landforms. Whereas, Working Landscapes are the areas between urban and natural areas, that are anyhow ecologically, socially and economically connected (Huntsinger & Sayre, 2007). These include farmlands, forests, grazing lands, touristic and historical sites, and cultural and protected areas, alike (Chalana, 2008).

On the other hand, Built Environments are all man-made structures such as buildings, and other social and physical infrastructures that occupy natural ecosystems (Johnson et al., 1997; Karen and Ngozi, 2008; US EPA, 2001) and transform them into heterogeneous patches of original habitats (Suski *et al.*, 2018). The three elements are socially, economically, and environmentally connected (McDonnell & Pickett, 1990; McDonnell et al., 2009). As a result, they have challenges and opportunities for each other (Halliday, 1997).

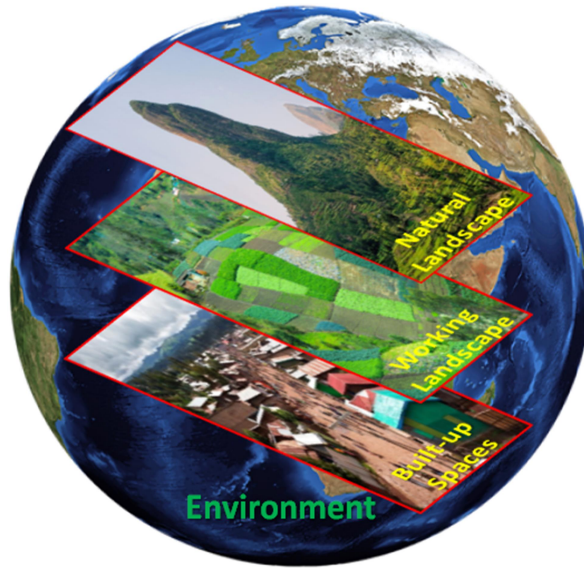


Figure 2.1: The three main land-uses of a schematic urban environment (*illustrated by the author based on reviews, 2020*)

2.1.2. The Environmental Elements and Social Goals

Human beings usually interact with the natural and working landscapes to fulfill their physical health and well-being (Cox & Gaston, 2015), psychological comfort (Curtin & Kragh, 2014), as well as social and spiritual benefits (Keniger et al., 2013), but they often have also altered the landscapes (Kareiva et al., 2007). For instance, the natural landscapes maintain air quality clean, regulate the temperature and precipitation, prevent floods, provide clean water, maintain the soils productive, the genetic diversity high and offer recreation areas, reduce noise pollution, provide aesthetic and emotional experiences, enable us to recover our attention capacities to the environment, (Assaye et. al., 2017; Kareiva et al., 2007; Keniger et al., 2013; Lindholm, 2019; Ohly et al., 2016; WHO, 2017; Zhao et al., 2006).

Therefore, natural and working landscapes are important land based resources whose conservation, development, and efficient use are indicators of sustainability of the development process. Due to its connection with the two elements of the physical

environment, the built environment's development process has opportunities and challenges for the landscapes (Brownson et al., 2009; R.C. et al., 2009). It can deplete them through inefficient use of land resource or it can pollute them through inadequate waste resource management system (W. Chen & Wang, 2014; Gan, 2011; Tsai et al., 2019). On the other hand, it can provide them with the resources to be conserved and developed (James A. Lagro, 2006; Ozcan, 2002).

However, history has shown that, as in the case of industrial cities and many urban centers in the developing world, the built environment development process may fail to be responsive to its opportunities and challenges (OECD, 2012; R.C. et al., 2009), and that unless this failure is managed, the two landscapes' capacity to contribute to sustainability may be constrained

Thus, apart from wider contextual factors such as the national and local economies that drive the built environment development process, the critical factor becomes the management of the failures of the process (Green, 2014; Malalgoda & Amaratunga, 2015). If this management is in place and adequate, the built environment development process is likely to produce outputs that can be used to support long term sustainability (Opoku, 2016). If there is management gap, the built environment development process is likely to produce outputs which are unresponsive to the opportunities and challenges of the process for the two landscapes and fail to produce outputs which can be inputs for sustainability (Fang et al., 2021; Moffatt et al., 2008).

2.1.3. The Conceptual Framework of the Research

A conceptual framework has a strategic position and role in a research (Guntur, 2019). Thus, in the light of the above discussion, the conceptual framework for the research is shown in the diagram below (Figure 2.2).

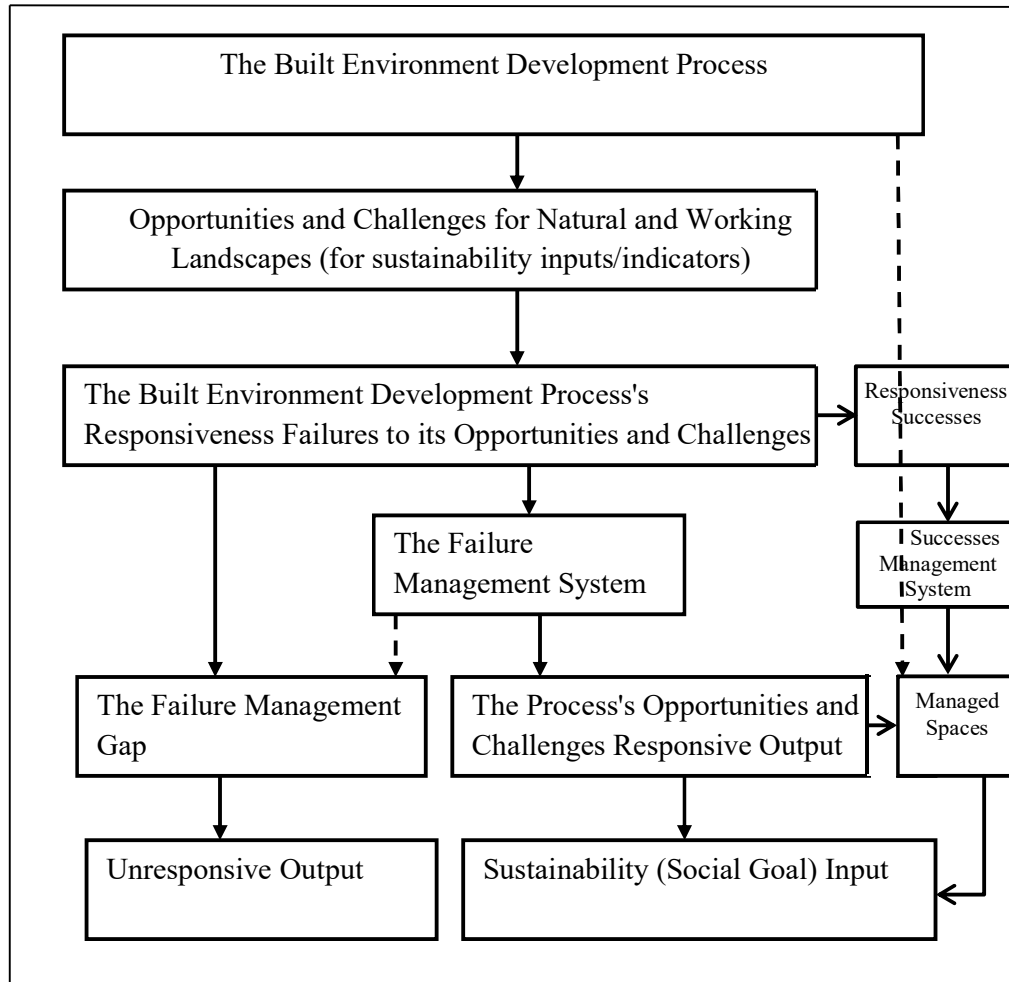


Figure 2.2: Conceptual Framework of the research

2.2. Theoretical Review

Based on the conceptual review the major issues that require theoretical review are the built environment development process, its opportunities and challenges for natural and working landscapes, and management of its failures to be responsive to its opportunities and challenges.

2.2.1. The Built Environment Development Process

The built environment is one of the three major elements of the physical environment (Lincoln et al., 2018). In principle, it includes all building intensities, but in practice, the most intense built environment is the urban center (Perrin et al., 2016). The development process of this component includes urbanization process (Streule et al., 2020), reaching a population size threshold (Dijkstra et al., 2020), engagement of more than half of the population on non-agricultural activities (Guo et al., 2022), building or property development process to house the population and the activities, and infrastructure development process to support the population and the activities (Balta et al., 2012; Hillier & Rford, 2014; Zhu, 2002). It also includes an urban land use pattern that develops from this process (Aguilera et al., 2011; Kleemann et al., 2017).

2.2.2. Urbanization, Urban Growth and Development

The urban center commonly has more building intensity than rural because by definition urban requires a certain threshold and above population size defined by governments and activities that require built environments (Dijkstra et al., 2020). Since the Industrial Revolution and the birth of industrial activities there has been rapid movement of populations to urban centers in the world (Dagdall Ince & Aslan,

2017; Duri et al., 2013). As a result, global urbanization level which was 15% in 1900 has now reached 56% (Whitehouse, 2010; World Health Organisation, 2018). Regionally there are variations. In Europe, the US, and South America the level has reached about 80% (Herzog, 2018) while in Asia and Africa it is below the global average (UN Department of Economic and Social Affairs, 2018). There are also size variations among the urban centers themselves expressed in for example the "Ekistics" scale as small town, town, large city, metropolis, conurbation, megalopolis, urban region (Doxiadis, 1968; Lang, 2003; Mahsud, 2010; Theodosis, 2020). Urban region implies the urban center as whole and the surrounding urban and rural areas and also the primary commuter areas typically formed around the urban area with a large concentration of people or a region (Abo-El-Wafa et al., 2017; Alberti, 2008; lawinsider.com, 2022). Anyhow, for more than a century the world has been in a rapid process of development and growth of urban centers and, thus, in a rapid expansion of the built environment component of the physical environment with implications for its other two components.

2.2.3. The Land and Property Development Process

Urban activities, which are one of the parameters that define the urban center, require housing in structures, which require a property development process (Gwamna & Zahari, 2014; Rodrigo Garcia et al., 2021). That makes the property development process one of the dominant elements of the built environment development process (David Adams, 1994; Healey & Barrett, 1990). It is a process in which new property or buildings for activities such as production, distribution, services, and habitation are developed or old ones are redeveloped or rehabilitated (Guy & Henneberry, 2000; Havel, 2014; Ismail, 1996). The process is very similar to an industrial process in

which inputs are processed to produce outputs. The major inputs are land, finance, technology, and professional service. Its major stakeholders are occupants, landowners, developers, financiers, marketers, and operators (Guy & Henneberry, 2000; M. F. R. Lee, 2011).

The literature on the property development process is based on private ownership of land and the private land owner stakeholders (DuPont, 2017; Verma & Tiwari, 2020). In this context, these stakeholders play an important role, whether actively or passively (S. J. Wilkinson & Sayce, 2015). For example, they may actively initiate development by a desire to sell and/or improve the value of their land. If they are not the active initiators, it may be the case that they become a crucial hurdle to the development, for without their willingness to sell their interest or participate in the development (unless compulsory purchase powers are used), no development can take place (Samsura et al., 2015; S. J. Wilkinson & Sayce, 2015; S. Wilkinson & Reed, 2008). In addition, the landowner's motivation may well affect their decision to release land for development, and this is the case whether they are individuals, corporations, public authorities or charities. At times, they may even take on the role of the developer, either in whole or in part (Cadman & Topping, 1995; Sani Gambo, 2022)..

The literature on the developer stakeholder is also focused on the large-scale and private developer. Their purpose is to make a direct financial profit from the process of development – in the same way that any other private sector company operates, whatever their product (Cadman & Topping, 1995; Sani Gambo, 2022).

In the same manner, development finance is dominated by loans supplied by financial institutions. There are two main types of money required for development: short-term

money, also known as ‘development finance’, to cover the costs during the development process; and the long-term money, or ‘funding’, to cover the cost of holding the completed development as an investment (Cadman & Topping, 1995).

The financial institutions include pension funds and insurance companies which are motivated by direct financial gain and which unlike developers, take a long-term view, needing to achieve capital growth to meet their payment obligations in real terms to pensioners and policyholders. There are also many other financial intermediaries such as clearing and merchant banks as well as building societies who also provide finance for property development (Sara Wilkson and Richard Reed, 2008) .

2.2.4. The Infrastructure Development Process

Even though not emphasized in the definition of the urban the infrastructure development process is a second dominant element of the built environment development process because infrastructure is a means by which basic services without which human well-being cannot be ensured and without which primary, secondary and tertiary productive activities cannot function are supplied (Loots, 2020; Yeowon Kim, 2018).

Infrastructure of a country can be divided into two major parts- physical and social infrastructure (Japan International Cooperation Agency (JICA), 2018). Social infrastructure consists of better education facility, better health services availability etc. The physical infrastructure sector includes power, telecommunications, railways, roads including bridges, seaport and airport, industrial parks, urban infrastructure (*water supply, sanitation and sewage projects*), mining, exploration and refining, cold

storage and cold room facility, including for farm level pre-cooling for preservation or storage of agricultural and allied produce, marine products and meat. Infrastructure can be local or urban, regional and trans-border (Hillier & Raford, 2014; JICA, 2018; Madhuri Malhotra, 2017). The development of the latter two has wide ranging implications for the environment in general and working and natural landscapes outside urban centers in particular. As a result, Environmental Impact Assessment (EIA) or assessment of their effects on the environment is often part of their development process (Antonio, 2009).

Urban physical infrastructure includes infrastructures for water supply, transport, waste management, communication, and mainly power distribution (Bishop, 1997; Jean-Paul Rodrigue, 2011). The literature indicate that there is an increasing practice of turning away from the gray infrastructure (systems of gutters, pipes, and tunnels to move storm water away to treatment plants or straight to local water bodies) to green infrastructure for the management of storm water (US EPA, 2022). The gray infrastructure carries trash, bacteria, heavy metals, and other pollutants into rivers. In addition, heavy rains can cause flooding that damages property and infrastructure (US EPA, 2022). Basically, green infrastructure filters and absorbs storm water where it falls (Y. Girma et al., 2019a; Raymond et al., 2016).

Green infrastructure solutions can be applied on different scales, from the house or building level, to the broader landscape level (Aladesote, 2022; William L. Allen III, 2012). On the local level, green infrastructure practices include rain gardens, permeable pavements, green roofs, infiltration planters, trees and tree boxes, and rainwater harvesting systems (Copeland, 2013; Landforce, 2021; R. Sharma & Malaviya, 2021; US EPA, 2022). At the largest scale, the preservation and restoration

of natural landscapes (such as forests, floodplains and wetlands) are critical components of green infrastructure (americanrivers.org, 2022; Benedict & MacMahon, 2002; Copeland, 2013; freshcoastguardians, 2022). They can provide cleaner air and water as well as significant value for the community with flood protection, diverse habitat, and beautiful green spaces. Green infrastructure is effective, economical, and enhances community safety and quality of life (americanrivers.org, 2022; Barnes, 2021; Dunn, 2008).

2.2.5. The Urban Land Use Pattern

The built environment development process is concerned generally with the use of land, which results in a pattern overtime. Three major types of patterns (Figure 2.3): the concentric, the radial, and the multiple nuclei dominate the literature (Chauncy D. et al., 2016; Lauer, 1988; Matt Burdett, 2018b; Tian et al., 2010).

The **concentric pattern** depicts urban land use in concentric rings: the Central Business District (or CBD) was in the middle of the model, and the city is expanded in rings with different land uses (Burgess, 2016; Goldfield, 2012; Kaufmann, 2014). It is effectively an urban version of Von Thünen's regional land use model developed a century earlier (Jean-Paul Rodrigue, 2011; Sinclair, 1967). This model states that the concentric circles are based on ability to pay for land (Beauchamp, 2007).

The **sector model** was developed based on the argument that the location of transport and industry within the city affects the location of residential districts and that this results in 'sectors' of the city with different land uses (Matt Burdett, 2018).

On the other hand, the multiple nuclei model was developed based on the argument that as cities grow, they swallow up smaller settlements around the edge and as they

become larger, travel between the outskirts and CBD becomes impractical and smaller centres grow throughout the city leading to a polycentric, rather than concentric, pattern (Jehling et al., 2018; Schwirian, 2007).

The literature also includes the hybrid model (Isard, 1951, 1956). The hybrid model intendeds to integrate the strengths of each approach since none appear to provide a satisfactory explanation of urban land use pattern. It combines the concentric effect of central locations (CBDs and sub-centers) and the radial effect of transport corridors, all overlaid to form a land use pattern (Berhie, 2016; Isard, 1956; S. Sharma et al., 2011; Taaffe E.J., 1996). It is more suitable to explain the evolution of the urban spatial structure as it combines different spatial and temporal impacts of transportation on urban land use, such as concentric and radial impacts (J Rodrigue, 2013; Secinaro et al., 2021). It recognizes the evolution of technological influences on urban mobility, from walking and cycling, to the setting of modern urban transit systems along corridors and the network of urban highways (Engelen et al., 2007; Jean-Paul Rodrigue, 2011).

The models are all focused on the built-up and manmade components rather than the natural and working landscapes. In addition, they are based on the contexts of private ownership of land and the market allocation of land. In general, the applicability and dynamics of land use models are related to issues such as the history, size, and locational setting of a city (Jean-Paul Rodrigue, 2020). For instance, concentric cities are generally older and of smaller size, while polycentric cities are larger and relate to urban developments that have taken place more recently. This also includes the impacts of public transit systems that can vary according to the level of automobile dependence (J Rodrigue, 2013; Jean-Paul Rodrigue, 2011).

Another issue is the representativeness and applicability of a global urban landscape. While most of the conceptual approaches related to the relationships between transportation and land use have been developed using empirical evidences related to North America and Western Europe, this perspective does not necessarily apply to the developing world due to factors such as colonial background, dualism or the factor of informal settlements, and central planning (J Rodrigue, 2013; Jean-Paul Rodrigue, 2011; Nigro et al., 2019).

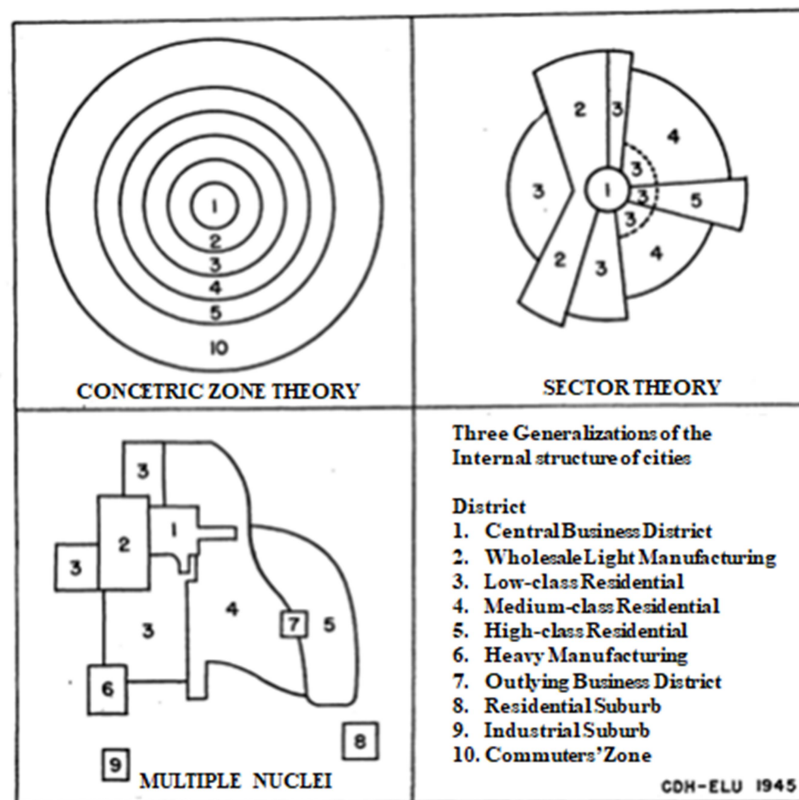


Figure 2.3: Types of urban land-use models, developed based on (Lauer, 1988 and Jean-Paul, 2011)

2.2.6. The Challenges and opportunities of the Built Environment Development Process for the Sustainability of Natural and Working Landscapes

The literature on the challenges and opportunities of the built environment development process, specifically the urban sector development process for natural

and working landscapes, emphasizes landscape depletion or degradation and pollution as challenges and urban rural linkages as opportunities.

2.2.6.1. Depletion and Degradation

In environmental literature, the types of human induced challenges mainly to natural landscapes are focused on degradation of biodiversity, vegetation, landforms, soil, and water (Islam et al., 2014; D. L. Johnson et al., 1997; Maitima et al., 2009). The loss of biodiversity is regarded as the most serious of all the environmental issues associated with urbanization (Chatterjee et al., 2022; Sun & Robinson, 2018). Urban expansion, which takes place on forests, wetlands and agricultural systems, can lead to habitat clearing and fragmentation, seriously impact on species that are dependent on those habitats, and can even drive some to extinction (Deribew, 2020; Desta et al., 2012; El et al., 2017; encyclopedia.pub, 2022; Fetene & Worku, 2013; Islam et al., 2014; Sahle et al., 2019; Su et al., 2011).

Urbanization usually increases urban settlements that degrade natural vegetation through deforestation (Bisu et al., 2016; Horst, 2006; Satterthwaite et al., 2008). Deforestation decreases the natural evapotranspiration, destabilizes hillsides leading to landslides, and increases soil erosion (S. Y. Lee et al., 2006; Sarma et al., 2013). It alters natural land forms leading to its degradation and disturbing the soil resources confined to land (D. L. Johnson et al., 1997). It leads to soil degradation or the reduction in the capacity of soil to provide ecosystem goods and services (Agus, 2011). Soil erosion removes the top soil, which is important for agriculture and construction (Bekele & Drake, 2003).

Urbanization also leads to the quantitative reduction of the landscapes through their physical consumption. The most common form of consumption which poses serious challenges for the landscapes is urban sprawl (Burchell et al. 1998; Kolbadi et al., 2015; Muranaka et al., 2015; Valle et al., 2015). Historically, it was associated with low-density single family dwellings, automobile dependency, and leapfrogging pattern of development (Cho et al., 2010; Hanham & Spiker, 2005). It was a process driven by population growth, blight of the core areas of the old cities leading to congestion, crime, and noise, the development of transport and infrastructure, low land values at the urban periphery, and later the preference for single family and low-density housing and laissez-faire planning or absence of an adequate management in the common interest that has resulted in undefined edge between urban and rural areas (Anderson, 2001; Kovács et al., 2019; Silva, 2018).

Urban sprawl is also associated with environmental failures (Hardi et al., 2020), which include “air pollution” resulting from automobile dependency, water pollution caused in part by increases in impervious surfaces, the loss or disruption of environmentally sensitive areas, such as critical natural habitats (e.g., wetlands, wildlife corridors), reductions in open space, increased flood risks, and overall reductions in quality of life" (Hardi et al., 2020; Hirschhorn, 2001; Kahn, 2000; Kenworthy & Laube, 1999). In addition, increased infrastructure costs, inequality, and social homogeneity are also its failures (Ewing, 1997; Ewing & Hamidi, 2015; Mills, 2003; X. Wang et al., 2020).

2.2.6.2. Pollution

Urbanization is associated with pollution of the elements of the natural and working landscapes such as water, soil, and air (Z. Liu et al., 2019; Torrey, 2004).

Cities generate a large amount of wastes, and pollute air and water resources (Balthazard-Accou et al., 2020; Mersal, 2016a; Randolph, 2004). With so many people living in close proximity, there is a higher risk of contamination from sewage and industrial effluent (J. Chen, 2007; Mohammed, 2012). This can lead to the spread of water-borne diseases such as cholera and typhoid (Sasakova et al., 2018; Vijayanand & Divyashree, 2015). It can also cause problems for wildlife and marine life, as well as the people who rely on them for food (Lindahl et al., 2015; “The Marine Environment and UN Sustainable Development Goal 14,” 2018; Ukaogo et al., 2020).

There is often also high concentration of vehicles and industries in cities, which release harmful pollutants into the air (Cárcel-Carrasco et al., 2021; Imam & Banerjee, 2016; Malamis et al., 2016). These pollutants can cause a range of health problems, including respiratory infections, heart disease, and cancer. Another impact of urbanization is soil pollution (Kampa & Castanas, 2008; Mabahwi et al., 2014; Matz et al., 2019). This can be caused by waste dumping, pesticide and fertilizer use, and the release of toxins from factories. This can result in lower crop yields and a decline in soil fertility over time, as well as threats to human health (Ahmed et al., 2021; richmondvale.org, 2022).

2.2.6.3. Urban Rural Linkages

The argument that urbanization is associated with improvement of quality of life (Mouratidis, 2021) suggests that the process provides the opportunities for quality of life improvement not only in urban centers but also in rural territories (Michalska-Zyła & Marks-Krzyszkowska, 2018) due to the urban-rural linkage (Cao et al., 2019; Gebre & Gebremedhin, 2019; Graziano da Silva & Fan, 2017; MWUD, 2009).

Urban rural linkage is concerned with the connections between urban and rural territories, in which working and natural landscapes are primarily located, and the flows that occur through the connections (Sietchiping et al., 2019; UN-Habitat, 2022). Historically, there has been a trend of viewing urban and rural territories as disjointed and even after the concept of their linkage has been developed there has been a trend of viewing the rural territories as the only beneficiaries from the linkage (Pu, 2020; Sietchiping et al., 2014). The current view is that the linkage has opportunities for benefiting both (Kroll et al., 2012). For example, almost all ecosystem services of urban areas such as food, water, wood, raw materials are imported from rural areas (Burkhard et al., 2012; Gebre & Gebremedhin, 2019). Similarly, the built environment or urban center development process has not only challenges but also opportunities for rural territories in general and working and natural landscapes located in the territories (Forster & Escudero, 2014). The opportunities include flow of goods and services that can improve agricultural outputs, flow of eco-tourists that can generate the resource for the conservation and management of natural areas, job opportunities that can relieve working and natural landscapes from the impact of rapid rural population growth, and markets for the produces, especially, from the working landscapes in rural territories (Kassahun & Tiwari, 2012; Lacitignola et al., 2007; McHale et al., 2015; Smit, 2016; Tacoli, 2003).

Urban centers facilitate farmers' access to inputs like fertilizers, pesticides, and technology that can raise the outputs of agricultural landscapes (Ruben & Van Den Berg, 2001). They serve as markets in which the outputs are exchanged and collated for transportation to other markets (Hosseiniabadi et al., 2012; Rondinelli, 1986). They generate local eco-tourists and serve as contact points for international ones whose

resources are important for the conservation of the natural landscapes and ecological resources (Bassett, 2009; Ramaano, 2022).

2.2.7. The Process's Failure Management System

The reviews above have indicated that the major driving force of the built environment development process is the process of urbanization. This process is nearing completion stage in the developed world and is at an emerging stage and rapidly ongoing in developing countries (Farrell, 2017) like Ethiopia, that it has both opportunities and challenges for the environment in general, and working and natural landscapes in particular.

In addition, the process may fail to exploit its opportunities and address the challenges unless managed (Alaci, 2010; Degife et al., 2019; Mubea et al., 2014). Consequently, the literatures indicate that the management was attempted through the development of first local or urban plans and eventually national and sub-national (regional) land use plans.

2.2.7.1. Urban Planning

Modern urban planning was introduced during the aftermath of the Industrial Revolution to manage the failures of the built environment development process in responding to its social challenges such as health and physical order (Assche et al., 2012; Hall, 2020). Rapid urbanization that followed the Industrial Revolution resulted in the rapid densification and expansion of the pre-industrial cities (Falkeis, 2015; Westlund & Haas, 2017). The densification and expansions were characterized by unsanitary conditions and physical disorder and these had led to social movements and eventually the introduction of modern urban planning (Towers, 2005; Verbeek,

2017). The earliest management solutions included the Garden City (Clark, 1967; Culpin, 2015; Ward, 1990), the Park (Jordan, 1994; web.uvic.ca, 1862), and the City Beautiful movements (Wilson & Johns, 1989). There was also demand for the responsiveness of the built environment development to its challenges for efficient use of resource, infrastructure, and public funds and the development into the rational planning approach (P. S. Lee, 2015; Monstadt & Coutard, 2019; Suykens, C., & van Rijswijk, 2016).

Later it included social challenges such as heritage conservation and equity: the distribution of cost and benefits among stakeholders and their access to resources. The responsiveness demands to the later challenges led to the development of public participation (Arnstein, 1968), Advocacy Planning (Davidoff, 1965), Transactive Planning and Collaborative Planning (Healey, 1998).

The failures of the built environment development process in being responsive to its challenges for the environment was realized early in the history of planning (Deal & Pan, 2017; J. Wang et al., 2021) but modern planning or the management system had gaps in managing the failures. These gaps were overtime attempted to be reduced by developing planning and management approaches such as: ecological planning approaches (Mersal, 2016b), smart growth and sustainable urbanism (Barthel et al., 2013), landscape urbanism (Panagopoulos, 2019; Waldheim, 2006), social-ecological urbanism (Aalto et al., 2018; Barthel et al., 2013), eco city (Jabareen, 2006; Moustafa Saad et al., 2017), and nature-based (Burkhard B, 2017; Ferreira et al., 2020) approaches.

2.2.7.2. Regional Planning

Regional planning was introduced to reduce the gaps of the urban center focused management of the built environment development process in managing the process's failures in being responsive to the linkages with territories outside the urban boundary (Hosseiniabadi et al., 2012; D. A. Johnson, 2001; Lu Dadao, 1982).

The concept was first introduced by Patrick Geddes (Wong, 2015; Wong et al., 2008) who put forward a synoptic vision of 'place, work, and folk' (MacDonald, 1994) to explain the symbiotic relationship between economic and sociocultural well-being and who through his planning work of the Edinburgh Zoological Garden, illustrated the complex interactions between human systems and the natural environment, which led to his idea of developing regional planning models to respond to these complex conditions (Thompson, 2006) . To Geddes, the spatial contexts of past and present were critical to planning as city development should be seen as part of a wider spatial network of the city and the surrounding countryside (Alex Lord, 2015).

Following Geddes, Lewis Mumford advanced a conception of regional development by taking an organic, ecological planning approach that aimed to balance the needs of the social world with those of the natural ecosystem (Alex Lord, 2015; Critchley, 2014). This regional approach to planning led to the establishment of the Regional Planning Association of America and the 'regional city' idea was advocated by Mumford, Clarence Stein, and other members in the 1920s (Meyers, 1998). The notion of a planned, polycentric city was then born, which emphasized on the importance of anti-sprawl and that individual settlements should be both distinct and interconnected at the regional scale (Bailey & Turok, 2001; Spórna & Krzysztofik, 2020).

While the term ‘regional planning’ consists of the spatial entity of ‘region’ and the practice of ‘planning’ the notion of a ‘region’ varies widely in different contexts (Perloff & Wingo, 2013). Perloff (1968) pointed out that regional planning had developed along pragmatic lines with relatively little attention to formal theory and defined it as the ‘ordering’ of activities and facilities in space at a scale greater than a single community and less than a nation, or, in the case of a common market situation where a number of nations are economically integrated, less than that of integrated totality (Frank, 1984; Perloff, 1968) .

Harvey Perloff (1968) also differentiated regional planning that were intended to strengthen national planning from regional planning that has specific objectives and operating components. He then settled on the fact that ‘we must deal with a varied assortment of regions which are subsystems of a larger whole and change with the whole over time in both internal structure and external relations’.

Several decades later, Seltzer and Carbonell (2011) view regional planning with similar flexibility: ‘rather than encompass a territorial interest that is sharply bounded and represented (or at least claimed) by an institution that holds general governmental powers and responsibilities, it is carried out over a territory that, at least when that planning takes place, is found to share enough characteristics to assert its existence as a region (Drennan, 2011; Whittemore, 2011).’ Their definition emphasizes on how regional planning should be deployed to address cross-boundary issues across jurisdictions, which differs from the earlier concerns of the size and spatial extent of regions.

The designation of a region, in planning terms, can be based on its administrative or functional boundaries and is likely to include a network or a hierarchy of urban

centers and urban and rural activities that have strong linkages and functional ties (Galland, 2012; Wong, 2015). The fluidity of the boundaries of a region asserts the crucial importance of interaction. The nature and intensity of interactions depend on what social–economic–physical activities are involved in the functional process (Hall, 1974; Parr, 2005; Wong, 2015). In this sense, the dynamic interaction between different activities over different spatial areas makes it difficult to delimit a region.

2.2.7.3. National Spatial Plans

National spatial plans are prepared in order to manage the failures of the inputs of development at national level such as urbanization, agriculture, tourism, energy, manufacturing, etc. in responding to their challenges for land and land based resources (Djordjevic & Dabovic, 2004). They provide a coordinating framework for sectoral planning and aims to address the disconnect that has existed for a long time between physical and economic and social planning which are the main focus on national development plans (Chimhowu et al., 2019). National development plans are normally established through a cyclic process led by the national planning institution (Ahmad & Hussain, 2014). They articulate government's economic, social and environmental priorities, and in turn influence the areas of cooperation and support provided by government partners including donors, intergovernment institutions, UN organizations, the private sector and civil society. They are often an amalgamation of sector (e.g. finance, agriculture, health, environment, education) strategies and plans, and elements of cross-cutting development issues such as HIV/AIDS, gender and human rights and increasingly, environmental sustainability (Hardee & Mutunga, 2010; Hazemba & Halog, 2021; Okitasari & Katramiz, 2022). National development plans may take the form of a party political manifesto prior to an election or of a

government action plan after an election. They are formalized as multiyear national development plans, typically covering a five-year or longer period. The five-year national development plans are implemented through three-year rolling budgets (medium-term expenditure frameworks) and the annual workplans and budgets chapter of sectors and subnational structures (UNEP, 2016; Coompanthu, 2007; OECD, 2002).

National spatial plans, thus, are basically aimed at managing the spatial development of a country by providing an integrated and coherent framework to promote and guide sustainable land use development (UN-Habitat, 2022) and they attempt to achieve that (Sliuzas, 2016) by:

- Formulating national land use and project proposals that are complementary to socio-economic policies and proposals for national development.
- Providing a strategic planning framework to facilitate: Rational allocation of land for competing uses and interests, providing consistent guidance to regulate and control development, more detailed planning at the sub-national and local levels.
- Adopting and implementing appropriate development policies and projects that: maintain the ecological integrity of the biophysical environment, maintain the integrity of the cultural landscape including traditional economic activities (agriculture, forestry), significant historical and archeological sites, and the form and character of urban and village development, safeguard suitable lands with tolerable levels of risk for affordable housing, viable agriculture, and environmentally sensitive tourism and industrial development, manage the demands on the infrastructure systems (water supply, waste

disposal, transportation facilities, etc.) and ensure efficient use of existing and proposed systems, safeguard population, housing, economic activity, and infrastructure facilities from natural and technological hazards.

- Promoting efficient, timely development through coordinated public and private investment programs.
- Stimulating community participation in the planning and development process.

2.3. Contextual review

2.3.1. Urbanization and the Built Environment Development Process in Ethiopia

Ethiopia has been in a rapid process of urbanization and built environment development process. The urban population of the country has more than tripled in the last 30 years, from about 4.5 million in 1984 to about 16.7 million in 2014 (Ermias *et al.*, 2019) and the urbanization level has also been increasing: 6.4% in 1960 (Tegenu, 2010), 14% in 1994 (CSA, 1994); 16% in 2007 (CSA, 2007); 18% in 2014 (JMP, 2014); 20% in 2018 (UN , 2018) and is forecasted to reach 30% by 2028 (Ozlu *et al.*,2015).

Population size is a main factor in the definition of urban and in determining their hierarchies in the country. Urban center is defined as "any locality with an established municipality or with a population of 2000 or more, of which three-fourth (75%) of its labor force is primarily engaged in non-agricultural activities" (MUDCo, 2010; MUDH, 2012). The number of urban centers (centers of intense built environment development) has increased from 648 in 1984 to 972 in 2012 (Ermias *et al.*, 2019), out of which more than 85% are small towns having populations from 2,000 to 20,000

(MUDCo, 2012). Nonetheless, urban centers are categorized into five levels / grades / as shown in the figure below on based on population size.

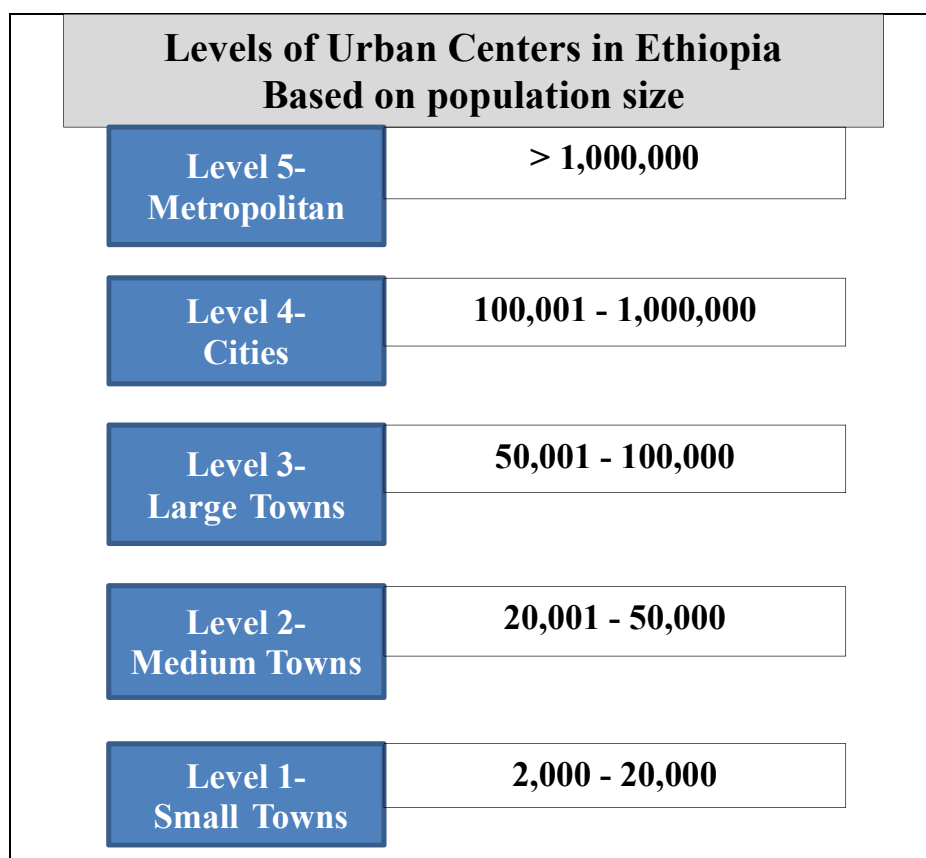


Figure 2.4: Levels of urban centers in Ethiopia (*Illustration from the 2012 Structure plan manual of Ethiopia*)

The categorization does not take into account population density and it is not stated how the population ranges have been defined. In addition, like all successive ranges, it has a problem of range difference based on a single person.

Given the size of the rural population (about 80%), it can be concluded that the urban areas in Ethiopia are still small in number while expected to increase in the near future. This helps to set possible proactive measures (or strengthening if any) to handle non-urbanized areas before they are part of the forecasted urbanization level and their associated problems reach peak.

2.3.2. Management of the Built Environment Development Process in Ethiopia

Although modern urban planning was introduced to the country nearly a century ago in the 1930s during Italy's five year occupation of the country, the development of few of the country's urban centers have been managed (Alem, 2021).

Since then urban plans were regularly prepared for the capital, Addis Ababa and later for regional capitals and small towns beginning from the late 1990s (Tegenu, 2010). Since the socialist revolution of 1974 urban plans have been prepared in the context of public ownership of land (Alem, 2021; MUDCo, 2005, 2012a), and until the beginning of the 21st century master plans were used and till 2000 they were prepared by expatriate planners due to lack of plan preparation local capacity (AACPPO, 2017; Appelhans, 2016; Meskerem et.al., 2017).

The first local urban plan preparation institution was the National Urban Planning Institute (NUPI) (1985-2005). It was first replaced by the Federal Urban Planning Institute (FUPI) (2005-2008) and later by the Regional Urban Planning Institute (MUDCo, 2012b). Private consultants were also involved in urban plan preparation since the early years of the 21st century (AACPPO, 2017).

Three major types of plans were used (MUDCo, 2012b): Basic Plans (BP), for management of the growth of small towns, Structure Plans (SP) that set out basic characteristics of the major land-uses at urban scale, and Local Development Plan (LDP) or detail plans at sub-city levels (Figure 2.5). National and regional level plans were also attempted, as shown in the figure below, even though they are urban focused.

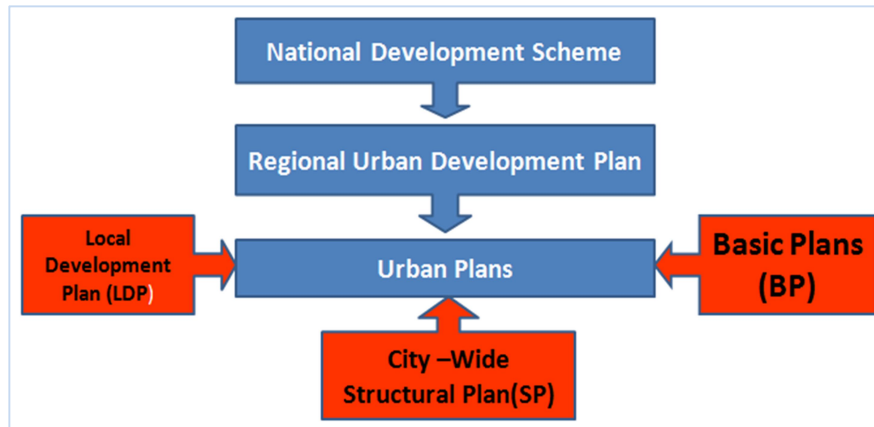


Figure 2.5: Illustrated from (MUDHo, 2012) and Ethiopian Urban plan proclamation 574/2008

The country also had the practice of preparing national socio-economic development plans since the 1950s with the most prominent ones being the five-year Growth and Transformation Plans (GTP-I & GTP-II) and the current ten year plan (National Planning Commission, 2016). However, a national spatial plan was not introduced until 2010 (World Bank, 2018). This plan was focused on the urban sector and was not based on a comprehensive national land use plan. Apart from the regional urban plan mentioned above, the country's plan preparation practice does not include regional planning (Maru & Worku, 2022). In addition, the country has an autonomous administrative region based division (Federal Negarit Gazeta, 1995) which can be a challenge for this scale of planning.

2.3.3. Natural and Working Landscapes in Ethiopia

The unmanaged urban development situation in Ethiopia brought along major environmental problems, such as deforestation, biodiversity loss, environmental pollution, land degradation, and reduction in the existence of surface and ground water (Beyene, 2009); as well as the city grew at the expense of farmlands and vegetated areas, influencing directly the communities living in the peri-urban areas

and the food production (Abo-El-Wafa et al., 2017). Small towns in Ethiopia usually face challenges by the absence of land-use planning. E.g., designated space for food production and unfavorable land-use changes (Tola et.al., 2021).

According to a study by Fashing et al., (2022) Ethiopia is one of the countries in Africa reputed for its biological diversity. Firstly, the country has widely varying altitude and climate, 'ranging from one of Africa's lowest and hottest locations (Dallol hot springs in Danakil Depression, -125 m below sea level) (López-García et al., 2020) to one of its highest and coldest points (Ras Dashen in the Simien Mountains National Park , 4,533 m above sea level)'(Teshome & Demissie, 2018). In addition to its extensive Highlands, Ethiopia possesses large expanses of lower-elevation ecosystems, including forests, swamplands, and the deserts and semi-desert grasslands and scrublands of the Horn of Africa (Fashing et al., 2022).

The study also includes estimates of depletion of the resource. Between 1990 and 2020, its naturally regenerating forest cover declined by 16% while over the past decade, its annual percentage of forest wood removal (3%) was the highest in Africa (Fashing et al., 2022). However, the driving factor for depletion is forest removal mainly due to agriculture and grazing uses than urban development (Wassie, 2020).

On the other hand, studies such as Tesfaye and Wolf (2014) indicate that the country has 12 river basins with the total length of all rivers estimated at 8065 KM. The country also has many lakes and reservoirs and a number of small water bodies and large flood plain areas distributed throughout the country and covering a total surface area of about 13,637 km² which is about 1.2% of the total land area (Tesfaye & Wolff, 2014).

In Ethiopia, small holder agriculture is the mainstay of the economy and the country has the largest livestock population in Africa (Hamza & Iyela, 2012). As a result, farm and grazing land dominate its working landscape (Birhanu, 2014) and, hence, are the most affected by the built environment development process. For instance, Addis Ababa city has been growing in all directions encroaching farmlands and other related spaces (Arsiso et al., 2018; Gosaye, 2008; Meskerem et al., 2017). From 1986 to 2011, the built-up area of Addis Ababa city increased by 121.88 km² horizontally (Arsiso et al., 2018; Kasa et al., 2011) at the expense of the peri-urban environment and its inhabitants' livelihoods (Arsiso et al., 2018). Other Ethiopian urban areas like Adama, Hawassa, Bahirdar and Mekele experienced similar patterns (Wubneh, 2013; OECD, 2016).

In Hawassa city, informal land appropriation induced land use change, mainly on agricultural and forested lands (Gebeyehu Admasu, 2015) and Bahirdar has grown 31% per year, passing from 279 ha in 1957 to 4830 ha in 2009, mostly at the expense of agricultural areas (Haregeweyn et al., 2012). The built-up area in Mekele increased from 531 ha in 1984 to 3524 ha in 2014 in which all farmlands were converted (Fenta et al., 2017). The Adama city area expanded by 293% between 1984 to 2015 periods (Priyakant et al., 2016), and also the built-up spaces of the city increased by 31.73% (42.66 km²), while the agriculture area have decreased by 24.53%, (32.98 km²) from 1984 to 2014 (Mekonnen & Ghosh, 2017). In general, the various land-use land cover analysis so far done in the major urban areas in the country shows high depletion of the land uses categorized under the natural and working landscapes.

In the Ethiopian urban land use planning the natural and working landscape are commonly categorized under the land-use “Open spaces and Environmental Sensitive

Area (OES)”. This OES land use include the natural, cultural and working landscapes which consists of both the formal and informal green areas (*public parks, gardens and public Squares, natural forests, solid and liquid waste disposal areas and treatment sites*); urban agriculture (*farming, horticulture, mixed forestry, apiculture, floriculture, poultry, dairy and fattening*); geology and hydrology, *which incorporates seismic areas; and deteriorated areas that need rehabilitation (MUDCo, 2012).*

2.4. State of the Art in the Current Urbanism

As indicated in the review above modern urban planning as an instrument of management of mainly the built environment development process has been developing for more than a century. It is also indicated that its most recent development focus has been on the environmental approach and sustainability. The development has been taking place in directions expressed as: ecological planning approaches, smart growth and sustainable urbanism, sustainable urbanism, landscape urbanism, social-ecological urbanism, eco-city, and nature-based solutions.

Ecological planning approaches are based on ecological modernisation theory which has become one of the dominant sociological theories that try to understand and interpret how modern industrial societies are dealing with the environmental crisis. It focuses on changing social practices and institutional developments associated with environmental deterioration and reform (Mol, 2000). The approach depended on a new empirical knowledge of the scale of the world and actual observations of the ability of humans to change the natural environment on a worldwide basis (Richard Grove, 2003).

Smart growth and Sustainable urbanism

The attainment of smart urbanism and sustainable urbanism are amongst the most prevalent topics in international urban research in reflecting the nature of urban growth and the level of continuity of Urbanism (Al Khalifa, 2021). Smart growth is an urban planning approach that provides a framework for making development serve the economy, the community, and the environment (Durand et al., 2011). It promotes an urban development pattern characterized by compact and mixed-use development, walkable and bikeable neighborhoods, preserved green spaces, mass transit accessibility, environmental health, and balanced distribution of services (Bagheri et al., 2021; Mohammed et al., 2016).

The Smart growth approach has ten foundation principles (www.smartgrowthamerica.org):

1. Mix land uses
2. Take advantage of compact design
3. Create a range of housing opportunities and choices
4. Create walkable neighborhoods
5. Foster distinctive, attractive communities with a strong sense of place
6. Preserve open space, farmland, natural beauty, and critical environmental areas
7. Direct development towards existing communities
8. Provide a variety of transportation choices
9. Make development decisions predictable, fair, and cost effective
10. Encourage community and stakeholder collaboration in development decisions.

Sustainable urbanism is basically the application of sustainability principles to urban development. It also promotes walkable and diverse places with the need to build high-performance infrastructure and buildings (Ritchie, 2008). It is an approach that

combines three comprehensive approaches (1) society-based; (2) complexity-led, and (3) landscape-driven design approach (Roggema, 2017).

Landscape urbanism is a recent conceptual discourse in Architecture, urban design and urban planning is landscape urbanism (Waldheim, 2006). It was primarily derived from a landscape architectural/geographical/ ecological perspective (Burley, 2018) and it promotes inter-linkages between ecology and architecture (Panagopoulos, 2019).

Social-ecological Urbanism is a scientific upgrading of the ecological and landscape urbanism concepts and came after the smart growth and sustainable urbanism paradigms (Barthel *et al.*, 2013). It is a paradigm of urban sustainability focused on the frameworks of Ecosystem Services and Resilience thinking (Carpenter & Folke, 2006; al Rawaf, 2017). The approach is based on the argument that socio-economic, environmental and physical processes taking place in cities are highly interdependent and interlinked at multiple scales (Pickett *et al.*, 2013) and hence, a system-wide holistic approach is crucial (C. Wilkinson, 2012). According to Ratter (2012) the socio-ecological system basically consists of 'a bio-geo-physical' unit and its associated social actors and institutions and is delimited by spatial boundaries surrounding particular ecosystems.

Eco-City is an approach focused on sustainable development. It advocates turning our eyes to the environment and to find out a positive way to live with nature by realizing that mankind strongly depends on well-functioning ecosystems and natural capital that are the basis for a constant flow of ecosystem services from nature to society (Moustafa S., 2017).

Nature-based Solutions aim at addressing societal challenges through the protection, sustainable management and restoration of both natural and modified ecosystems, benefiting both biodiversity and human well-being. They include protecting and restoring forests, the protection of mangroves and coral reefs, the conservation and restoration of wetlands and the creation of urban green spaces (Raymond et al., 2017).

2.5. Methodological Review

Concern about environmental quality and the long-term livability of urban areas was a driving paradigm to planning professionals. For this, a modern framework that emphasizes a dynamic view of a biologically rich urban environment with a focus on interactions among various sites across temporal scales was preferred to the classical concepts that emphasize to a static view of landscape and focus on short term planning of a single site. In the modern framework, five key ecological principles- **content, contexts, dynamics, heterogeneity** and **hierarchy**, were presented (Flores et al., 1998).

For the planning and managing landscapes worldwide a conceptual framework for sustainable landscape planning applying landscape ecological concepts and exploring the multiple potential roles of landscape metrics as ecological planning tools were developed (Botequilha Leitão & Ahern, 2002). This framework was developed to represent a significant contribution to increase the acceptance and use of ecological knowledge across the horizontal sectors planning, and to enhance communication between planners, thus contributing to an increased scientific and cultural consensus for sustainable landscape planning. They urged to that proper and informed use of landscape metrics will contribute to advance landscape planning theory and practice towards the goal of sustainability (Botequilha Leitão & Ahern, 2002).

Operational urban models are still primitive in terms of their ability to represent ecological processes. On the other hand, environmental models designed to assess the ecological impact of an urban region are limited in their ability to represent human systems. Urban Ecological Model (UEM) simulates the environmental pressures associated with human activities under alternative demographic, economic, policy, and environmental scenarios. The specific objectives of UEM are to: quantify the major sources of human-induced environmental stresses (such as land-cover changes and nutrient discharges); determine the spatial and temporal variability of human stressors in relation to changes in the biophysical structure; relate the biophysical impacts of these stressors to the variability and spatial heterogeneity in land uses, human activities, and management practices; and predict the changes in stressors in relation to changes in human factors (Alberti, 2008).

Conventional approaches to natural resource management are increasingly challenged by environmental problems that are embedded in highly complex systems with profound uncertainties. These so-called social-ecological systems (SESS) are characterized by strong links between the social and the ecological system and multiple interactions across spatial and temporal scales (Schlüter et al., 2012).

There are various Eco-friendly methodological approaches in urban areas recently. One is Urban Eco-Environmental Sensitive Areas (Urban Eco-ESAs), a synthesized assessment method giving finely controlled priority to bottleneck factors, and a relative model based on selective local encouraging variable weights combination. The method is able to increase the weights of some eco-bottleneck factors on the basis of a weight-changing function in synthesizing multiple factor assessments as long as their assessment values break the bottleneck threshold values, which can guarantee

the eco-sensitive areas identified by bottleneck factors being embodied in the final result, while also retain the compensation effect of multiple ecological factors, which makes the results of the assessment more reasonable (Niu et al., 2018).

In terms of the needs in urban regional governance and the challenges of global urbanization fresh commitments to a city–regional perspective in ways that are explicitly embedded in the Anthropocene bio- techno- and noospheres, to extend existing understanding of the city–nature nexus and regional scale are the crucial demand. These perspective include three dimensions: (1) shifting diversity, (2) shifting connectivity and modularity, and (3) shifting complexity, which are characteristic of current urban processes and offer potential intervention points for local to global action (Elmqvist et al., 2021).

Moreover, researchers and planners worldwide have emphasized the importance of better planning in an urbanizing world. Because of the social imbalances that characterize large cities, the expansion of urbanized areas has increased people's access to modern facilities and urban infrastructures while decreasing their quality of life (Gavriliadis et al., 2016). They have indicated that the quality of the urban landscape can be used to predict whether a person has a high or low quality of life and they proposed assessing urban landscapes using an Urban Landscape Quality Index (ULQI), which is used to map the landscape quality within a city.

Many urban researchers, particularly those conducting land-use/land-cover research in Ethiopia, used spatial analysis and mapping tools such as Geographic Information System (GIS), Erdas IMAGINE, ENVI, and modeling software such as InVEST (Sahle et al., 2019). The common trends and methods of spatial data analysis and mapping have been downloading and extracting different satellite images with

different resolutions from various sources. One of the most common validation methods for satellite image-based land-use/land-cover classifications was on-site observation or site investigation using a Global Positioning System (GPS).

Non-spatial analysis data were analyzed using Excel, SPSS, and R software after being collected primarily through: interviews, questionnaires, and focus group discussions (FGD) with key experts, officials, and urban residents. In this research, Local Ecological Knowledge (LEK) was used. LEK in the urban land use planning process that exists among nature enthusiast, local residents, and planners and can obtain most notably through networks of knowledgeable key informants and local nature associations. In urban planning it is important because it complements scientific ecological data and indicates places important to locals (Yli-Pelkonen & Kohl, 2005).

Aside from the primary data types, sources, and collection and analysis methods mentioned above, almost all of the researches done in Ethiopian urban areas have used secondary data, which was mostly obtained through a systematic review of planning documents and maps, articles, and books.

CHAPTER THREE : METHODS AND MATERIALS

3.1. Study area and Rationale for Selection

The study area mainly focuses on Sebeta town which is located in the **Oromia Special Zone Surrounding Finfinne**, the capital of Ethiopia, Addis Ababa, which is called '*Finfinne*' in the Oromo language (Y. Girma et al., 2019). It is one of the zones of the Oromia Regional state which was created in 2008 from parts of the previous North, Southwest, East and West Shewa Zones (Tadesse & Imana, 2017), and its administrative center is in Addis Ababa. The main reason for creating this special zone was to ease the co-operation and development of surrounding Addis Ababa areas and control this city's urban sprawl on Oromia's lands (OWWDSE, 2011).

The special zone is endowed with vast arable land and significant proportion of building material resources, and the location of Finfine boosts and diversifies their land use (OWWDSE, 2011). Based on their potential resources and locations (Figure 3.1), the northern special town (Sululta) is preferred for hotel and tourism, the eastern town (Lege Tafo) is preferred for manufacturing, storage and real-estate, the southern town (Gelan) for heavy industrial establishments, the southwest town (Sebeta) is preferred for manufacturing and agro-industry, and finally the western special town (Burayu) for agro industry and commercial (OWWDSE, 2011).

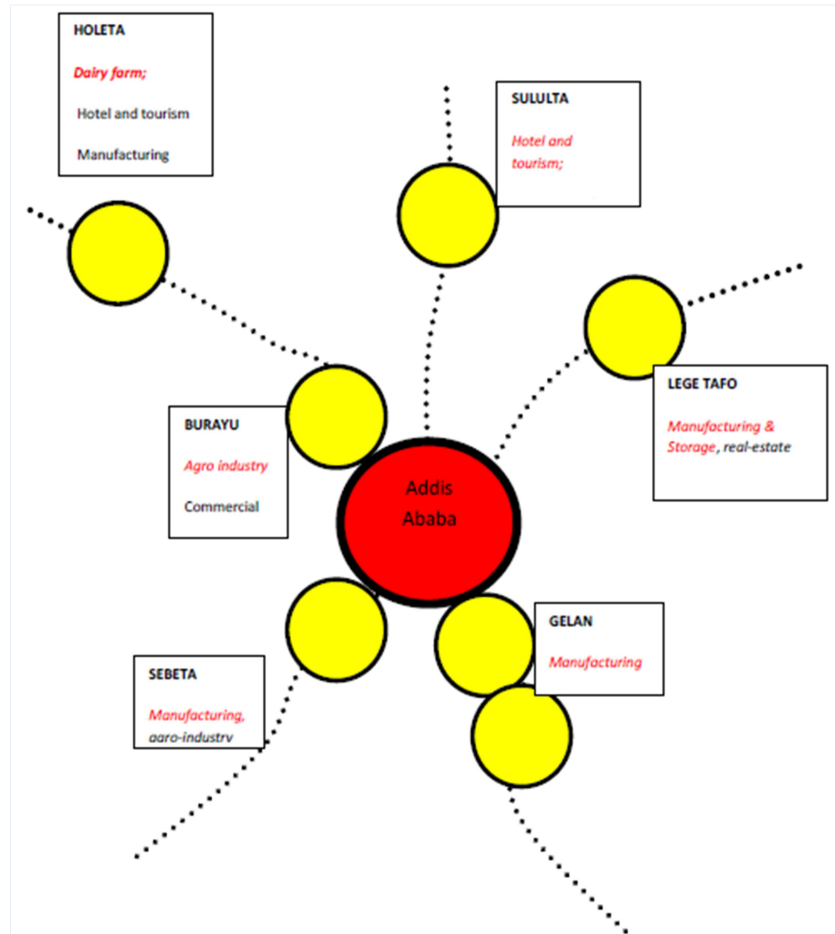


Figure 3.1: Map showing the major Functions of special Towns in Investment Trend Analysis (OWWDSE, 2011)

The special zone (Figure 3.2 a & b) covers an area of 4,300 km² and consists of six districts and eight (8) large towns with 7,000 to 50,000 inhabitants (Mohamed & Worku, 2019; OWWDSE, 2011). These towns are Burayu, Gelan & Dukem, Holeta, Lega Tafo, Sandafa & Bake, Sebeta, Sululta, and the boundaries of three (3) towns Burayu, Gelan & Dukem, and Sebeta overlap with the Addis Ababa city (Figure 3.2c).

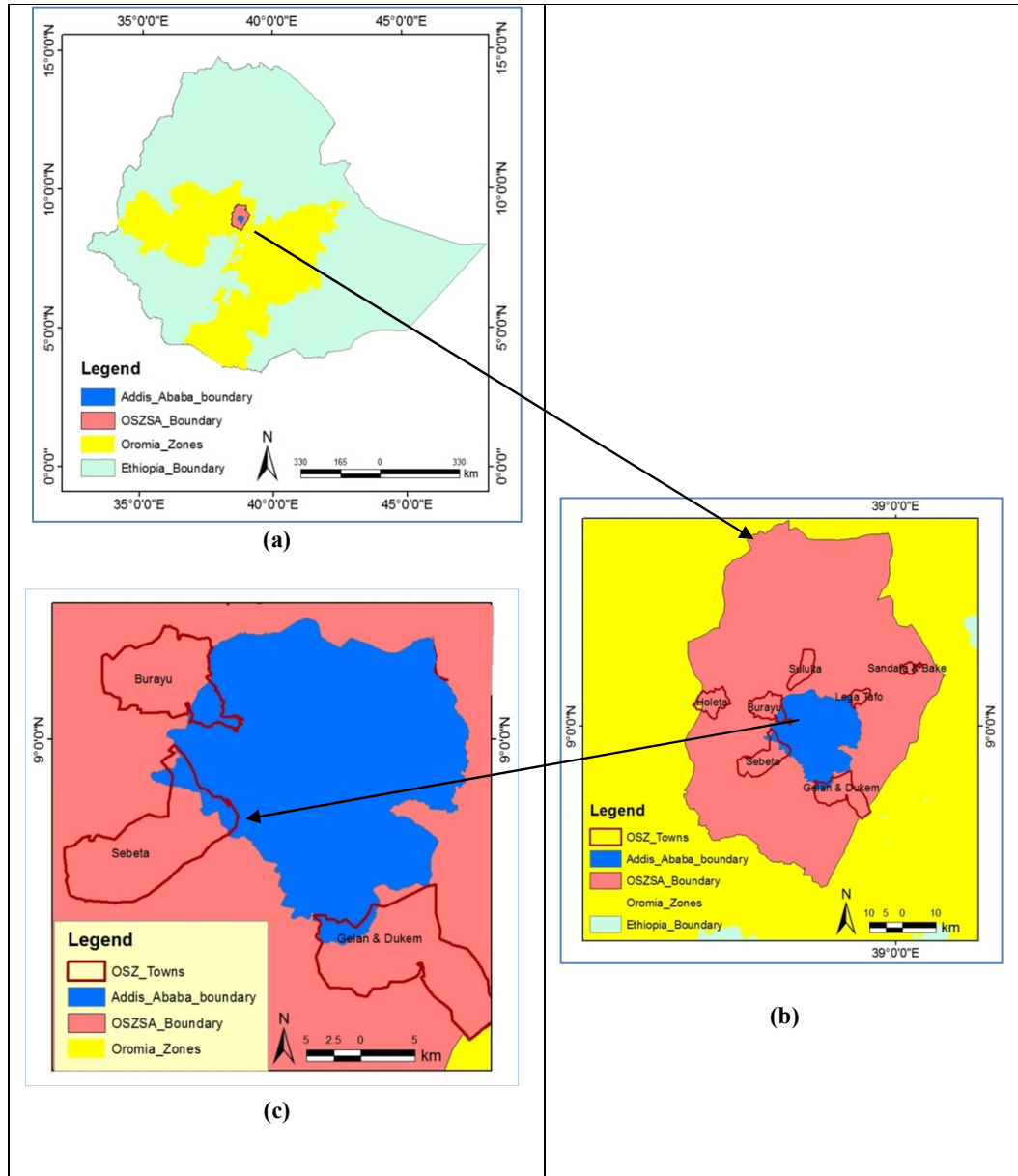


Figure 3.2: Location of the study area: the OSZSA in relation to Ethiopia and the Oromia regional state (a); the OSZSA, towns in the OSZSA and the capital city of the country (b); towns of the OSZSA that overlaps with the capital (c).

The study area selection aims to identify emerging towns that confront the challenges of big cities including impacts happening at the edges of urban centers that share boundaries. In this regard, Addis Ababa, with its rapid urbanization, high complexity (Meskerem et al., 2017), and persisting development pressure through urban sprawl

and boundary overlapping (Girma et al., 2019; OWWDSE, 2011) on nearby towns in the OSZSA is a paramount example.

The Sebeta town, located in the OSZSA, was selected as a study area. Because it is a good example of the emerging towns in Ethiopia as, it largely experiences the fastest urbanization trends due to its locational advantages to the capital city of Ethiopia (Girma *et.al.*, 2019). Geographically, the town is located at latitude 8°52'30"-8°59'30" North and longitude 38°34'00"- 38°42'30" East (Terfa *et al.*, 2020), and about 25 km away the southwestern fringe of Addis Ababa city (Girma *et al.*, 2019).

Besides its proximity, the Sebeta town also contains the largest boundary overlap with the capital city that created urban management failures between the two jurisdictions. Several towns surrounding Addis Ababa have overlapping boundaries with the city and are pulled by its sprawl. Three towns (Burayu, Sebeta and Gelan) were initially shortlisted, and finally Sebeta town was selected as a study site (Figure 3.2), by its major geographical overlapping with Addis Ababa.

Sebeta is also the top industrial hub in Ethiopia. There are 418 manufacturing companies in the town: breweries, steel, liquor, cement factories, and water bottling companies. In addition, there are hundreds of agro-industrial initiatives, including flower farms and other companies in various sectors, and around 20 real estate developers (Chaka, 2018; OWWDSE, 2011; Taye M., 2013). Following the existence of these industries and companies, the vast endowed natural environments of the town have been converted to other urban land uses (Benti et al., 2021; Y. Girma et al., 2019; Tesfaye Gutema, 1997).

Therefore, due to its proximity and boundary overlap with Addis Ababa, the factors that triggered the development of the capital also contributed to the emergence of the Sebeta town (Benti et al., 2021; Chaka, 2018; Girma et al., 2019; OWWDSE, 2011). In this regard, Andualem (2019) mentioned that the Sebeta town is not home for those who work in Sebeta, but also for many people who work in Addis Ababa and live in the town.

Sebeta has also experienced high rural immigration and the expected population growth is high (Chaka, 2018; Y. Girma et al., 2019). The Sebeta town had a population of 14,100 in 1994 and 49,331 in 2007 (CSA-Ethiopia, 2007) and was estimated in more than 167,000 for 2017 (CSA, 2013; Terfa et al., 2020). On the other hand, the municipality of Sebeta has documented that the town population is around 336,975 inhabitants, with a growth rate of 4.5% in 2020. Even though this has made it even more attractive for investors, as they can easily access employees from the town, the high population caused due to immigration has also led to informal land holding in the town (Andualem, 2019).

In addition, the information cited in Girma et.al (2019) on land value for residential and commercial uses recorded in 2016 for the Sebeta town is the highest [1m² of land for residential purpose was sold for 12,229.5 birr (USD 531.7)] as compared to the average land price of any town found in the OSZSA which were mostly resulted following the high investment opportunities in the town.

Furthermore, the town is also in an area known for its natural resources endowment, surrounded by mountains, hills, seasonal marshy plains, rivers and streams, some of them of importance for the Oromo culture and religion- '*Waaqefataa*' (Tesfaye G., 1997; OUPI, 2008; Sebeta City, 2019). For instance, the spring of the Wachacha

Mountain served as a water supply for Addis Ababa city, which continued until the Italian occupation, and still some water is being bottled and shipped from there (Mahiteme, 2007).

3.2. Research Design and Methodological Framework

This research combines both explanatory and descriptive types, which were collected from both primary and secondary data sources, and analyzed using quantitative and qualitative methods (Figure 3.3).

The data types used were natural landscapes and socio-cultural elements, needs of society, stakeholders' views, previous conditions and facts, historical facts about urban formation, existing urban plan preparation approaches, and remotely sensed satellite images.

The major primary data sources are Professionals (or practitioners); towns/cities officials and decision makers; researchers' experiences; site investigation; local communities and elders. Whereas, the secondary data sources are: published and unpublished documents; remotely sensed data sourced from freely available satellite images like USGS and Google Earth pro.

Primary data collection methods (tools): the opinion of officials of the study area were collected through Face to Face Interviews (*using structured questionnaire*) and through FGD (*with semi-structured questionnaire*); Views of professionals and practitioners were gathered through the FGD and Key Informant Interview (*with structured questionnaire*) whereas, the data from the residents were collected through: mapping exercises, FGD and Face to Face Interviews. Finally, the Natural landscapes and other socio-cultural important landscape elements were identified using the

mapping exercises of the residents and through physical investigations using satellite images, GPS and Photo Camera.

On the other hand, and the Boolean search commands (*AND*, *OR*, *NOT*) were used in order to combine or exclude certain concepts when searching database, and to identify the important literature reviews (or documents). Critical reading, systematic reviewing and note-taking were applied to collect important information from the published and published documents; and downloading, extracting and overlaying were used to obtain the required data from the remotely sensed satellite images.

The spatial data were analyzed, mapped and illustrated through using GIS (ArcMap 10.2), Erdas IMAGINE 2013, ENVI 5.0, Ecognition and Adobe in Suite whereas; the non-spatial data were analyzed using SPSS, Excel and manual compilations.

The results of the research were Interpreted and Presented through illustrations, narrations, graphs, maps, and tables. In addition, the output of this research is the social-ecological responsive urban planning approach especially for those urban areas to emerge in the future. Lastly, urban planning and implementation recommendations were forwarded.

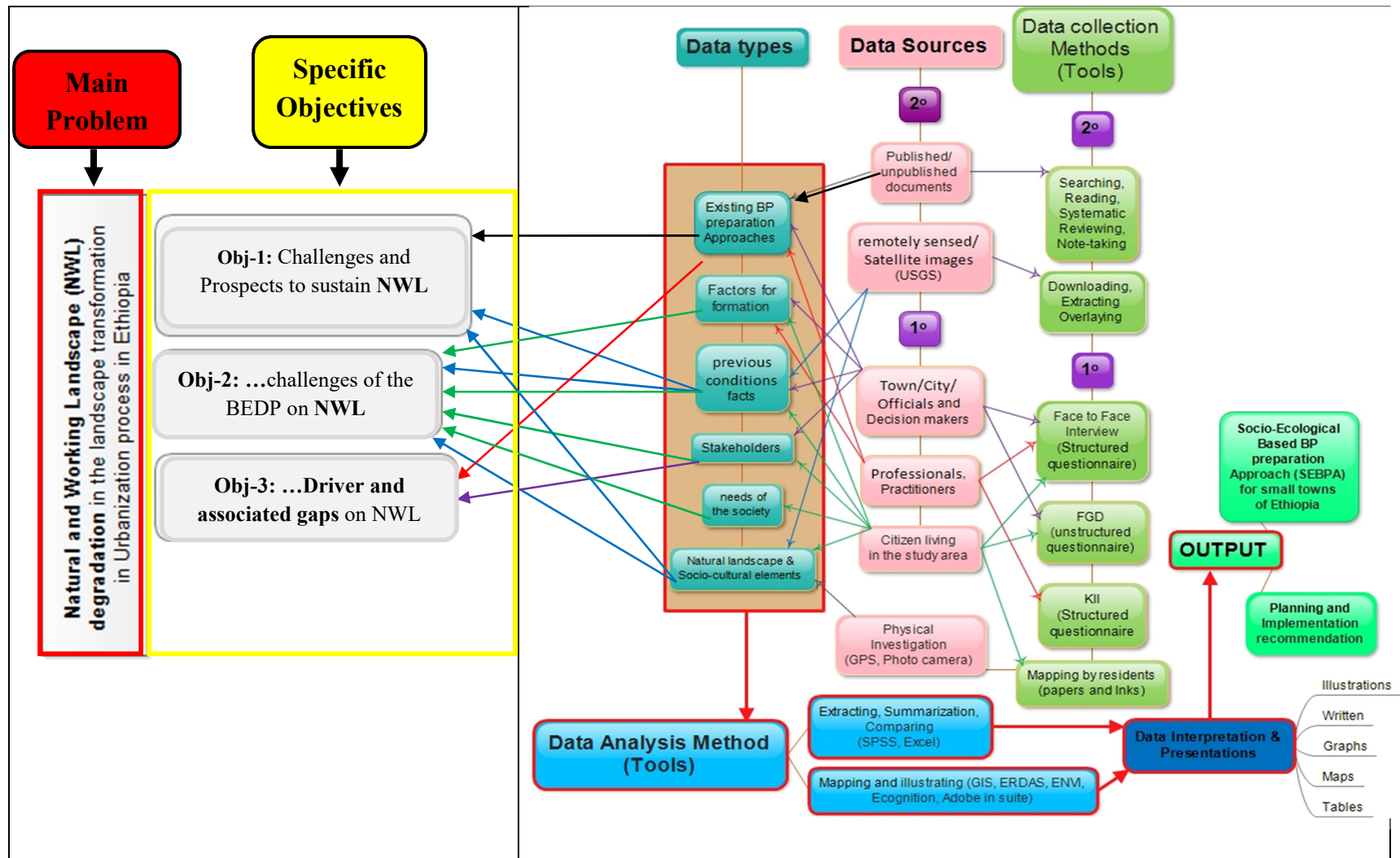


Figure 3.3: General Methodological Framework

The combinations of the four specific objectives of this study have shown in the general methodological framework (Figure 3.3). It starts from the challenges that hindered the Natural and Working Landscape (NWL) from being sustained and the prospects for Ethiopia's urbanization, which created opportunities for the suggestion of planning strategies that are socially and ecologically relevant.

The primary factors for the degradation of the NWL that were analyzed are those that could be contextualized for the future emerging towns, and the driving factors for the emergence of urban settlements were evaluated to identify some fundamental hotspots that serve as the inception points and potentially lead to the intensification of built-up spaces that in turn challenging the sustainability of the NWL in an urban area.

Issues of urban boundary was picked as a regional planning gaps under a separated object to give it a focus based on the major challenges identified in the inability of sustaining the NWL specially due to the availability of the competition of interests on lands between the Addis Ababa city administration and the towns of the Oromia regional state that surrounds the city, particularly to the study area as it contains large boundary overlaps with the capital.

3.3. Adequacy and Validity of the data

The data is adequate and valid because the experts interviewed relied on the saturation of ideas and the points that most of the experts agreed on based on their explanations. The data obtained through focus group discussions are validated based on participant

explanations and crosschecking with existing realities. Data collected from elders and residents were supplemented with mapping exercises based on the spaces they identified.

The majority of the issues addressed under specific objectives are more related to spatial aspects that can potentially be validated through any physical investigation.

3.4. Methodology for Objective -1

The first objective of this research addressed under the research question “*What are the challenges and prospects to sustain the natural and working landscapes in urban areas in Ethiopia?*” The following detailed methodologies including its spatial focus, methods and materials are deployed.

3.4.1. Location and Description of the Study area

The study focuses on the Ethiopian urban areas Figure 3.4. Addis Ababa city, the country’s capital, is selected as an example and is chosen to represent the other urban centers. The city is selected because of its primeness, persistent problems. It is the most populated and urbanized area of the country (Meskerem et.al., 2017) where large degradation of the natural and working landscapes can be evidenced. Therefore, analyzing the vast and different nature of problems in the city is assumed to represent other urban areas in Ethiopia that exist at different levels of urban hierarchy.



Figure 3.4: Location map of the study area

3.4.2. Data types and sources

Both primary and secondary data were used. Primary data was obtained from seventeen (17) key experts giving an opinion on specific cases; Informal interviews of residents, site-specific realities guided by site photographs, and personal experiences were used as the main primary data types and sources. The main secondary data used and sources include: the Ethiopian urban planning documents such as the Structure and Basic plan manuals, proclamations, standards, policies from the Ministry of Urban Development and Construction (MUDCo); recent satellite images from Google Earth Pro; the boundary and

structure plan documents of Addis Ababa city from the Office for the preparation of the Master Plan of the city; the plan documents of the towns surrounding the Addis Ababa city were collected from the Oromia Urban Planning Institute (OUPI), and the Ethiopian urban planning related: Articles, Books, websites and alike documents collected from various sources were used.

3.4.3. The sample selection criteria

The selection criteria for choosing the experts were their involvement in the urban planning of Addis Ababa city and other regional capital cities, i.e., Hawassa, Bahirdar, Mekele, Adama, Diredawa, Jigjiga, Harar, Semera and Arba Minch. As such, most interviewees were affiliated to the Ethiopian Federal Urban Planning Institute (FUPI), the Oromia Urban Planning Institute (OUPI), and the Ethiopian institute of Architecture, Building Construction and City Development (EiABC) of the Addis Ababa University. Others working for the government and private consulting offices were also requested. Altogether Seventeen (17) experts were interviewed, their profiles included: urban and regional planning, urban design, environmental planning and management, landscape design, ecosystem planning and management and urban sociology.

3.4.4. Data collection and analysis methods

Operationally, the primary data was collected in two phases: interviewees filled up a pre-designed questionnaire, and after the responses, a tailored personal interview followed. The interview was carried-out in the local languages “*Amharic*” and “*Afaan Oromoo*”, and the responses were recorded or noted with the interviewees consent. Responses were

reorganized and analyzed under pre-defined themes and finally contrasted with secondary data.

The process of interviewing successively seventeen (17) experts allowed us to consolidate the main arguments as these repeat along until achieving ‘theoretical saturation’ or ‘*Saturation of idea*’ (Figure 3.5). Finally, the challenges most repeated, those having more than 50 % of agreed respondents, and those containing clearly notable issues were summarized and further discussed. Some case specific realities were assessed through physical investigation guided with note taking and site photographing.

Informal interview were conducted with some pioneer settlers and residents who are living around their vicinity around Guje of Burayu and Furi of Sebeta, towns sharing boundaries with Addis Ababa city in the West and South West, respectively.

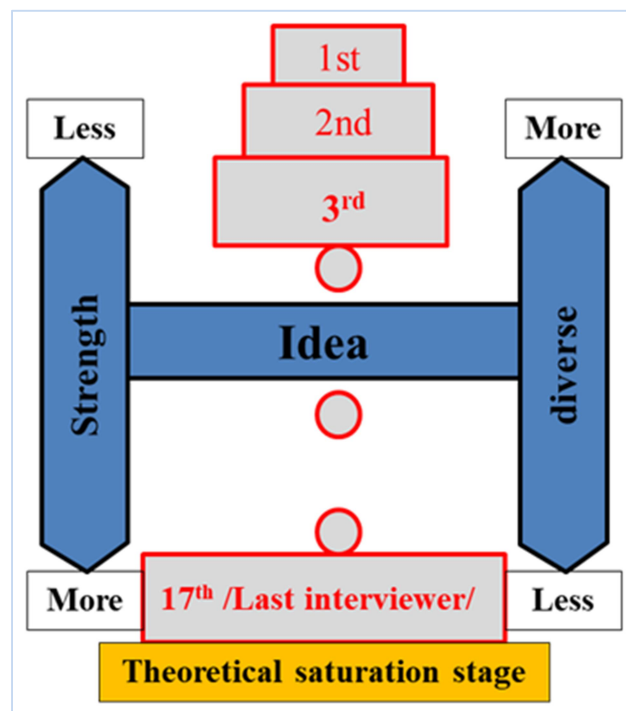


Figure 3.5: Steps in the process of saturation of ideas (illustrated by author, 2020)

The secondary data such as satellite images and spatial plan documents, which helped as examples to validate the responses of experts, were analyzed through Arc GIS. The analyses were made through extracting, digitization, overlaying and illustration.

Additionally, the data indicating the general trends of urban areas in Ethiopia were collected and analyzed through reviewing and note-taking of its urban planning documents. The same method was used to summarize the ideas of articles and books supporting the responses of the interviewer.

3.4.5. Result presentation and illustration methods

The results obtained from the experts' responses, personal experiences and secondary data were presented through narrations, maps, Line charts and Bar graphs. The identified challenges were graphically presented in the order of large numbers of agreed respondents to less numbers. The challenges were categorized and presented as: those having direct effects for the un-sustainability of the natural and working landscapes, and those having indirect effects and serving as the causes for the direct challenges, and a problem tree used to indicate the relationship and interdependence of the challenges and which were illustrated using Edraw Mind Map software. Finally, the challenges having direct effects were discussed under the title results and discussion whereas the indirectly contributors elaborated in the sub paragraphs of these challenges.

3.5. Methodology for Objective -2

The second objective is related to *“The gaps of responsiveness of the built environment development process to the sustainable transformation of the NWL in the Sebeta town”* was addressed under the main research questions: Which land use / land cover changes have occurred from 2005 to 2018 in the Sebeta town? The following summarized methodologies were applied:

Cloud free Satellite imageries of the 2005, 2008 and 2018 of the Sebeta town were assessed to track the changes in land-cover. The land-cover was mapped by applying remotely sensed temporal satellite image analyses using ArcGIS and Erdas Imagine and participatory geographical information system exercises were mainly applied. 2018 was selected to track the recent, the year when the second structure plan is made by reviewing the 2008 structure plan and also the year when large areas of rural areas are included in the proposal planned to serve for 2018-2028; 2008 represents the year when the first structure plan (SP) of the town was made and aimed to include the 2008-2018 proposal, and the 2005 image was used to detect the conditions before the SP and it represents the year when the SP initiation was started and year of political unrest in the county.

High-resolution (pixel size of 1m*1m) historical imageries from Google earth pro were downloaded under the following adjustment options: (i) In order to avoid the tilt while zooming in the Google earth, the Navigation option was adjusted to “Do not automatically tilt while zooming”. (ii) Under the 3D view option: the Unit of Measurement was adjusted to meters/kilometers, Elevation exaggeration was set to the

minimum scale which is 0.01, and the Lat/Long display option was adjusted to the Decimal Degrees.

Based on the resolution scale indicated above, the Sebeta town administration and its immediate surroundings were covered with about 45 grids of images (Figure 3.6). The images were merged to a single file by applying the Automate Photomerge in the Adobe Photoshop CS6, and it was based on the similarities or common geometries, and its geo-referencing was executed in ArcGIS by using Coordinate points of easily detectable places that were collected from the Google Earth Pro by applying Placemark tool. Finally, the town administration was clipped from the geo-referenced image by using Extract by Mask of the spatial analysis tool.

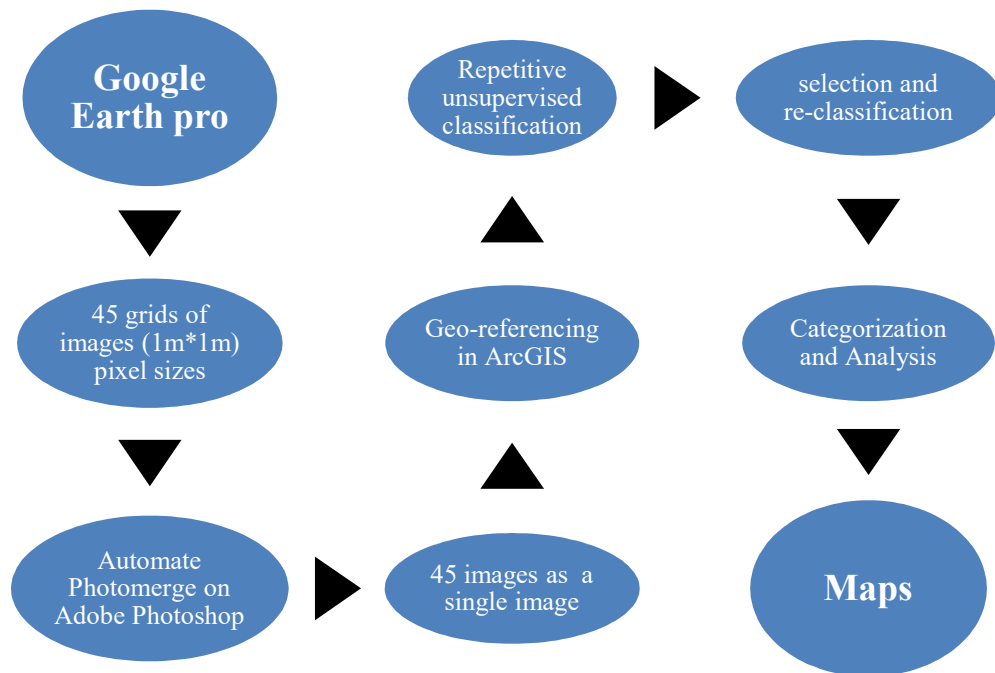


Figure 3.6: A flow chart illustrating the main steps involved in processing the images downloaded from Google Earth pro.

Repetitive Iso-Cluster Unsupervised Classification (Spatial Analyst) was applied by changing the number of classes. Finally, they were limited to six land-cover categories (Agriculture, Pasture and barelands, Settlements, Rivers and riverbanks, Forests and other greeneries, Cultural and related sites). Still, based on the purpose of the research, the land cover was reclassified into two major components: (i) Built-up areas, all settlements and other man-made structures; and (ii) Non-built-up areas, places devoid of settlements and structures, including natural and working landscapes, such as: vegetation, agricultural lands, water bodies, cultural sites and alike.

The land-cover changes were quantified by comparing the measurements of 2005, 2008, and 2018 maps. Additionally, the 2008 land cover analyses were compared against a land inventory collected by the Oromia Water Works and Design, and the 2018 land cover also considered land inventory done for the Sebeta town Structure plan revision by the Oromia urban planning institute and the Sebeta Town Administration.

3.6. Methodology for objectives-3

The third objective of this research is *“To explore the drivers for the built environment development process and associated responsiveness gaps on the NWLs”*. It constitutes two main research questions (i) What are driving factors for the inception of spontaneous development of built-up spaces in the Sebeta town? (ii) Which major driving factors have contributed for the increment of built-up spaces in the town?

3.6.1. Data types and sources

The identified landscape change dynamics were patchy and segregated spontaneous development that were intensified in the process of the built environment development process. Therefore, the drivers for the builtup environment development process were investigated under two main research questions (i) What are driving factors for the inception of spontaneous development of built-up spaces in the Sebeta town? (ii) Which major driving factors have contributed for the increment of built-up spaces in the town?

Opinions and views of key experts and officials, Urban historians, members of the Sebeta town's elder community, and researchers were the main sources of primary data. These types of data sources have been recently applied by different researchers (Alem, 2021; A. Girma, 2013; Y. Girma et al., 2019; Sahle et. al, 2019). The secondary data used in this objective were urban planning documents, published and unpublished research and working papers, and free satellite imagery. Such types of data were also used by (Alem, 2021; Benti et al., 2021).

The 2012 Ethiopian urban planning standards and manuals, the 2008 proclamations were collected from the Ministry of Urban Development and Construction (MUDCo). The 2002, 2016 urban plan documents related to the city of Addis Ababa were collected from the Addis Ababa City Master Plan Project Office. Urban planning documents (manual and standard) of the towns in the OSZSA of the regional state of Oromia from 2008, were collected and compiled from the Oromia Urban Planning Institute (OUPI).

In addition, drawings and reports of the structure plans (SPs) of the town of Sebeta that were prepared for 2008-2018 and 2018-2028 planning years were collected from the town's municipality and OUPI. The other secondary data sources were cloud-free historical satellite imagery of the 2005, 2008 and 2018 containing the Sebeta town and its surrounding. The images were downloaded from Google Earth Pro. Google Earth images have been used by many researchers in the analysis of urban and regional landuses, specially in the lack of freely available high resolution satellite images (Jenberu & Admasu, 2020; Kasim et al., 2021; Koroso et al., 2021). The Geographical Information System (GIS) was used to show the spatial drivers behind the emergence and development of the spontaneous settlements in the town of Sebeta. The GIS was similarly applied in the works of (Gebeyehu , 2015; Kindu et al., 2018).

3.6.2. Sampling and rationale

The corresponding author conducted the interview during the town's structure plan (SP) revision process in the 2018-2019 years by participating in the plan making process. Twelve (12) experts were purposively selected, and the experts involved in the interview were those who had specialized and had profiles, including urban and regional planning (4), environmental planning and landscape design (2), urban historian (4) and urban sociology (2). Most of the respondents were affiliated with the Oromia Urban planning Institute (OUI) and the municipality of Sebeta town.

Focus Group Discussions (FGD) were conducted in 2018-2019 with the elders who had already known to the Sebeta town municipality and the urban historians were those who had prepared documents about the town's history in the first SP, which was prepared for

the 2008-2018, and the second SP proposed for 2018-2028 planning years. Altogether ten people, four Urban Historian and six Elders of the town including '*Abaa Gadaa*', were participated in the FGD. The Elders were identified through the nomination method as used by Krueger & Casey (2009) and only included those who were involved in the revision and previous plans of the town in telling the history of the town.

The 2018 satellite image was chosen to map settlement patterns and land uses/land cover at the time of the second SP; 2008 is when the town's first SP was prepared and the year when the OSZSA was established. The 2005 image was used to identify the nature of settlement patterns of pre-SP and represents the year when the 2008 SP was initiated. The reasons for using Google Earth Pro images are lack of high-resolution historical images (Fenta et al., 2017) of the study area and high cloud cover on other freely available satellite images in the specified years.

Finally, the concept of spatial determinants used in this paper is any human-made or natural elements that exist physically and trigger the formation of settlements in an urbanization process.

3.6.3. Data collection and analysis method

Expert interviews, FGD with elders and experts, and physical assessments of the study area were the primary data collection methods. First, interactive interview with key experts was carried out until the achievement of theoretical (idea) saturation (Benti et al., 2021). Then, the contents of secondary data, including urban planning, management, and

monitoring documents were systematically reviewed (Heymans et al., 2019), analyzed, and finally compared with primary data.

Besides using the Interview and Focus Group Discussion (FGD), GIS were applied for the analysis of spatial data. Due to the absence of high-resolution satellite images for the Sebeta town and its surrounding, the spatial change hotspots, sequences, and growth of settlements were mapped and analyzed based on the Google Earth images.

First, the 2005, 2008, and 2018 historical satellite imageries were extracted and downloaded from Google Earth Pro. Next, the images were georeferenced and rectified with control points (Techniques, 2017; Tehrany & Pradhan, 2013), and then coordinates were redefined and transformed into the projected Ethiopian coordinate system (WGS_1984_UTM_Zone_37N). Finally land use/ land cover changes in the town of Sebeta, which were used to show their implications for planning, were analyzed in ArcMap 10.4 of the Geographical Information Systems (GIS).

The 2005 image was used as the starting year and point-based settlement digitization (Benti et al., 2021) was carried out in the Arc GIS. Parcel (plot)-based built-up areas in 2008 and 2018 from the non-built-up land cover was differentiated using the supervised classification of the GIS spatial analysis tool (Y. Girma et al., 2019; Mohamed et al., 2019). The spatial changes and the degree of settlement intensification were analyzed by overlaying the settlements of 2005 with the land cover results of the 2008 and 2018 (Figure 3.7). In addition, several spots of spontaneous settlement intensification processes were shown through the illustration on historical images of Google Earth Pro (Benti et al., 2021; Fenta et al., 2017).

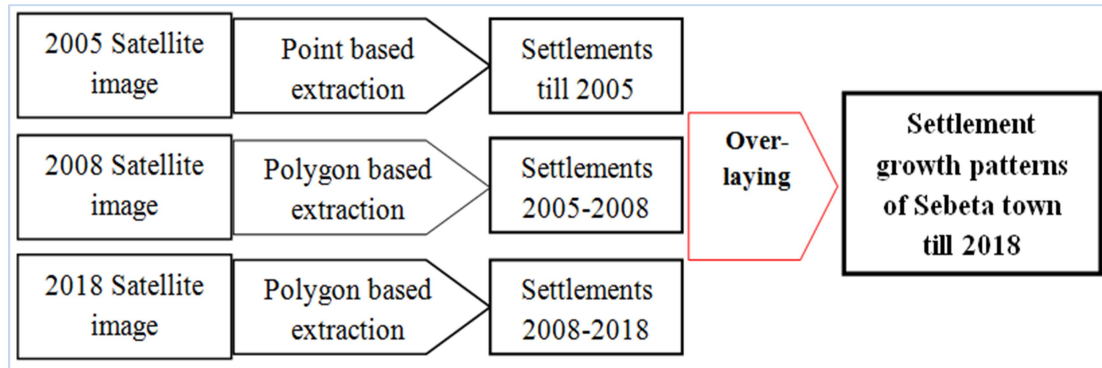


Figure 3.7: Satellite images used in the process of identifying settlement growth patterns in Sebeta town

In general, most of the spatial drivers for the emergence and intensification of settlement in the town were analyzed as follows: First, the historical sections of the town's SP documents were reviewed. Later, urban historians who participated in the Sebeta town SPs were interviewed and the results were compared with the review results and verified. Historians were also asked to locate the spatial drivers on satellite images.

Second, the other driving factors and causes for the intensification of built-up spaces in the town were collected from documented videos, which were recorded throughout the process of the 2018 Structure plan revision of the town. General overviews and discussion points suiting to the research objective were collected from the videos. Further specific details and explanations were obtained regarding the factors and causes through focus group discussion (FGD) with experts. Finally, the spatial drivers were checked and verified through physical observations and mapped using Arc GIS tools (Figure 3.8).

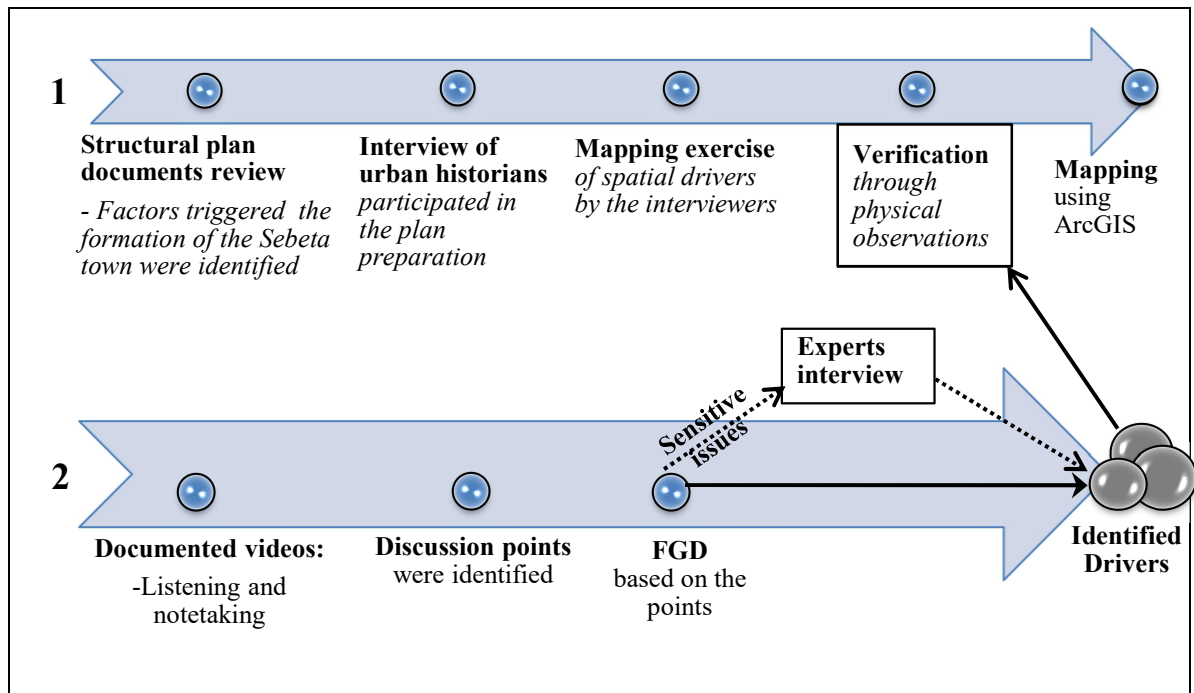


Figure 3.8: The process of identifying and verifying the driving factors

On the other hand, gaps in urban plans and implementation in terms of natural and working landscape related changes that have socio-ecologically valuable hotspots between 2005-2018 were identified using the participatory geographical information system approach.

It was done by identifying and involving key stakeholders (urban planners, urban Sociologists and historians), and elders who have been living in the Sebeta town for more than 15 years, who were intended to assist us in place-mapping such spots. For that we were assisted by the cultural and tourism bureau of the town and ‘*Abbaa Gadaa*’¹. For the mapping itself, a printout of the 2018 satellite image was provided.

¹ In Oromo ‘Father of Gada’, an indigenous democratic socio-political system of the Oromo people (UNESCO, 2016b)

Finally, the identified hotspots were cross-checked against the 2005 satellite imagery using ArcGIS. Lastly, the current physical situations around the hotspots were documented using site photographs and zoomed high-resolution satellite image.

In line with the hotspots change detection, the driving factors for the land-use change in Sebeta were compiled from 2 hours video of an expert discussion on who revised the 2008-2018 Structure Plan. Additionally, some other social challenges were gathered through a focus group discussion with the town elders involved in the mapping.

Moreover, based on the built up development intensity seen around the boundary shared by the Addis Ababa city and the Sebeta town, the drivers for the built environment development around the shared boundary in particular were investigated and obtained by deploying the following illustrative methods and materials:

The OSZSA is administered by the Oromia regional state and made up of Six (6) major districts (Akaki, Berek, Sebeta Hawas, Mulo, Sululta and Welmera) and Seven (7) major towns (Burayu, Gelan & Dukem, Holeta, Lega Tafo, Sandafa & Bake, Sebeta, and Sululta), and coincide with the five major highways that depart from Addis Ababa and pass through these towns (Mohamed & Worku, 2019) (Figure 3.9).

Among them, the boundaries of three (3) towns, *Burayu (1000.58 ha)*, *Gelan & Dukem (923.12 ha)*, and *Sebeta (1457.77 ha)*, overlap with the boundary of the Addis Ababa city administration where the Sebeta has the largest overlapping areas. Moreover, the Addis Ababa city boundary also extends further into the rural regions of Sebeta, making it different from the others.

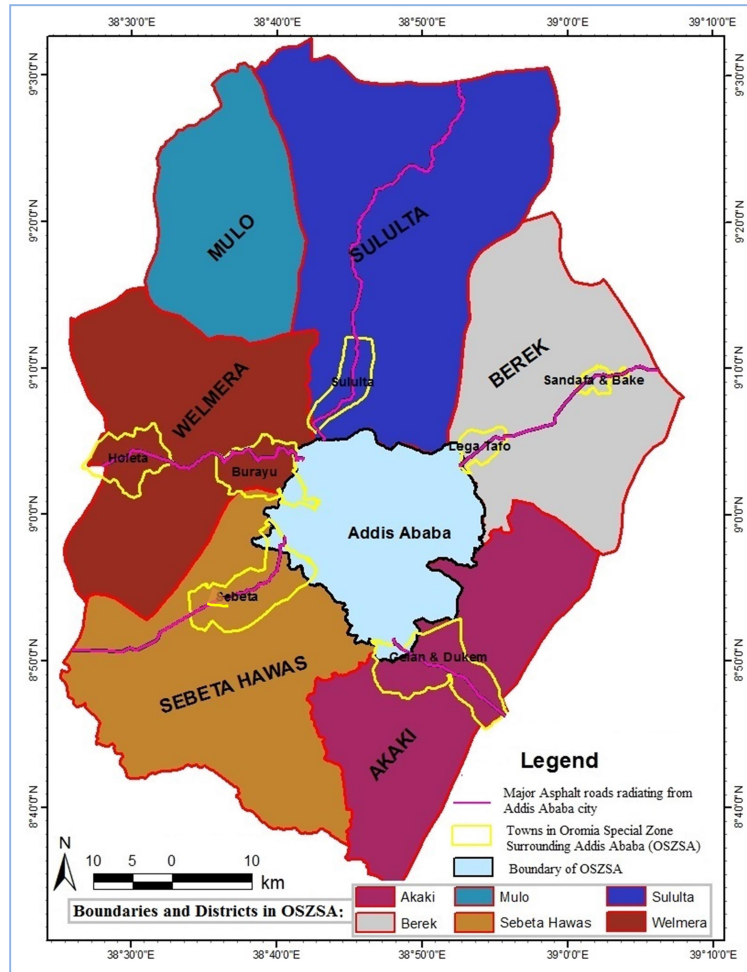


Figure 3.9: Boundaries, names of the districts and towns of the OSZSA with respect to Addis Ababa

The boundary issues of any towns in the OSZSA are direct issues of the boundary of the Oromia Regional State administration as the boundary of the region is defined by their boundaries. Similarly the boundary of the Addis Ababa city administration, which is governed as a charter city having different administrative entity, relies on the boundaries of the towns in the OSZSA. This is due to the fact that the Addis Ababa city is located in the center of the Oromia regional government's administration, and the city's unmanaged boundary extensions directly affect the Oromia region's boundary and vice versa. Following the urban boundary management gaps, most of the towns in the OSZSA

contain large extent of boundary overlap with the capital and there are always the challenges of competing interests between the two regions in setting the boundary of the city and its neighboring towns of the Oromia.

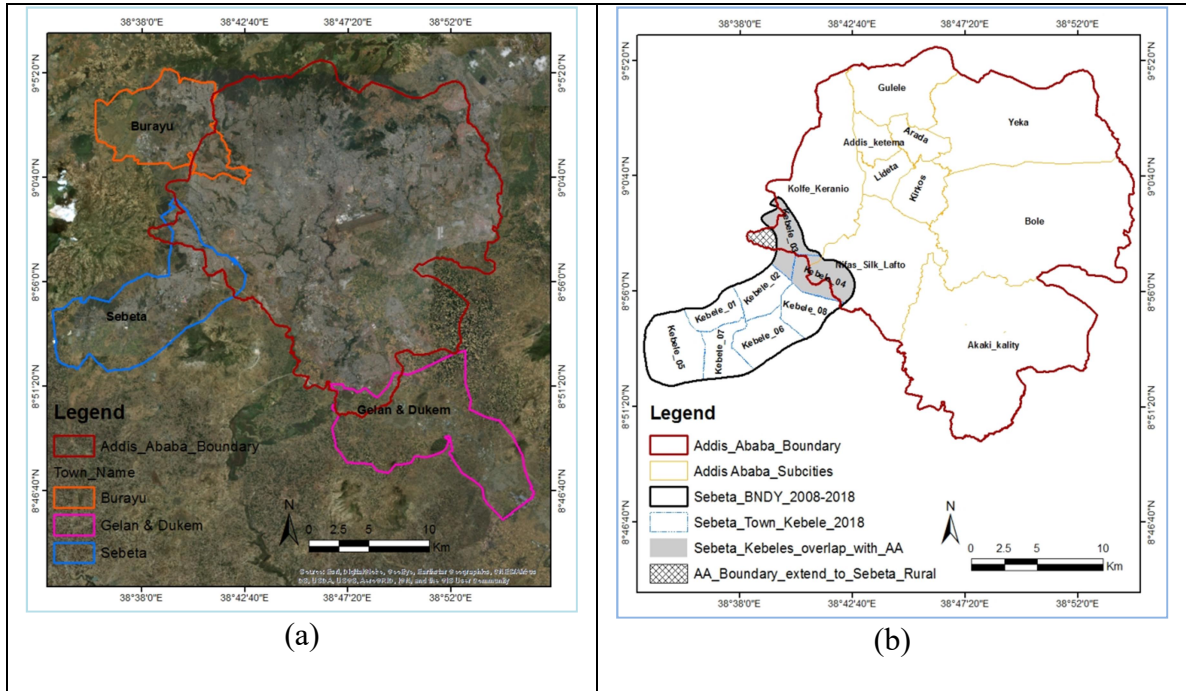


Figure 3.10: Oromia Special Towns surrounding and overlapping the city boundary of Addis Ababa (a) and Sebata Kebeles, a town with major overlapping with the city of Addis Ababa (b)

The boundaries of the two urban areas have changed inconsistently in different planning years. Still, given the recent boundaries, the (2008-2018) boundary of the Sebata town and the (2016-2026) boundary of the Addis Ababa city overlap about 1,414 hectares of land. The Addis Ababa city boundary extends approximately 248.03 hectares of land to the rural areas of Sebata (Figure 3.10-b). Sebata is a small urban area compared to Addis Ababa city, but it has been put under the same influence as the city. The availability of the city of Addis Ababa adjacent to the town of Sebata and its overlapping boundary have put pressure on the town.

The overlapping areas between Sebeta town and Addis Ababa city were assessed as follows: The first step was to define the overlapping region under three considerations (i) to be framed within the 2008-2018 boundary of Sebeta and Addis Ababa 2016-2026 boundary. (ii) The two Kebeles of Sebeta town (03 and 04) were included in the analysis because a large portion of the Kebeles exists in the overlapping region. (iii) Part of the Addis Ababa boundary extends over the rural Kebeles of Sebeta (Figure 3.11).

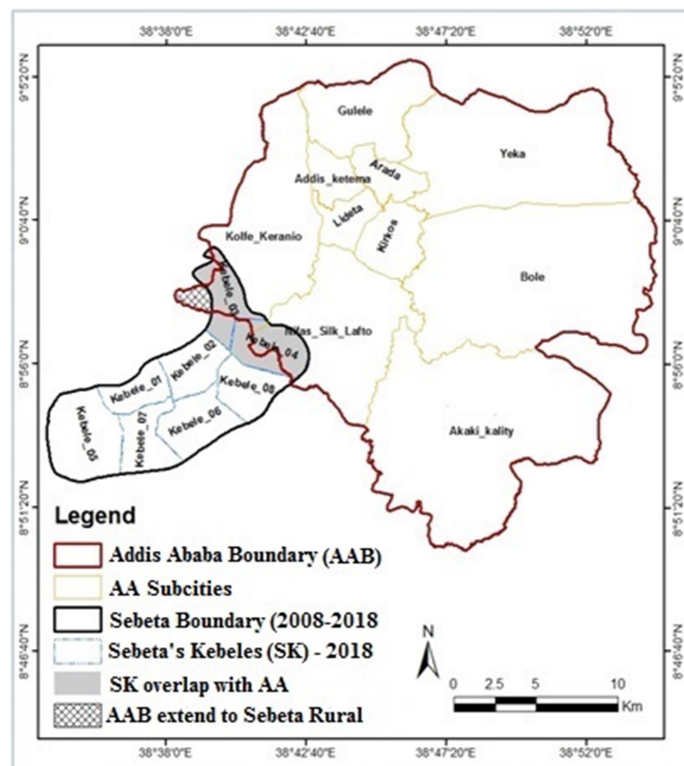


Figure 3.11: A Map showing the Sebeta town and the Addis Ababa boundaries, and their overlapping regions

The second step was selecting the spatial data to analyze the overlapping area. This research used cloud-free historical satellite imagery from Google Earth Pro of 2005 and 2018 to analyze land use/land cover change. The reasons for using Google Earth Pro are the lack of high-resolution historical images and the high cloud-cover in other freely available satellite image sources in the specified years. The 2005 marked the beginning of

OSZSA reforms for the towns surrounding Addis Ababa. It was also a year of political unrest due to the 2005 elections, which also caused land-use changes. 2018 was chosen because it was the end of the first structure plan period of the town, and therefore revised for the 2018-2028 period.

The Geographical Information System (GIS) 10.1 and ERDAS IMAGINE 2013 software were used for image preprocessing (collecting control points for rectification, defining projection and rectification), supervised classification, and finally analyzing land use/land cover change. The comparison of land use/land cover change was made based on two main classifications: (i) Built-up areas, comprising settlements, infrastructure, and other human-made constructions; and (ii) Un-built areas comprising all areas absent of constructions, such as natural landscapes (water bodies, different forms of vegetation, and the like), and working landscapes include agricultural land, historical sites, pastureland, and the like.

Third, the competing land was analyzed by comparing the Addis Ababa City's proposed land use for 2016-2026 and the Sebeta town proposed land use for 2018-2028, against the 2018 recent and detailed land use of Sebeta town. Although the recent land-use proposal of the Addis Ababa city, which used for the comparison, was prepared two years before the 2018 existing land use it is the only detailed available data, and most of the land uses around the overlap have shown insignificant land use changes during these two years.

Moreover, urban planners involved in preparing the Sebeta town's structure plans were interviewed to know the criteria and process used in defining the town's boundaries.

Furthermore, the challenges beyond the spatial mapping exercises were traced through systematic informal interviews with residents living in the overlapping region.

Furthermore, the experts who were involved in the structure plan of the Sebeta town were also interviewed whether the public ownership of land policy of Ethiopia has role in driving the built environment development process in the country, particularly to the study region.

CHAPTER FOUR : RESULTS AND DISCUSSION

4.1. Challenges and prospects to sustain natural and working landscapes in the urban areas of Ethiopia

The result emphasizes graphical and table-based representations of: the key challenges that impede the sustainability of natural and working landscapes; summarized challenges in order of impact; and the interconnectedness and inter dependability of the identified challenges.

The identified challenges are: spontaneous settlements; exclusion of the socio-ecological factors; Focus on physical planning; Deficient land suitability analysis; Unclear and extended boundary setting; Limited stakeholder participation; Limited baseline data; Limited expertise in urban planning; Urbanization and growth in housing demand and Inadequate time frames .

C1-C6 and C8 were identified as the most significant operational challenges, while C7, C9, and C10 were identified as intrinsic causes in the Ethiopian context for the emergence of other challenges (Figure 4.1). As a result, the C7, C9, and C10 challenges are all discussed in the context of their respective causality topics.

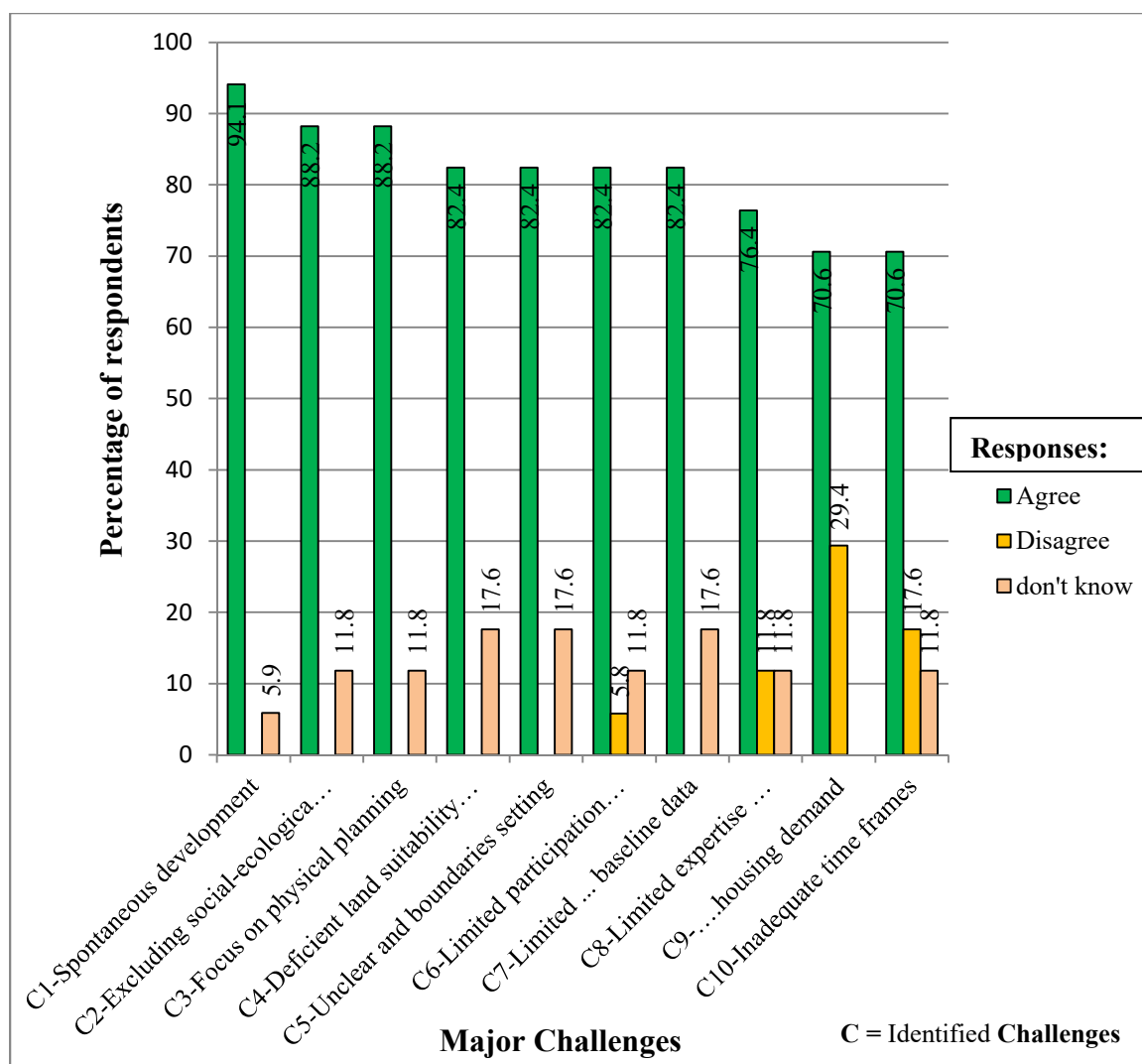


Figure 4.1: Challenges highlighted by experts' on the challenges to sustain the natural and working landscape attributes in urban areas in Ethiopia

The top ranked challenge is spontaneous development of settlement, followed by the exclusion of social-ecological factors and a focus on physical planning; the third is a lack of landscape suitability analysis, unclear boundary setting, limited stakeholder participation, and limited baseline data; the fourth is a lack of expertise relevant to urban planning, and the fifth-ranking challenges to sustain the natural and working landscapes in Ethiopia's urban areas are increased urban housing demand and insufficient time frames in the plan preparation process (Table 1).

Table 1: Weighting the challenges based on number of agreed expertise

	Identified Challenges	Percentage of respondents agreed	Rank
1	Spontaneous development	94.1	1
2	Excluding social-ecological	88.2	2
3	Focus on Physical planning	88.2	
4	Deficient Landscape suitability	82.3	3
5	Unclear boundary setting	82.3	
6	Limitation participation	82.3	
7	Limited Baseline data	82.3	
8	Limited expertise	76.4	4
9	Housing demand	70.6	5
10	Inadequate time frames	70.6	

Even though the challenges are ranked by the number of experts who **"agree"**, they are all equally weighted since the majority of disciplines are accepted (Figure 4.2). Those who responded **"don't know"** and **"disagree"** were primarily raised due to their lack of knowledge of the issues, as they had been assigned to roles somehow far from the raised urban planning challenges.

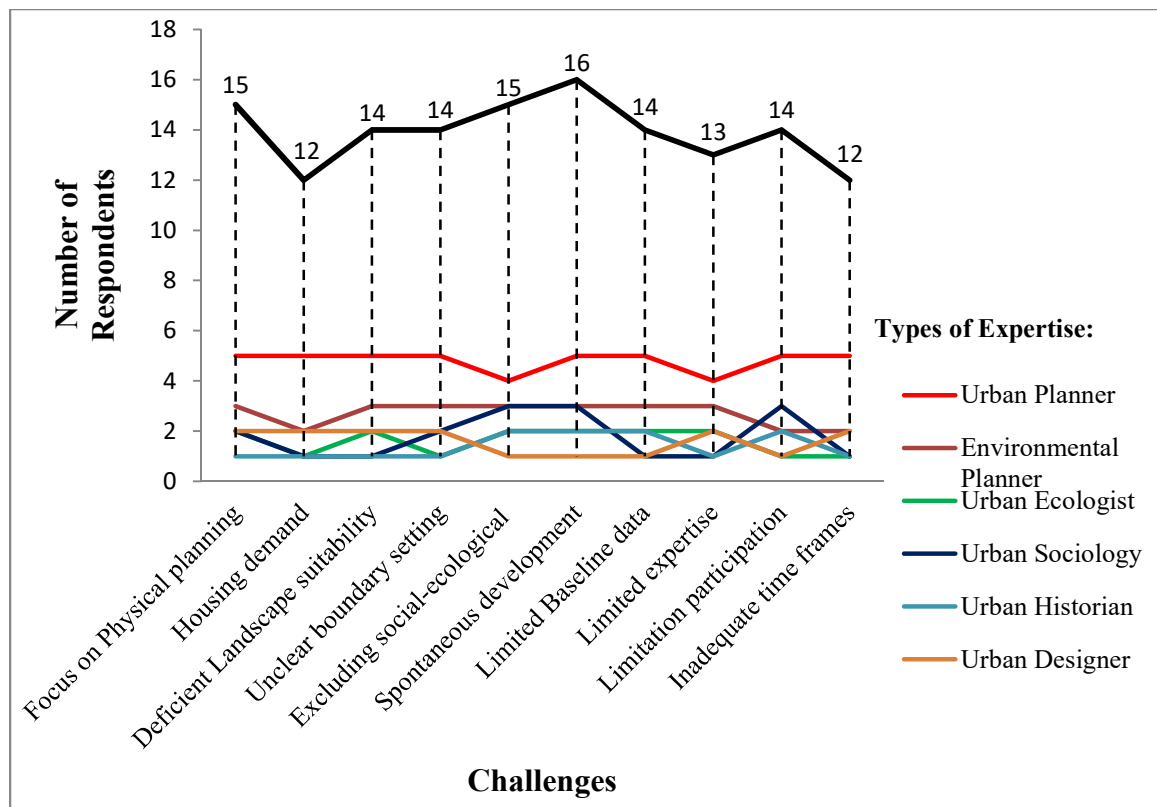


Figure 4.2: The types of experts agreed on the challenges

4.1.1. Spontaneous development

Key experts pointed out that the definition of a population-based urban area in Ethiopia and the level of urban determination are factors for the emergence of spontaneously intensified settlements in urban areas of the country.

In Ethiopia, urban is defined primary as an area having 2000 and above population (MUDCo, 2010, 2012b). A summarized experts' opinion show that “the spontaneous urban developments in the country are related to the inability of the commencement of urban entitlement and preparing basic plans for areas at the stage of the lowest population required (2000 inhabitants)”.

Similarly, the definition of urban set in the planning documents of the country is also the other issue for the increment of spontaneous urban developments. The definition request that to get an urban entitlement, three-fourth (75%) of the residents of an area should be engaged in non-agricultural activities (MUDCo, 2012). Experts pointed out that *“In its most basic aspect, this definition is impractical in the case of Ethiopia, where agricultural activities are the backbone of the economy and about 80% of the population lives in rural areas”* [Key Informant Interview (KII), 2020]. In addition, it was mentioned that *“It is difficult to define an urban area in terms of non-agricultural economic activities in Ethiopia, as most of the residents of small urban areas in the country operate in multiple locations and multi-purpose economic activities, most of whom are both resident in urban and rural areas”* (KII, 2020).

Therefore, non-early responding to the minimum population threshold and expectation to gain the specified non-agricultural activities to be an urban area have resulted the emergence and intensification of large spontaneous settlements in the country before attaining their basic plans. For instance, the history of spontaneous growth has shaped the Addis Ababa city. The unplanned mushrooming of micro-dynamic elements in every corner of the city still reinforces the trend of spontaneity against the continuous attempts to reverse it through planning interventions (MUDCo, 2012; ORAAMP, 2002). As a result, the initial urban plans in the country usually rely on the spontaneously emerging housing conditions, physical infrastructures, and existing patterns in general, which influence the subsequent urban planning. In supporting this idea, Benti et al. (2021) stated as poor management of spontaneous settlements as early as possible is the greatest planning challenge and usually lead to the formation of slums.

Ninety-four percent (94%) of the interviews related unmanaged landscape changes with spontaneous development following segregated pioneer settlements. About Eight-Eight percent (88%) agreed that the major planning challenge in this regard is the poor management of these early settlements. For instance, limited attention is given to pioneer settlements in establishing social structures, what later on, with the arrival of new settlers, tend to grow chaotically. In Ethiopia, it is usual that the households in indigenous communities are very dispersed and householders tend to build their homesteads on their own lands, creating a cascading development pattern irradiating from them.

For instance, the summarized results (Figure 4.3) based on the informal interview of the pioneer settlers and residents living around the *Guje*, *Burayu* town and *Furi*, *Sebeta* town and personal experiences.

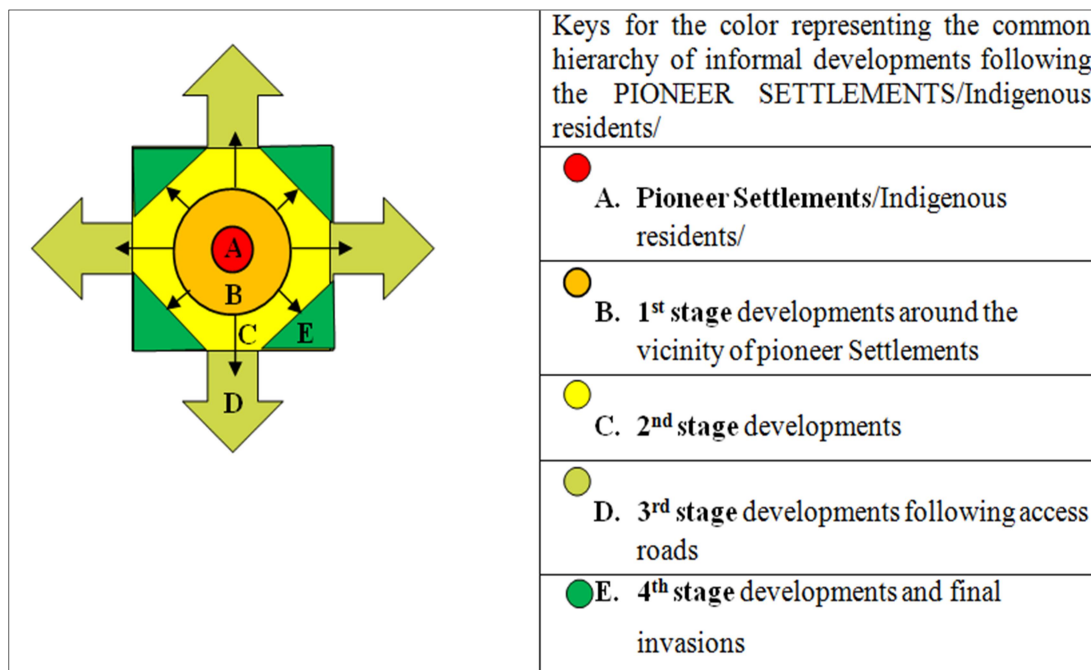


Figure 4.3: Illustrated settlement expansions trend to follow the pioneer settlements (*illustrated by the author, 2020*)

The 1st stage of community development refers to buyers who join the pioneer/indigenous properties close to the existing social infrastructure hoping to secure the informal land holding. At the 2nd stage, newcomers get far from the pioneer settlements, mainly along the access roads. In the 3rd stage, people are no longer interested in areas around the pioneer settlements and began to settle in lands across the access roads. The 4th stage of development usually happens after some years of the settlement intensification, when the values have grown. As the first two stages mostly happen around the pioneer homesteads, the 4th stage mainly occurs on farmlands and other natural landscapes.

This intensification around dispersed pioneer settlements defines the shape and forms of a town, becomes a major cause for unsustainable natural and working landscape conversion and creates difficulties for formal urban planning.

For instance, the slum dwelling areas in the old centers of Addis Ababa city indicate a character of spontaneous urban development (Figure 4.4) which lacked landscapes. The poor management of such developments at their early stage of development created similar trends in the other urban areas of the country.



Figure 4.4: Slum areas in the inner part of Addis Ababa city (Photo credit: Hailu, 2016)

Experts and personal experience have identified the following major causes for the emergence of Spontaneous Development in Ethiopian urban centers:

The first is the shortage of expertise and planning offices and insufficient coverage of urban plans, which has resulted in haphazard urban development. *E.g. many of the planning departments are governmental, and are a few in numbers. In addition, although there is still a limited number of professionals in the sector that is attributed mostly to a few academic institutions, insufficient number of planning offices and the planner jobs are occupied by other professional largely discouraged students from joining urban planning programs.*

Land base corruption is often related to causing informal settlements to emerge before a formal plan. It has been identified as one of the main contributors to spontaneously emerging settlements by experts and from experience.

Other experts raised the relationship between original (indigenous) residents and spontaneous settlements. In Ethiopia, indigenous residents usually reside at segregated places, and informal settlers joining them intensify houses forming patches of settlements. Therefore, those segregated settlers have been considered as the initiators for the emergence of spontaneous settlements.

Informal dissemination of information is also one of the other causes of spontaneous urban development. In most cases, pioneer settlements attract people belonging of the same ethnic groups and even from the same origin. As a result, they easily understand and support each other in the land holding process, and they can easily agree in the formalization of their properties. *E.g. Silte Sefer; Gurage sefer; Dorze sefer and etc.*

Those groups usually share information in the process of togetherness and socializing, like calling for a coffee drinking ceremony at their homes (*Figure 4.5 shows a typical one*). During the event, which mostly takes hours, neighbors share information about their life, communities, politics and who did what with whom. In most cases, the shared information does not leak to the other different groups. No-one surpasses his/her neighbors to legal bodies, which have mainly brought difficulties for early manage the illegal land ownership. These led to expansion of informal settlements, contributing to the country's inability to sustain its natural and working landscapes.



Figure 4.5: A typical coffee ceremonies in Ethiopia: a means of informal information sharing among neighbors

Spontaneous urban growth was also associated with migration and urbanization. The increase of populations in megacities like Addis Ababa results from migration from rural areas and small regional towns. As migrants usually cannot afford high rental costs in core urban areas, they tend to occupy peripheral lands mostly farmlands, as well as environmentally sensitive areas that are not recommended for human settlement like river banks and hills informally (Figure 4.6). Most of the lands around those areas are categorized under the natural and working landscapes and are usually converted in unsustainable trends.



Figure 4.6: Informal settlement in the northern part of Addis Ababa causing encroachment into the fragile ecosystem (Source: Hailu, 2016)

4.1.2. Exclusion of the social-ecological factors triggering the inception of urban areas

A summarized finding from experts shows that in Ethiopia, urban development mostly emerged spontaneously based on the provided social and physical conditions and the surrounding ecological factors. Human agglomerations then, tended to follow the provision of basic social services, such as worshiping areas (Churches and Mosques), educational and health centers, markets places, the establishment of political administrative units (*Kebeles*) and farmers training centers, and conducive ecological factors, such as the availability of water bodies, the existence of forests , favorable climate conditions, and agreeable landscapes.

According to experts, excluding those factors is becoming the main urban challenge to sustain the natural and working landscapes. They have also indicated some major causes for the emergence of this challenge. Inadequate time is one of the causes that hinder the collection of all essential socio-ecological data, mainly factors that cause urban development, and the collection of other needed baseline data that restrict data analysis beginning at the early stages of urban development.

The livelihood of the farmers around the peripheral areas of Addis Ababa city, where high-rise condominium houses are built, is unimproved. The farmers do not have access to roads for cars and still use traditional transportation means (Figure 4.7a), their cattle suffer from grazing lands (Figure 4.7b), and the houses of the farmers are shanty and still made of mud walls and grass roofing (Figure 4.7c).



Figure 4.7: Unsustainable land conversion at peripheral areas of Addis Ababa city and the livelihood of the indigenous farmers

The development of condominiums that have been constructed are marginalized the indigenous residents around there, which resulted the fear of developments and open ways for informal settlements rather than inclusiveness in the development. As a result, the exclusion of indigenous landowners, mostly farmers, around Addis Ababa city was one of the reasons for the protests (2016-2018) that occurred in the Oromia regional state and become a development constraint.

In general, including the social-ecological factors of urban areas is the epicenter of their developments. Therefore, the less focus given to those factors during the planning stage usually leads to unhealthy urban growth and becomes the main cause for the unsustainable transformation of both the natural and working landscapes.

4.1.3. Deficient landscape suitability analysis for proper land uses

The current increase in the competition and pressure for land uses need a better understanding of the interrelationships between natural features in a landscape and its social dimensions (Elwood et al., 2018) requires proactively setting the suitable landscapes for proper land uses. About 82.3% experts indicated that a limited land suitability analysis is the major challenge for the effective integration of the natural and working landscapes in urban planning in Ethiopia. Most of them indicated that the mapping and assessing the socio-ecological elements, social values, and traditional knowledge of local communities are rarely considered and mapped.

In consequence, the urban planning in the country rely on simple analyses not assisted by geographical information system tools and usually done on the views and understandings of the planners, who tend to ignore the natural and working landscapes. In this regard, studies demonstrated that land-use planning should be carried out using decision-making process that facilitates the allocation of land to the uses that provide the largest and most sustainable benefits (Wehrmann & Schmitz, 2011) and should also prevent and protect the land against incompatible changes (Ullah & Mansourian, 2016).

According to the experts, the main reasons for the deficient landscape suitability analysis in urban planning in Ethiopia are the spontaneous emergence of settlements and the technical inability of officials to use specific tools to conduct land suitability analyses. Furthermore, the negligence of long-term effects of deficient planning, lack of awareness on the conceptual implications, limited baseline data of natural resources, and time constraints also play a role.

Detailed mapping of the social-ecological components is crucial to monitor the dynamics of the land-use/cover changes. In Ethiopia, non-detail baseline data inventory mostly relates to limited technologies and the lack of technical abilities in using support tools (software). As a result, identifying trends and quantifying the transformation of the natural and working landscapes into other urban uses is difficult and usually opens ways for illegal urban growth.

Another factor is the inadequate time frames given to set the baselines. For the preparation of an initial Basic Plan (BP) of a town, a detailed socio-ecological analysis often is not conducted due to time constraints. For instance, only 30-40 days are given to prepare plans for the emerging towns in the Oromia Regional state. If existing, the problems related to the socio-ecological dimensions may not be visible at first stages. Insignificant at early stages, these can cumulate and have significant impacts in the towns' growth leading to deficient plans, eventually forcing to more costly approaches to solve their inaccuracies.

Finally, it is worth underlining that most of the challenges above are detailed, resulting from their absence in the existing urban planning standards, guidelines and related planning documents, and even in the general framework for land-use allocation.

4.1.4. Unclear and extended boundaries setting

Several studies show that urban growth boundaries are frequently used by planners to constrain urban expansion, increase the density of urban services, and protect surrounding non-urban environments. They are also used to guide zoning and land-use

decisions, and prevent urban sprawl (Humstone, 2011; Pijanowski & Tayyebi, 2011; University of Delaware, 2006).

In terms of urban boundary, the systematic review proofed that the Ethiopian urban planning documents lack clear and detailed criteria for setting boundaries of urban centers in the country. The concept of the physical boundaries for urban centers comprising a general content about the boundary issues is specified in Article 6 of the Ethiopian Urban Planning Proclamation (EUPP) No 574/2008 and consists of three key points: (i) Urban centers should have clear boundaries. (ii) The boundaries between urban centers shall be defined by the relevant regional governments, and the boundaries of the Charter cities (Addis Ababa and Dire Dawa) shall be indicated in their respective charters. (iii) The urban center may be favored by the authority concerned and granted the status of a growth center to merge its immediate surroundings for a development purpose, irrespective of its physical boundary (EUPP, 2008). Apart from this proclamation, there are no other guidelines and clearly defined criteria for delimiting urban boundaries in the country.

Similarly, the absence of a comprehensive boundary delineation criterion in the national urban planning manuals of the country opens decentralized and unstructured urban boundary setting methods at regional planning offices even at an urban level. For instance, the Oromia Urban planning Institute (OUPI) prepare plans for the towns administered under its regional jurisdictions like the Sebeta town, and the Addis Ababa city Administration have prepared the structure plans of the city at different time period although they share common boundary. Therefore, in addition to the lack of criteria in

boundary setting, non-integrated structure plan preparation has resulted in boundary overlap in the study area.

In supporting the document review, Eighty two percent (82%) of the interviewed experts agreed that urban areas in Ethiopia are usually based on clearly undefined urban boundary demarcations. The criteria to delineate urban boundaries are not clear; rather, they are defined arbitrary, overlaps with a predefined areas, uses non-stable landmarks, and are poorly signaled.

For instance, the administrative boundary of the Addis Ababa city overlaps with the boundaries of its surrounding towns including Sebeta, Burayu, and Gelan (Figure 4.8c). The uncontrolled horizontal expansion and development of the city brought a high intensification of settlements along the main streets radiating from the city center causing the extended boundary setting (Figure 4.8a, b).

The overlapping of the administrative boundaries creates urban land management difficulties, leads to conflicts of interest, and allows the expansion of edge built-up zones. In addition, the unclear boundaries open ways to abuse the natural and working environments and possibly attract informal settlers.

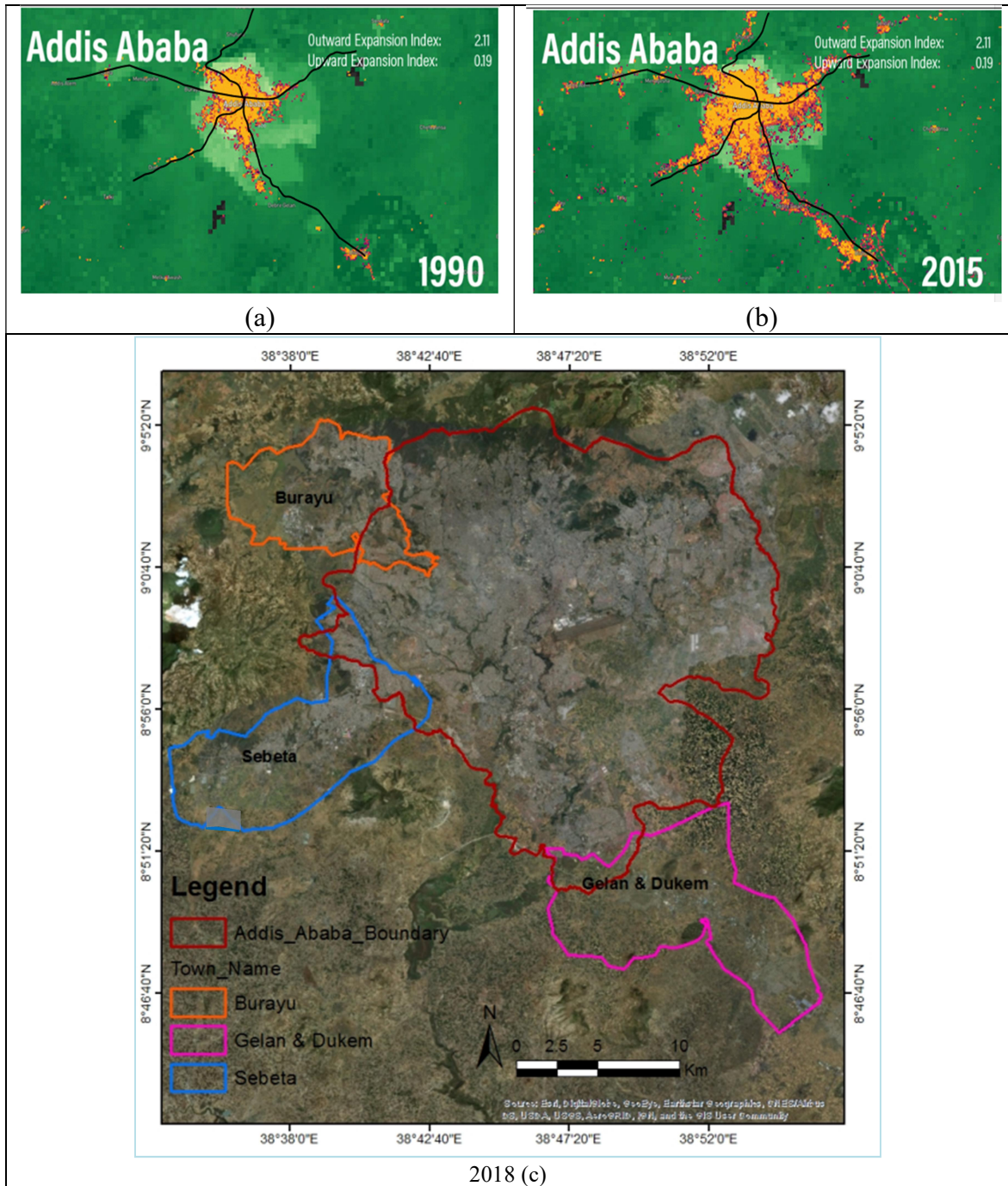


Figure 4.8: A comparative analysis of the outward and upward expansion of Addis Ababa city (Eric Markres and Elise Mazur, 2019) [a & b] and the city boundary overlaps with the administrative boundaries of the surrounding towns (c)

4.1.5. Limited participation of stakeholders

Participatory urban planning helps in linking the local knowledge and perceptions with the analysis of the socio-economic and ecological reality of an urban area (City Club of Portland, 2005; MWUD, 2007; Randolph, 2004). To do that, all stakeholders at all levels, should be involved from the early plan preparations to their implementation (FAO, 1996, Landelma et al., 2000; Tahvanainen et al., 2001, Tripathi & Bhattarya, 2004). In this regard, the Ethiopian Basic Plan and the structure plan manuals, indicate that the community needs should be involved via community representatives from an early stage (MUDCo, 2010; MUDCo, 2012).

The interviewed experts expressed that in the urban planning process of Ethiopia, the residents are usually neglected, especially those who live in peripheral areas, which is due to the short time given for the plan preparation, negligence, and limited capabilities of planners to trace the local knowledge and include it. For instance, the Oromia Urban Planning Institute has accepted several plans that indicate having considered socio-cultural issues from community representatives. But, in general, the selection of the community representatives is non-transparent. Instead, planners discuss with counterparts provided by the city/town officials, who likely exclude people who may raise challenging issues.

As a result of, their limited participation, residents, especially from rural communities, develop a sense of insecurity about their farmland rights. Following this, land brokers and speculators nudge them to sell their properties by misinforming them, telling them that the government will expropriate their lands and they will be poorly compensated.

For instance, some experts who participated in the Addis Ababa city structure plan told that residents who were living at the peripheral areas of the city, especially on the areas where the condos built (Figure 4.9) were hardly consulted, and finally evacuated with a few compensations.

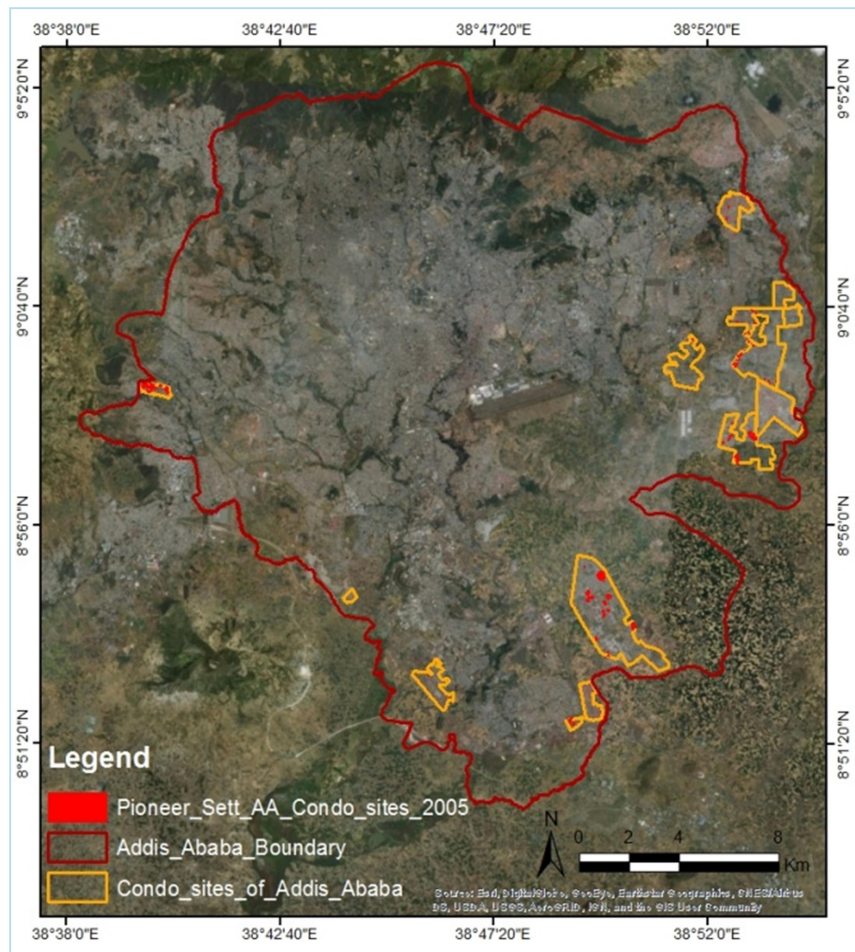


Figure 4.9: The Addis Ababa Condo sites majorly expropriated the pioneer farmers

Nevertheless, broad local participation has also shortcoming and downsides, among others: (i) The inability of planners or planning process to incorporate and address the major interests raised by the community representatives. (ii) Some demands are individualistic and biased, e.g., locating market areas, major roads, health and educational

facilities, etc. to satisfy individual interests, sometimes even by trying to corrupt the planners. (iii) Some issues surpass the decision scope of urban planning offices, and rather require of other sectorial offices, like in relation to drinking water, electricity coverage, telecommunications, etc. and (iv) Contradicting interest among communities, authorities and government officials.

4.1.6. Limited expertise in urban planning offices

Urban development units require personnel, endowed with professional and administrative experience of various disciplines (CollegeGrad.com, 2019; Germany Association of Cities, 2013), but planners are the deciding ones, as they are in charge of the long- and short-term decisions about the development and management of cities, towns, villages and the countryside (Careers Network , 2014; Carsten Schaber, 2016). They should have proficiency in planning and be able to identify and prevent social, economic and environmental related-problems (Ashiru, 2015).

In theory urban planning should start from base maps, generally made by surveyors. Based on that map, the protocol states that a team at least composed by two urban planner(s), a sociologist, an economist, a geographer, an environmental planner, and a historian who have visited the planning area (Ministry of Urban Development and Construction , 2012; OUPI, 2010). But in the Ethiopian reality, team members with the required profile are usually scarce or simply absent, and their tasks are assumed by other professionals. Consequently, the socio-ecological and physical assessments are not detailed enough and often disregarded in their importance.

Moreover, urban planning departments in the country have different institutional arrangements and hierarchies., For instance, a centralized approach, was set in 1985-2008 when the National Urban Planning Institute (1986-2005) and the Federal Urban Planning Institute (2005-2008) took the leadership (MUDCo, 2012; ORAAMP, 2002). After 2008, the increasing number of towns forced the government to decentralize the mandate of plan preparation and monitoring and the assignments were given to regional urban planning institutes and private consultants (MUDCo, 2012). But experts pointed out that this decentralization was done without enough information about the available experts and organized urban planning offices. Until 2010, very limited institutions could train urban planners. For that, the Ethiopian Civil Service College was worthily stated by the experts. In 2010, the number of urban planners increased following the first 22 graduates from the Addis Ababa University, EiABC (Students' yearbook, 2010), soon other universities followed that path.

Still, graduates confronted the lack of job opportunities by the limited number of governmental and private urban planning offices and logistical challenges, such as language fluency in regional urban planning offices. Additionally, financial constraints limited the outsourcing of urban planning projects to private consulting offices that discouraged them from planning, which narrowed the job opportunities. These challenges make the field unattractive to graduates, which prolong the lack of experts in the area.

All those factors caused most urban planning projects were done by governmental offices with limited expertise, and personnel with non-appropriate profiles, questioning the quality of the outcomes.

4.1.7. Focus on physical planning

Most of the proposed land uses are expected to be achieved as per the predetermined proportional standard in the manual of the Structure Plan of Ethiopia (Table 2). One of the challenges is the existing standard in term of numbers and focuses given to one of the landuses related to the natural and working related landscapes in the structure plan manual of Ethiopia majorly in the small towns. It is non-proportional allocation of the land-use categorized under “Open spaces and Environmental Sensitive Area (OES)”.All the sub-classifications listed under OES (for detail categories of this land use refer in the background of this study) are only represented by the proportional standard, which is represented by 15-20 % indicated in Table 2. These proportions are majorly non-indicative, especially for medium to large towns where the OES classes can represent the majority of land covers of the towns.

On the other hand, the proportion of housing land use (55-70 %) is expected to meet regardless of the housing demand. The challenge here is that, the manual does not indicate how the proportion works on areas where the need for housing cannot be expected to reach the seated standard where the urban population is low. This proportion similarly applies to all types of urban areas (Medium towns-Metropolitans) where the medium towns need to have large proportion of open spaces and agricultural lands than others.

Table 2: Proposed proportion of the respective land uses in the Structure Plan *(Adopted from the 2012 structure manual of Ethiopia)*

	Land use components of a Structure Plan	Proposed percentage
1	Housing	55 -70
2	Business and commerce/ Centers and market places	5-10
3	Public facilities, cultural, archaeological sites and special functions	5-10
4	Manufacturing / Industry and storage	5-10
5	Infrastructure, utilities and transportation	15-25
6	Open spaces and environmental sensitive areas (parks, urban agriculture, recreation, mineral resources)	15-20

Therefore, having such generic and non-representative land-use proportion standards classified similarly for all types of urban areas in the structure plan manual have challenged sustaining the natural and working landscapes in urban developments in Ethiopia. Even the smallest percentage adds up to 100%, indicating a lack of flexibility in assigning a different percentage than the proposed one, which is the side back of the standard set for the structure plan.

About 88% of interviewed experts emphasized that urban planning in Ethiopia prioritizes built-up spaces over the natural environment, which implies the construction of residential houses, condominiums and real estate developments, and physical infrastructures like roads and other built-up areas (Figure 4.10). In line with this, the Ethiopian urban planning standard indicates 40%, 30%, 30% for built-up spaces, roads,

and open spaces, respectively. This standard testifies that about 70% of urban land should be planned for physical structures.



Figure 4.10: Some Photographs showing the Physical planning focused on developments in Addis Ababa city (Source: Culture and tourism Bureau, 2017)

Most of the experts also expressed physical structures are one of the most important aspects of an urban area, but they point out the planning that encourage horizontal expansion and developments starting at the edge of an urban boundary are among the most challenges to sustain both the natural and working landscapes in Ethiopia. For instance, planning focused on the physical structure, condominiums in the peripheral areas of Addis Ababa city have been constructed at the expense of the natural and working landscapes (Figure 4.11).

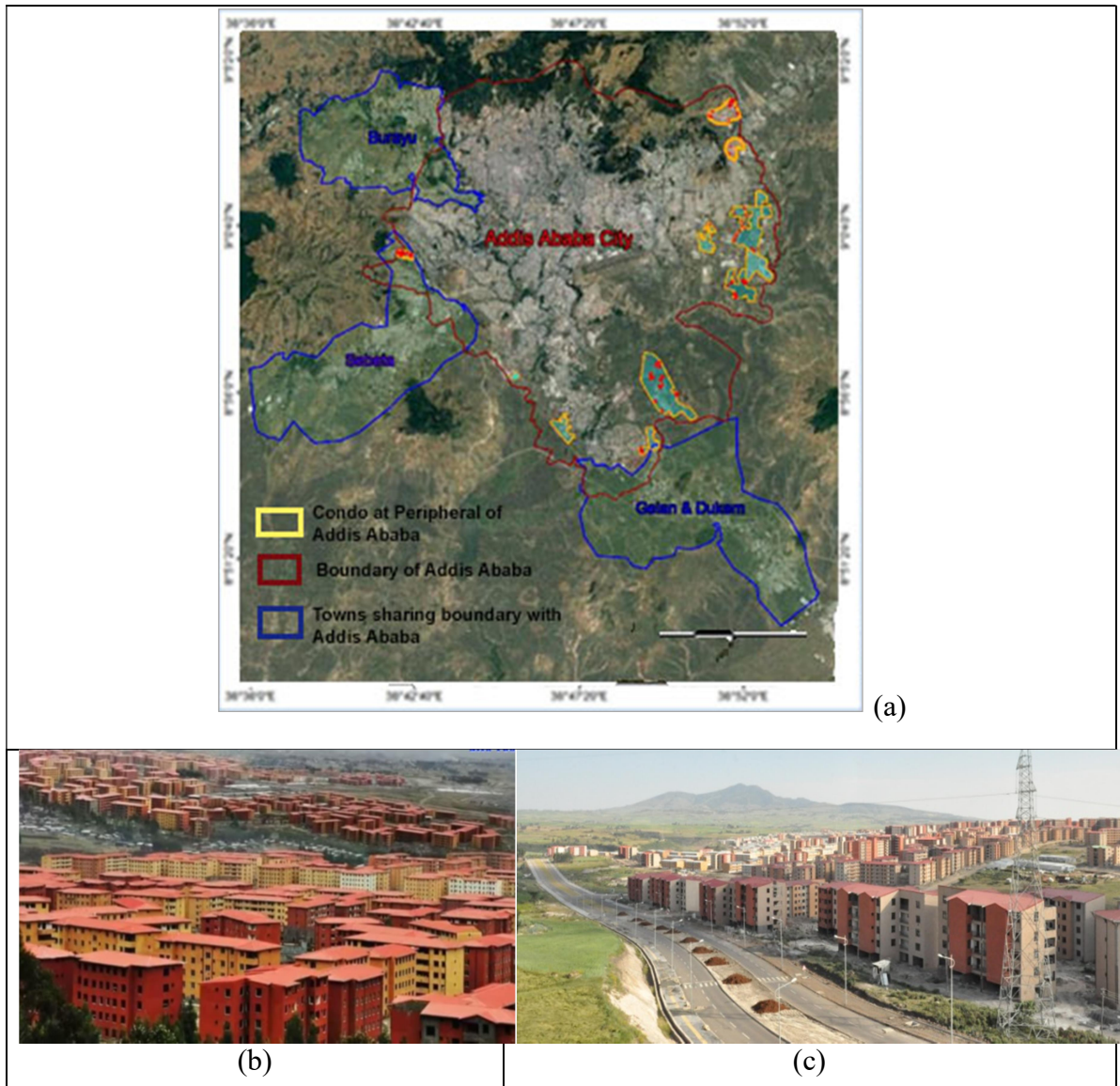


Figure 4.11: Condominiums sites (a) and typical Condos and other infrastructures built at peripheral areas of Addis Ababa city (b, c)

Addis Ababa City prioritized the “*From edge to center development*” strategy (Figure 4.12). Such development aimed to define the extended boundary of the city by including adjacent towns such as Sebeta, Burayu, and Gelan but undesirably created also vacuum in between that propped the emergence of informal settlements, which in turn led to the alarmical degradation of the natural and working landscapes in nearby towns.

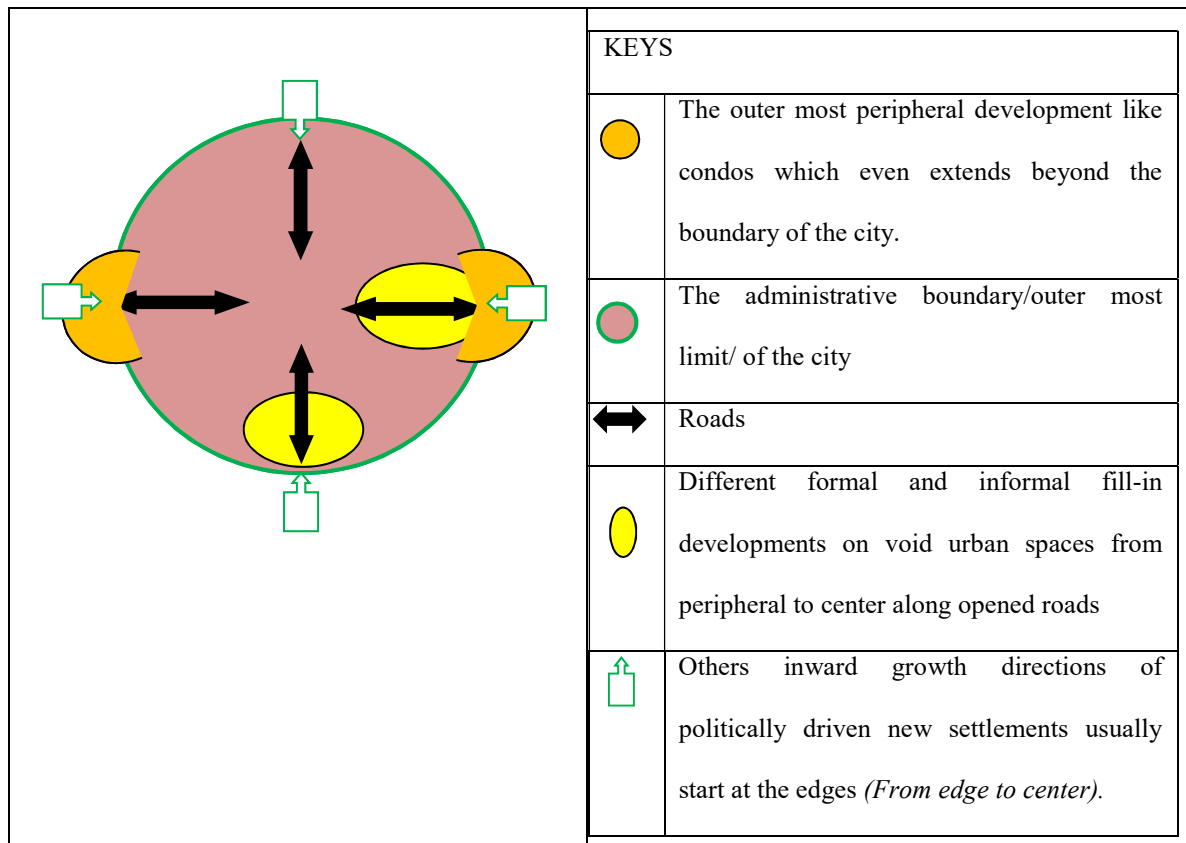


Figure 4.12: Illustration of the recent urban growth trends in Addis Ababa city (illustrated by the researchers, 2020)

The reasons for that include: (i) Urbanization and housing demands, (ii) Profitability of land-use conversion, as land prices increase, (iii) limited focus given to natural environments in the existing urban plan manuals, (iv) No equal opportunity for recreational area developers as compared to real-estate developers, (v) Negligence in considering the natural and working landscapes, and (vi) Limited awareness on the importance of natural environments and assuming them as ‘leftover’ spaces.

More focus on physical planning led to negligence to consider the natural and working landscapes, which have fragmented and depleted natural and cultural landscapes and contributed to the loose of fertile farmlands.

Although very late, there are some potential prospects where areas that were previously categorized as the special uses and having security issues, and contained abandon natural landscapes that are visibly re-integrated with the existing built-up spaces and become public spaces. One best example is the Unity Park (Figure 4.13), which was developed in compound of the Ethiopian government grand palace existing in Addis Ababa city. The construction of this park shows the government commitment, as it was majorly initiated and implemented by the Prime minister of Ethiopia, Dr. Abiy Ahmed.



Figure 4.13: Unity Park in the compound of the Ethiopian government palace, Addis Ababa, Ethiopia
(Source: Addis Ababa city government, 2021)

Additionally, the rehabilitation of the Addis Ababa Rivers and their banks were also started around an area demolished for renewal. In this regards, the “Friendship Square” (Figure 4.14), which was built in close proximity to the Sheraton Addis and the palace, can worthily be stated although the previous proposals and the process of change to the open spaces need further investigation.

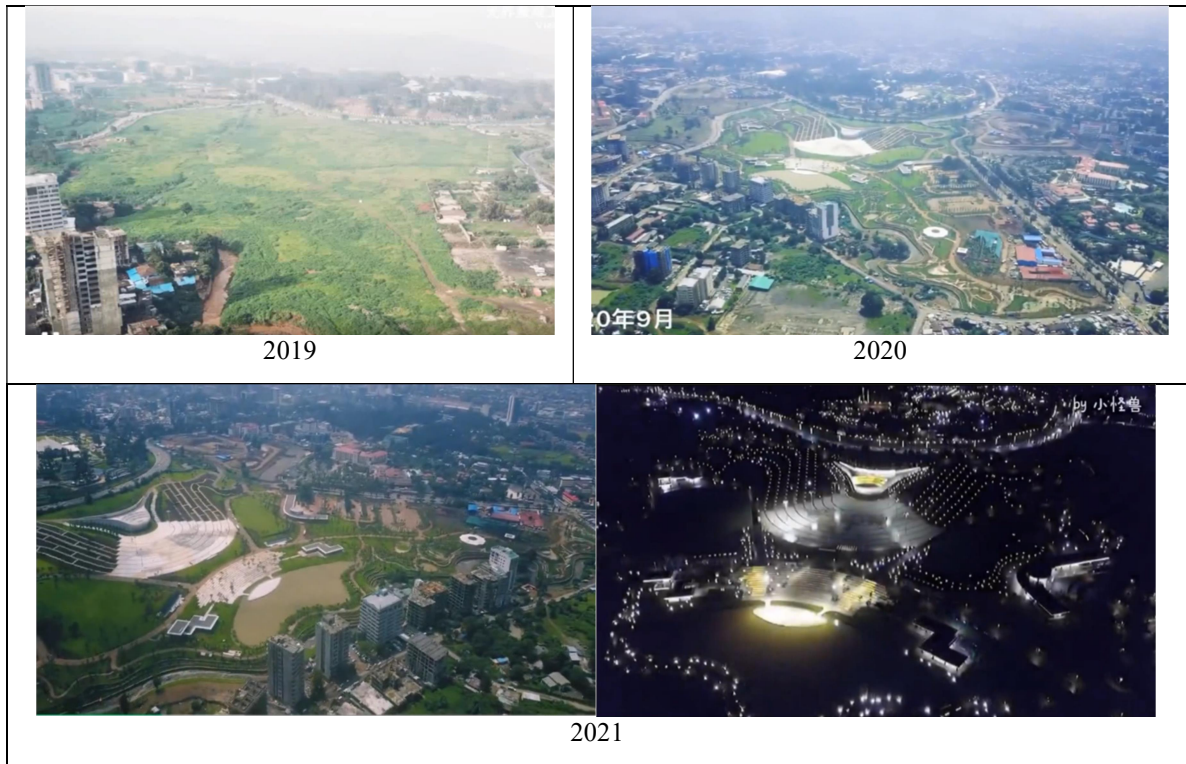


Figure 4.14: Friendship Square, Addis Ababa, Ethiopia (*Source: Addis Ababa city government, 2021*)

4.1.8. Challenges interconnectedness

The identified challenges are highly interconnected (Figure 4.15). Urbanization and the increase in housing demand impels to focus on physical planning and induced deficient land suitability analysis.

Unclear boundary setting mostly for those urban areas sharing boundaries, spontaneous developments, limited expertise and planning offices, limited baseline data and inadequate time frame were identified as the main causes for the deficient land suitability analysis in the urban planning process. The Inadequate time during data collection and delayed time of response to control settlements emerging around pioneer settlements, limited participation of stakeholders in the urban plan preparation process were identified

as the main causes for the exclusion of the socio-ecological factors triggering for the inception and development of urban areas. On the other hand, the main causes identified for the emergence of spontaneous settlements were segregated pioneer settlements, exclusion of the socio-ecological factors triggering the formation of settlements and the existence of land based corruptions and informal dissemination of land related information.

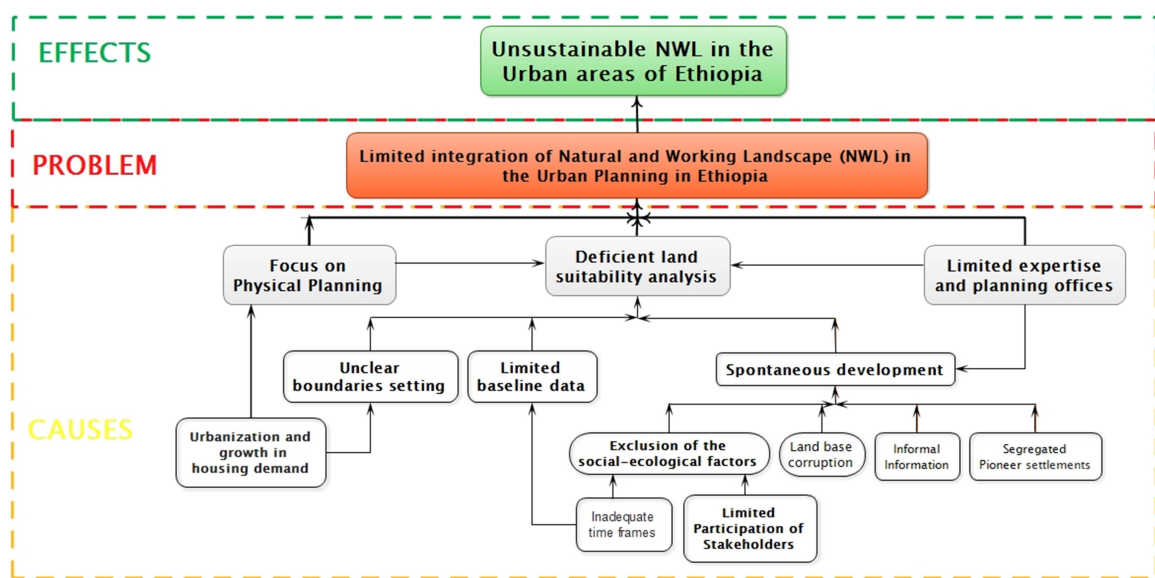


Figure 4.15: A problem tree indicating the challenges and causes of challenges to integrate the NWL attributes in the Urban Planning in Ethiopia (*Researcher' analysis based on the experts' response, experiences and review*).

In general, all the main challenges and the intrinsic causes for the challenges have brought problems in relation to limited integration of the Natural and Working Landscape (NWL) in the urban planning in Ethiopia which in turn bring effects of unsustainable NWL in the urban areas in the country.

4.2. The challenges of built environment development process on the sustainable transformation of the natural and working landscapes

The following result indicates challenges of the Built Environment Development Process (BEDP) in the study region in changing the Natural and Working Landscapes (NWL) to other land uses. The challenges have been revealed in terms of change dynamics particularly focusing to the Sebeta town.

4.2.1. Landscape Change Dynamics of the Sebeta town between 2005-2018

The analysis of the land-cover in the 2005, 2008 and 2018 satellite images of the Sebeta town show a high increment of the built-up areas, which were originally segregated in 2005 and 2008 but later merged by 2018. Out of the total 9826.33 ha, the built up areas account for 1,613.96 ha (16.42 %) in 2005, 2,278.73 (23.19 %) in 2008 and increased to 5,570.22 ha (56.70 %) in 2018 within nearly 13 years. Whereas the non-built-up spaces (natural and working landscapes) decreased from 8,212.37 ha in 2005 to 4,256.11 ha in 2018.

Therefore, the built environment development process in the town was unhealthy and vast areas of land use and land cover categorized under the natural and working landscapes were unsustainably transformed to the built-up spaces.

The areas of major conversion in non-built-up spaces are located in the inner parts, along major roads and in Kebeles neighboring Addis Ababa City (Figure 4.16).

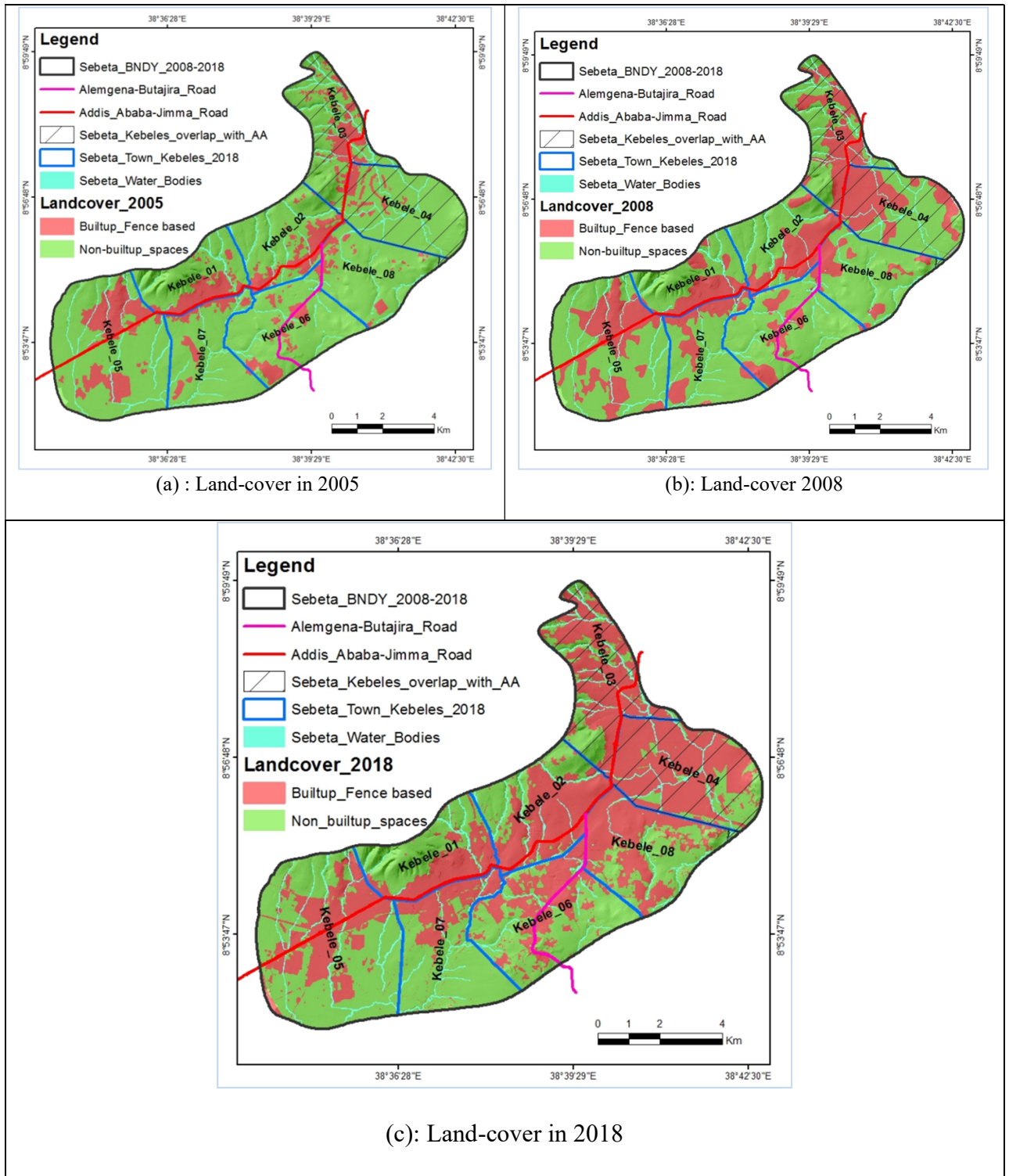


Figure 4.16: The comparison of the land-covers of the Sebata town in 2005(a), 2008(b) and 2018 (c)

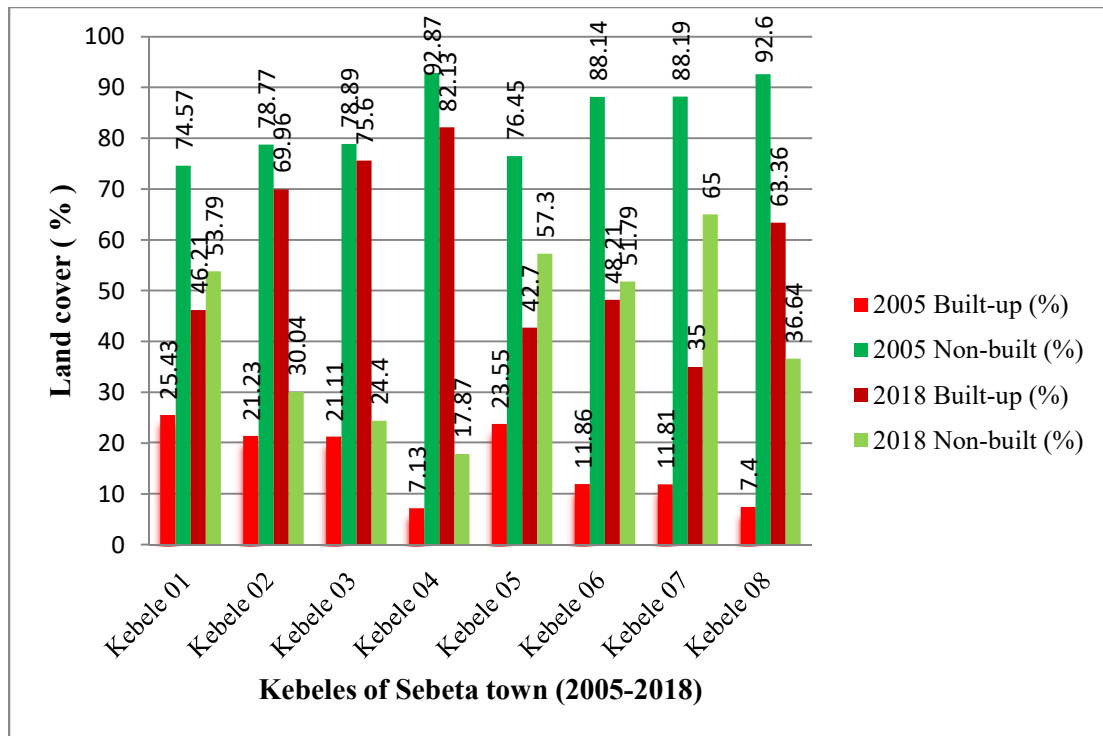


Figure 4.17: Kebele based percentage of land cover changes comparing the 2005 and 2018

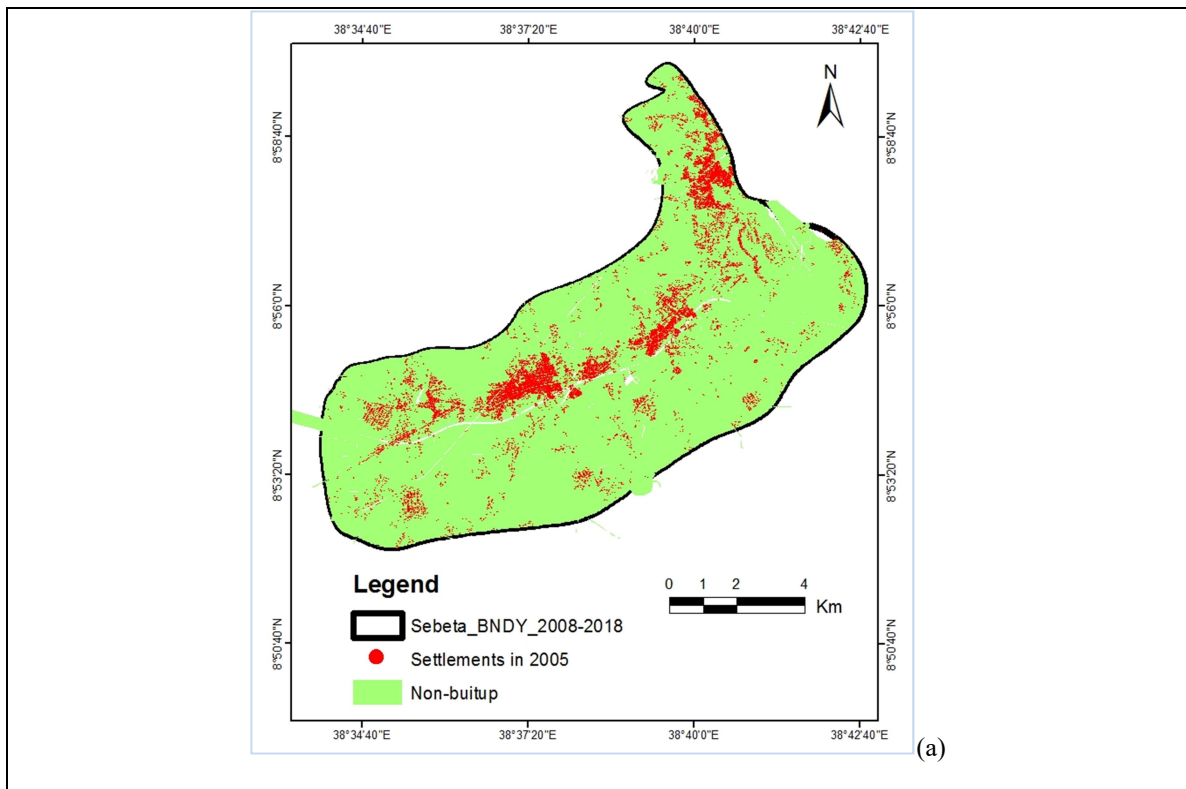
Table 3: Kebele based percentage of built-up spaces increment

Name of Kebeles	Kebele 01	Kebele 02	Kebele 03	Kebele 04	Kebele 05	Kebele 06	Kebele 07	Kebele 08
Built-up spaces increment (2005-2018) [Percent (%)]	20	48.73	54.49	75	19.15	36.35	23.19	55.96

For instance, Kebele 01 contains the largest built up spaces in 2005 as the town was initially established in this area shown a 20% built up spaces increment whereas the built up spaces in Kebele 04 that had only about 2% less of the Kebele 01, got a 75% built up spaces increment in 2018 (Table 3) indicates the unsustainable landscape transformation largely related to its close location to the capital. Through time, the process of built up spaces in some other Kebeles overpass the area because of their locational advantages, established different social-physical infrastructures and other drivers mostly detailed in the subsequent chapter of this thesis.

4.2.2. Settlement patterns and Morphology of the town

In detail analysis, the 2005 point-based settlement map of the Sebeta town show that the town had patchy, segregated and spontaneous settlement patterns, and development (Figure 4.18a). This indicates that such types of settlements had emerged before the 2008 first structure plan of the town. Three years later, in 2008, the segregated settlements were intensified and additional patches of settlements were formed (Figure 4.18b). Undoubtedly the 2008 structure plan of the town was prepared in the presence of spontaneously emerged settlements. Moreover, the 2018 land cover shows that the settlement coverage has increased in number and more intensified (Figure 4.18c).



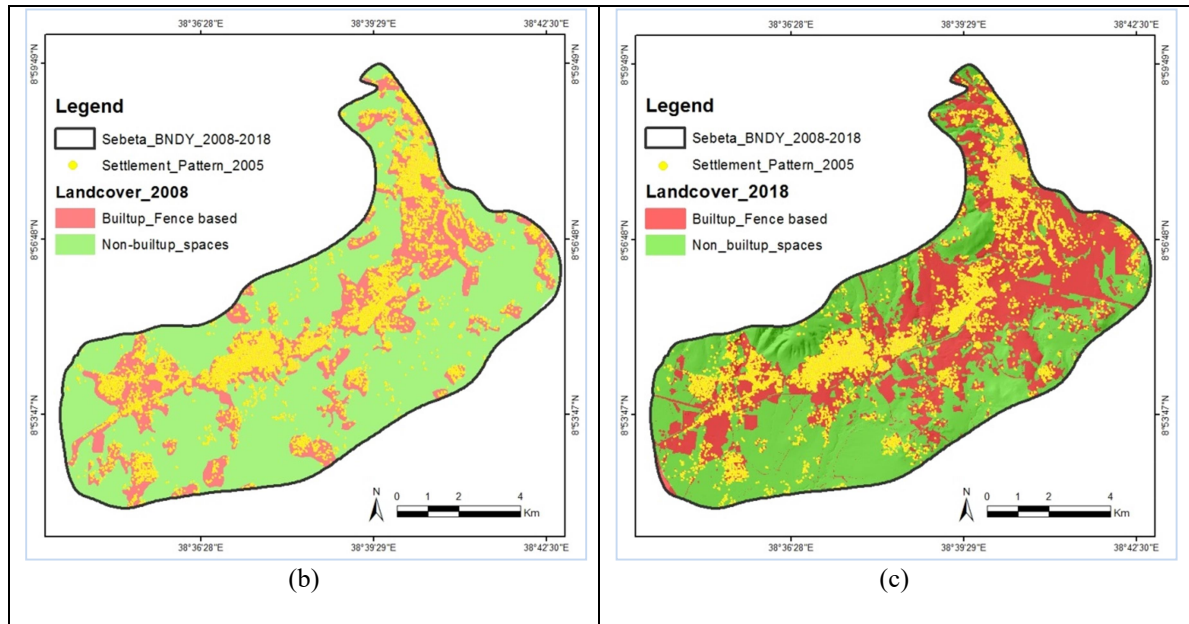


Figure 4.18: Settlement patterns and land cover changes of the Sebeta town in 2005, 2008 and 2018.

In general, the segregated points represent the majority of the pioneer settlements, while the patches represent settlement intensified and later joined communities of different ethnic backgrounds who owned land through various mechanisms of landownership

4.3. The drivers for the built environment development process and associated responsiveness gaps on the natural and working landscapes

This section of the result shows the possible drivers behind the inception and intensification of the built environment development process and how the management gaps of the drivers contributed to unsustainable natural and working landscapes, the findings are detailed and discussed as follows:

4.3.1. Absence of urban plans as the management system

The Sebeta town lacked urban plans until 2008. The town was established in 1944 (Sebetatown.et, 2019) and upgraded from village center to municipality in 1980 although got its first formal structure plan in 2008 (Kitie, 2012; OUPI, 2008). Lack of a structured urban land management system because of the absence of the plans, largely induced spontaneous built environment developments, which was largely responsible for the depletion of natural and working landscape related land-uses, as well as a major factor in the formation of haphazard urban growth in the town that potentially lead to slum developments.

For the absence of urban plans, key experts were asked to point out “the reason for the inability to prepare urban plans of the town as early as possible”. They reason out “*lack of sufficient and appropriately trained manpower in the field of urban planning*” as a main reason.

The settlement patterns, housing structures, and other social and physical infrastructures emerge for about 28 years is very crucial in determining the town’s urbanization process, but the challenge here is that they were neglected or not managed early which finally lead to spontaneous settlement growth.

Some of the precedent of activities are a truck workshop (Figure 4.19b) built in Alemgena (now the 02 *Kebele* of the town) during the Italian occupation (1935-1941) and after 1956, the basis for the Imperial Haile Selassie Road Training Center (ERA, 2001; OUPI, 2008, 2018), where some residential houses were built as well as shops in the area. The Ethiopian Agricultural Research Institute (EARI) also opened a research

station in Sebeta in 1967, which operates as the national center for research into improving fishing yields (Figure 4.19c) and contributes to the town's emergence (EARI, 2009).

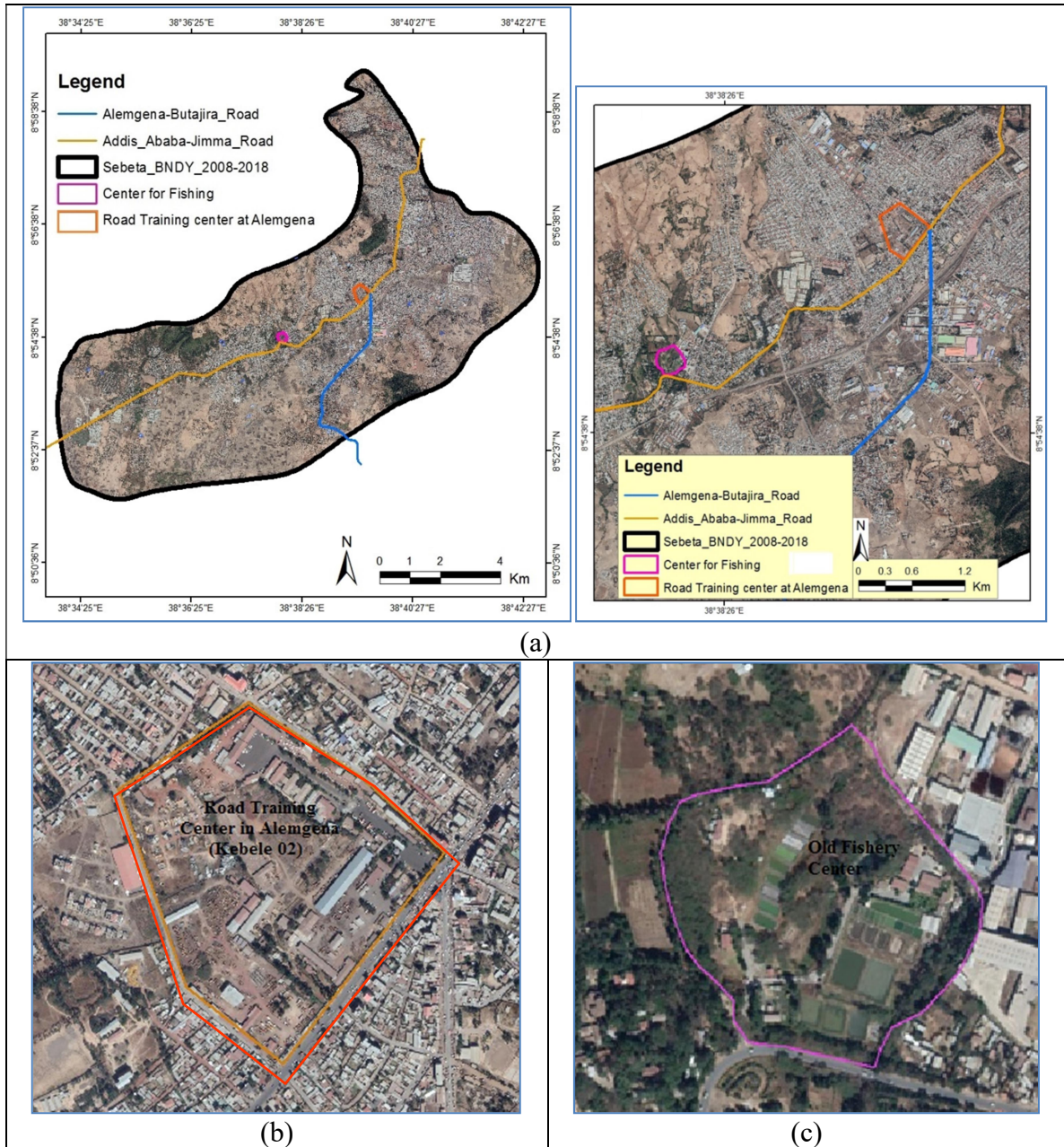


Figure 4.19: Location of Road training and Old Fishery centers enhanced the establishment of settlements around their vicinity

4.3.1.1. Major spatial drivers of spontaneous urbanization

A previous study by Badmos et al. (2019) indicated as the factors for slum development are nearest distance to markets, water bodies, local government administrative areas, and the price of land. This research argues with these findings, but the identified factors are not the root causes for the initiation of slum development rather they are the facilitators for the expansion of the slums. Therefore, the major root causes identified by this research are elaborated in the following sections.

4.3.1.1.1. Limited attention given to segregated pioneer settlements

According to the interviewed elders and some urban historians, the traditional and consuetudinary rules in emergence of spontaneous development, and the process of settlement intensification operates as follows: the pioneer settlers, who mostly had land tenure rights in rural areas, built their residences on their land usually exist at segregate locations. As their families grew, farmer households tended to subdivide their land, primarily for their sons, who get married and usually lived near their parents' homes. This rural neighborhood from the same family is called '*Qe'ee*'. When different *Qe'ees* get closer to each other, they become a '*Mandara*'. Predictably, a *Mandara* is not uniform, mostly conformed by people of different origins who have bought land around the pioneer settlements and the settlement intensification process continues (Figure 4.20).

Non-availability of information on land ownership and associated resource and lack of available recorded data on the family members of pioneer settlers are the major handicaps for early distinctions of the pioneer settlements from later settlers, which in turn increased

the transfer of land ownership right with false information (*Document review, 2019; KII, 2020*).

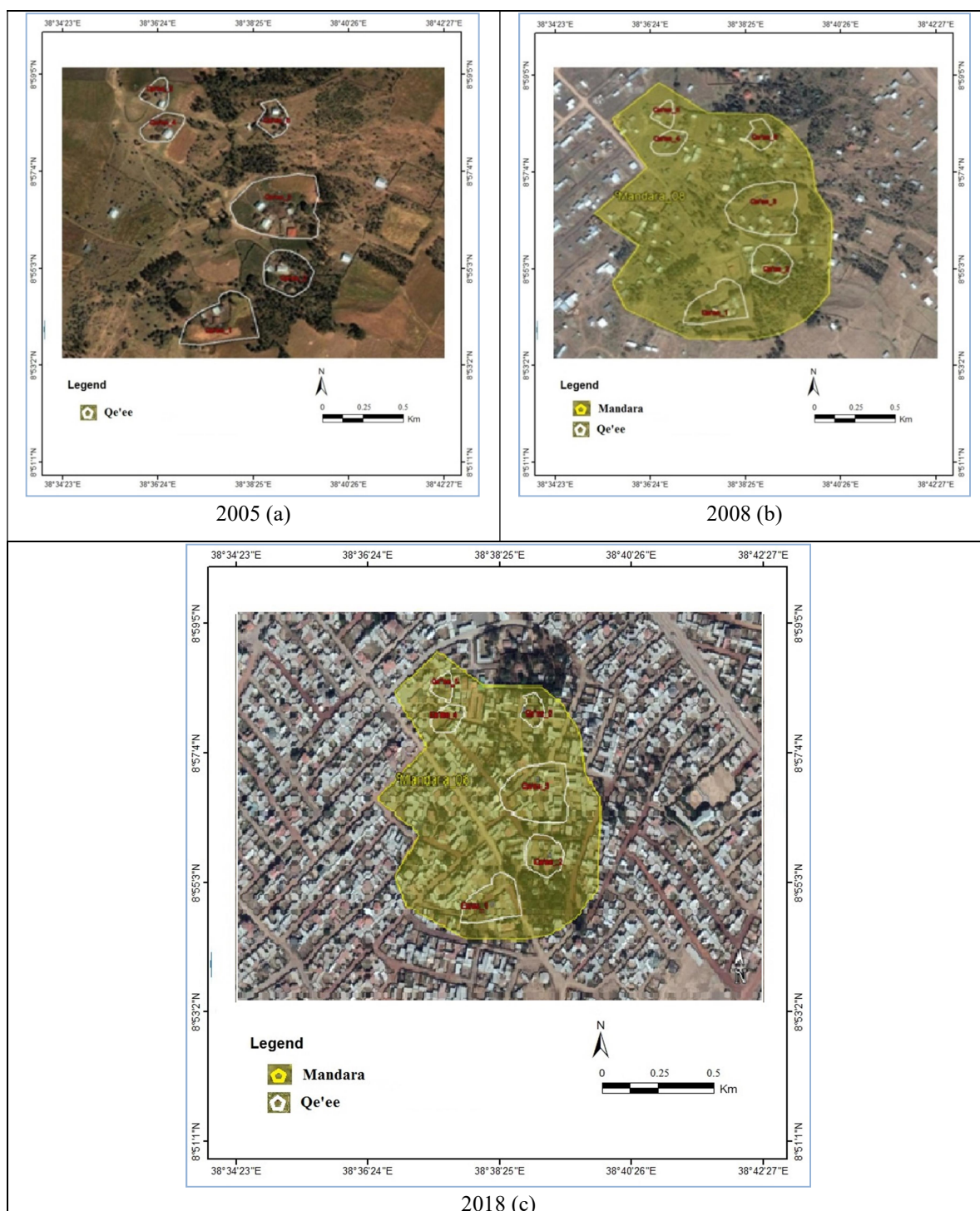


Figure 4.20: A typical Qe'ee (a) and Mandara (b) and spontaneously intensified settlements (c) in Sebeta town

According to Dubbale D. et al., (2010), indiscriminate growth is the main driver of slum development, which affects most of Ethiopia's urban areas. Similarly, Benti et al. (2021) stated spontaneous settlement growth due to limited attention given to pioneer settlements when building their social infrastructures lead to haphazard urban growth in Ethiopia.

The yellow spots in (Figure 4.21) more clarify how urban settlements spontaneously emerged and intensified around the pioneer homesteads in a later phase. Therefore, the segregated pioneer settlements are determinants of urban growth patterns and morphologies and have consequences on planning.

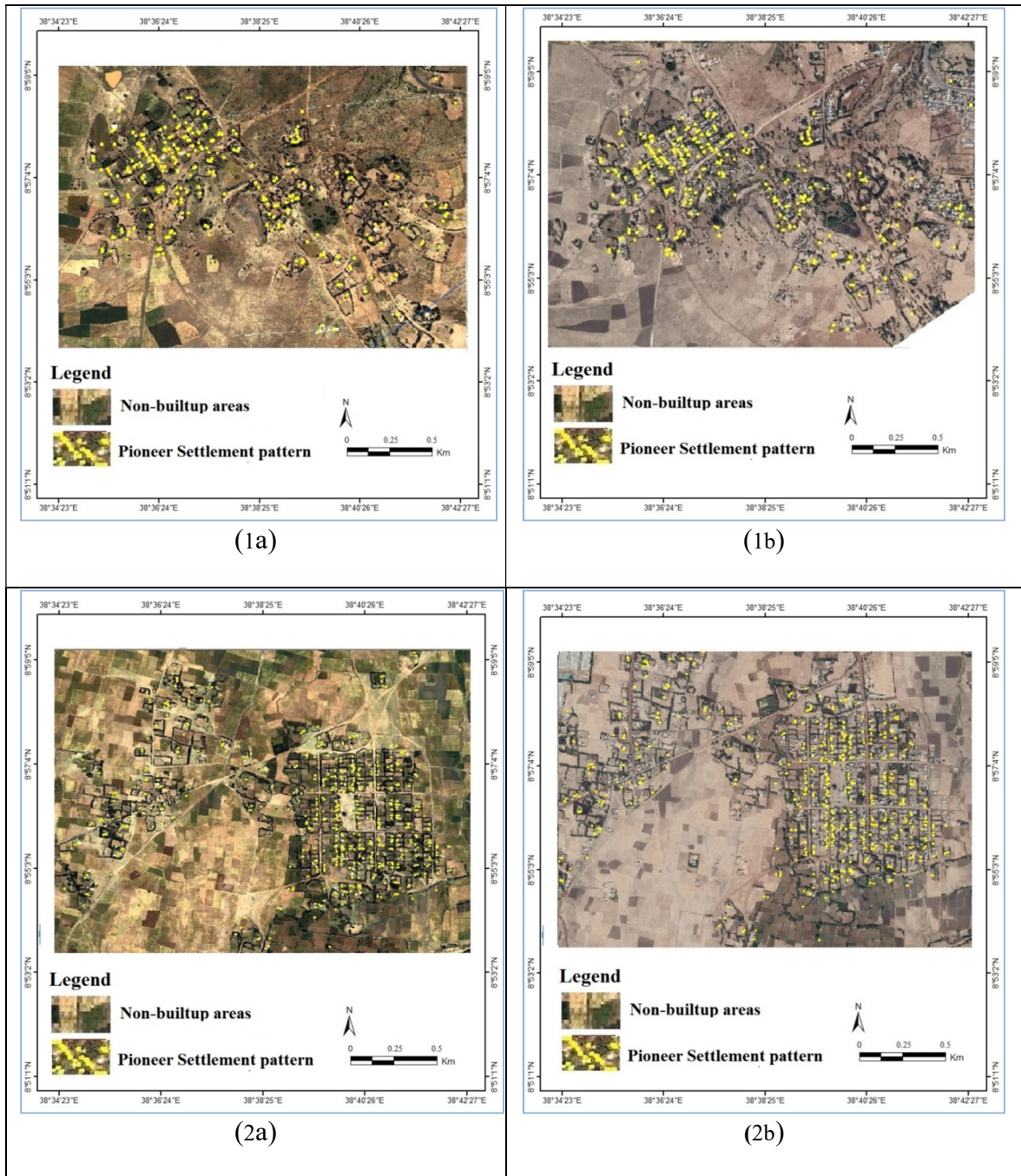


Figure 4.21: Settlements in 2005 (1a, 2a) and relative settlement growth patterns in 2018 (1b, 2b)

As a result, the initial settlements had an effect on the structural layout of the area in terms of defining morphology and infrastructure layout for subsequent settlements.

4.3.1.1.2. Pre-plan availing socio-cultural services and Physical infrastructures

Pre-plan established socio-cultural services such as worshiping places, particularly Orthodox Tewahedo churches, local weekly markets, educational services, and local administrative centers also majorly contributed to the emergence of spontaneous settlements in the Sebeta town, specifically in the areas currently characterized as slums while physical infrastructures such as roads played a significant role in the expansion and intensification of such developments.

The first socio-economic service related drivers for the emergence of spontaneous settlement is the establishment of a traditional weekly market area. The area was followed by settling retailer shops, small bars, and small factories, which led to the town's economic growth (OUPI, 2008). According to the information gathered from the local elders, the first constructions around the market were traditional mud huts, which offered merchants and market visitors homemade drinks such as '*Tella* ' and ' *Katikala* '. These huts were built near the houses of pioneer settlers (*'Abbaa Lafaa'*) and later in neighboring new settlements as land markets and the demand for better facilities increased. This urbanization process was continued around the market area currently known as '*Arat be Arat*' (Figure 4.22).

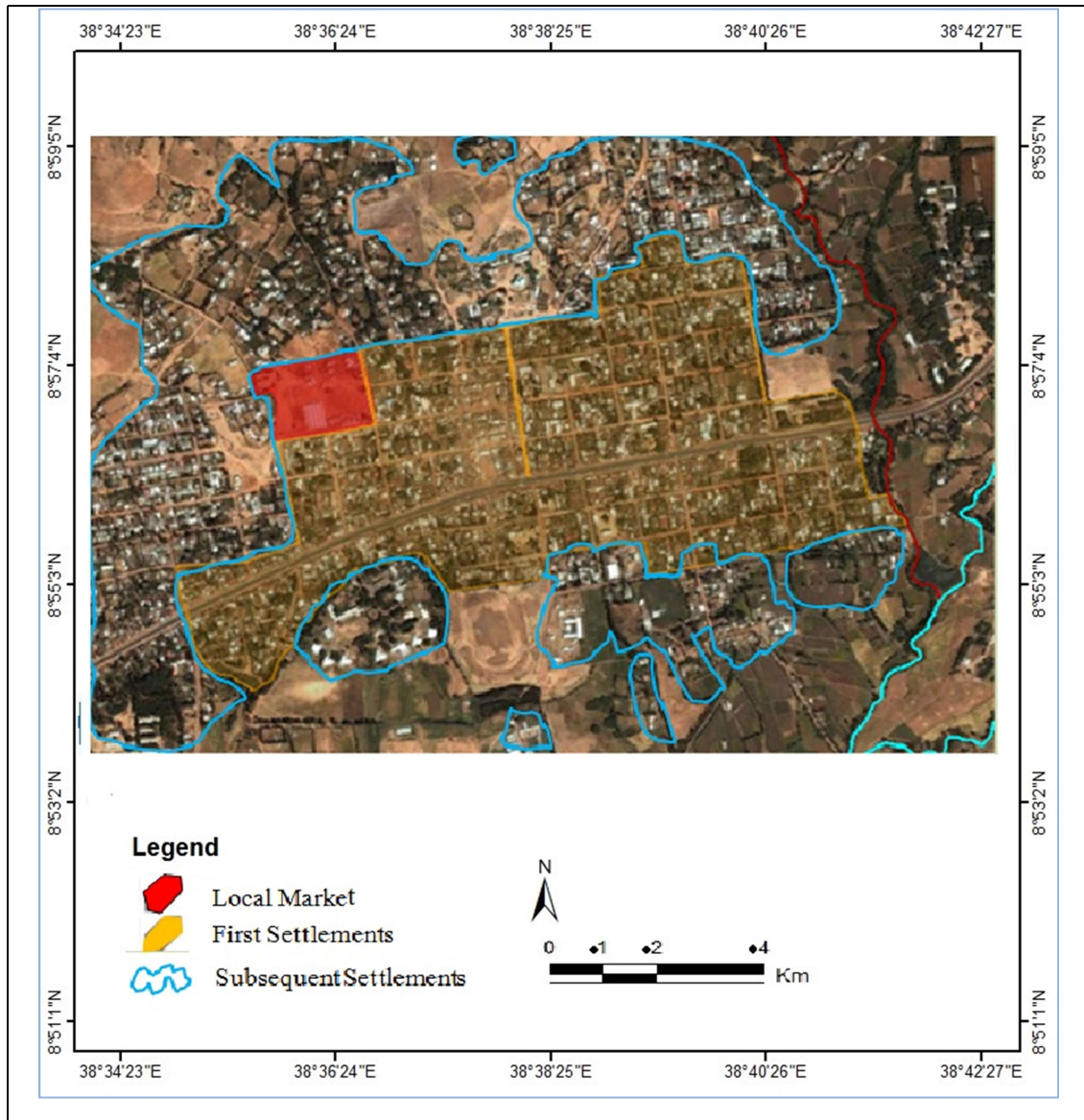


Figure 4.22: The map shows the locations of the local market of Sebeta, the first settlements in the so-called 'Arat be Arat', and the subsequent intensification of the settlements illustrated on the 2005 Satellite image.

The Figure 4.22 illustrates the patterns and intensification of the first and subsequent settlers around the market in 2005 (about 16 years of growth to now). This pattern is confirmed by observing the development of the footpaths, initially driven by rural residents on their way to the market and back to their homes, and then the gradual construction of roads linking the town center with neighboring rural *Kebeles*. Later, as it

intensified along the streets from Addis Ababa to *Jimma* and *Alemgena* to *Butajira*, where settlements mushroomed after land traders offered farmland for housing (Figure 4.23).

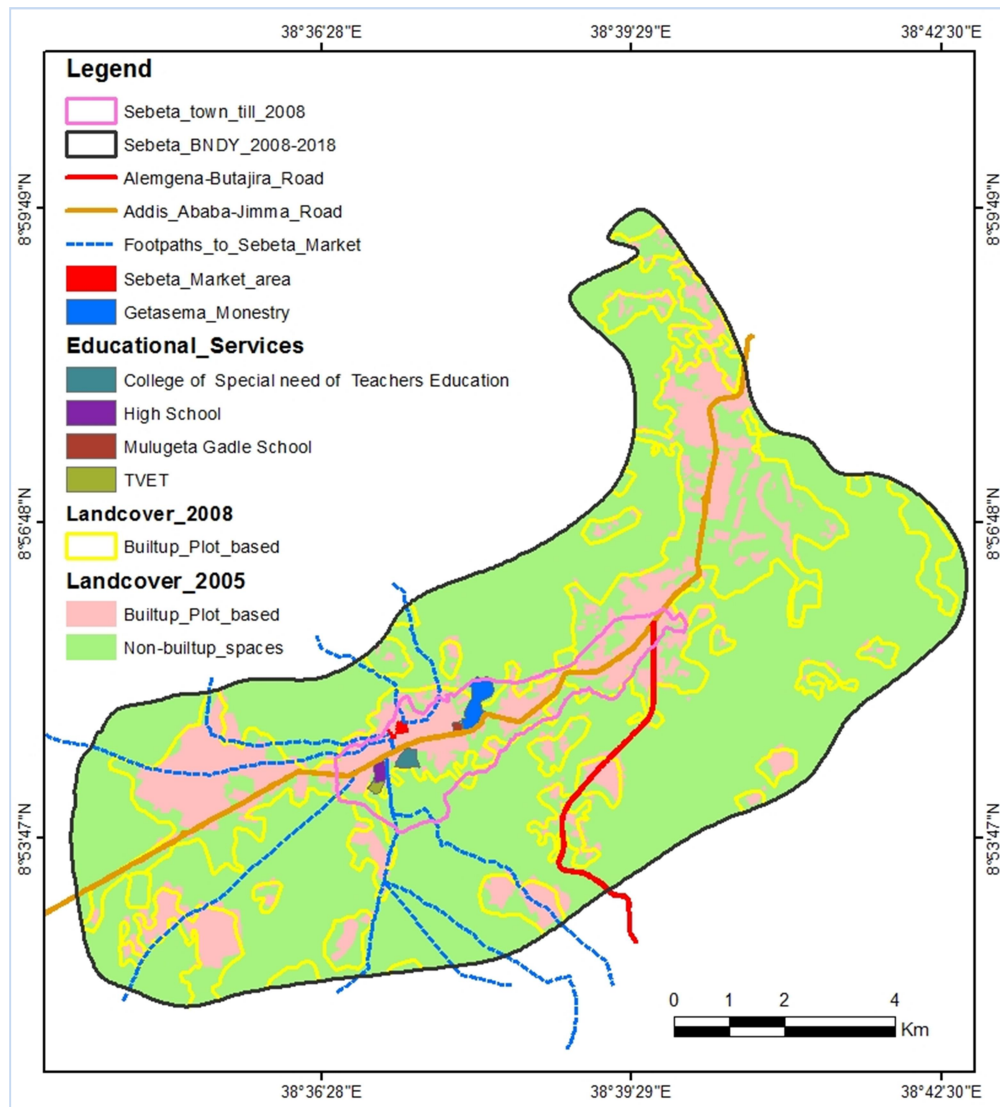


Figure 4.23: Driving factors for the establishment of the Sebeta town and the emergence of spontaneous settlements (Illustrated based on the document review and historian interview, 2020)

The second social services that led to the consolidation of the town of Sebeta (Figure 4.23) were educational facilities, originally built to serve the first settlers in current Sebeta town and surrounding areas. The pioneer schools are the Mulugeta Gadle Primary

school which opened in 1950, the *Sataba Merha Euran* School founded in 1951 and provided boarding schools to blind children from all over the country (OUPI, 2008; Local Elders, 2018; OUPI, 2018; Urban historian, 2018). The Sebeta High School, founded in 1968 (OUPI, 2008). Information compiled from the town elders indicate that due to the scarcity of high school at that time, it also served for students coming from very distant areas. This forced students to rent houses around the school, which greatly encouraged the construction of rental houses in the surrounding area. Such construction contributed significantly to the intensification of spontaneous settlements in the area.

The third pole of attraction for the emergence of settlements to the region was the construction of the Sebeta Palace in 1942 by the emperor Haile Sellassie. In 1960 the emperor handed the palace to his wife Empress Menen Asfaw. She then converted it into a monastery called *Sebata Getsemany Betedenagel Tebabat*. This event attracted several people from different regions of Ethiopia who had settled there (OUPI, 2008). The Palace still serves as the Monastery. Besides, a stream called '*Burqaa Qeerroo*' originates from its compound. It has been used as drinking water for the nearby settlements, and some local elders argue that the presence of this stream also attracted people to settle around.

Although the Monastery area contributes to the town's establishment in attracting people to settle around, people were afraid to build their houses near it and take the site as sacred and a place of the Holy Spirit until the last decade. The limited development around the Monastery can be seen on the satellite image of 2008, when the town's first SP (2008-2018) was prepared (Figure 4.24a). However, following this plan, which assigned all

areas outside the Monastery to residential and other land uses, the built-up areas in the surrounding increased (Figure 4.24b).

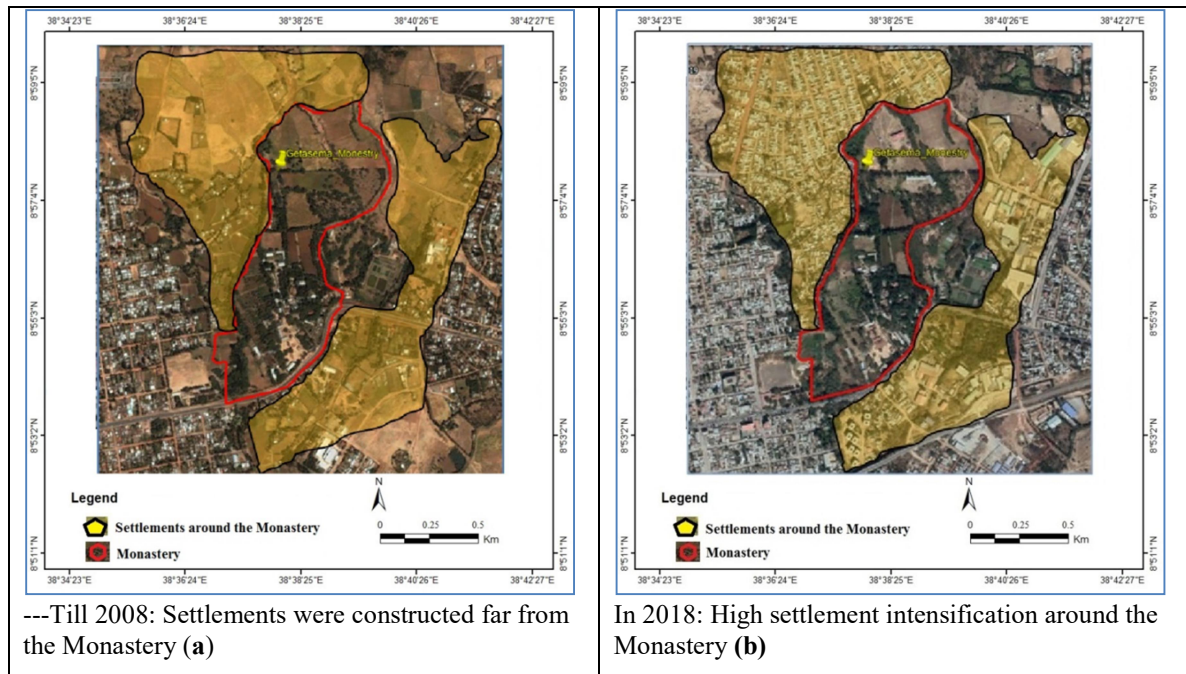
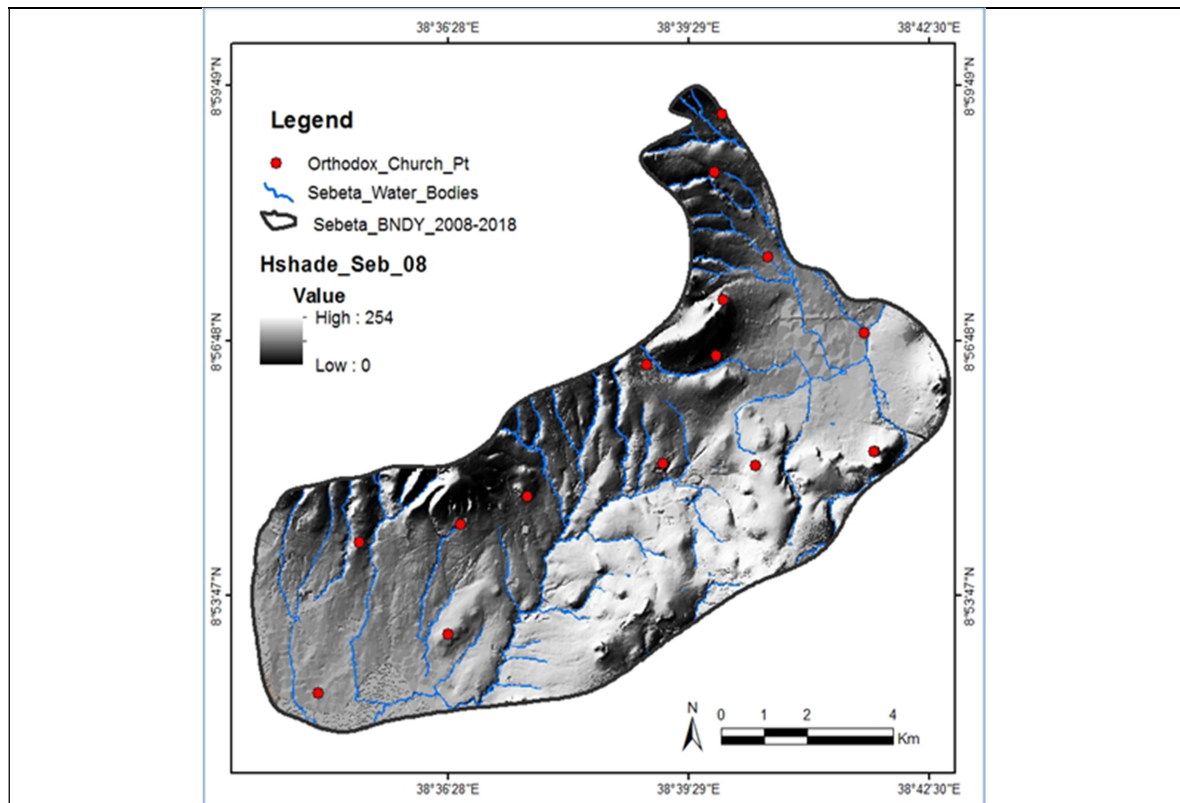


Figure 4.24: Satellite images show settlements intensification layers around the former Palace (now Monastery) of Sebeta

The fourth social service contributed significantly to the development of the spontaneous settlements in the town is Orthodox churches. In most cases, the churches were built on hilltops and near rivers (Figure 4.25a) in the absence of any settlements, but other worshiping places, such as Mosques and Protestant churches were mostly emerge after settlement consolidate and less contributed for the emergence of such settlements.

In terms of land use allocations, the Ethiopia's urban planning does not allow settlements on hilltops and nearby Rivers (MUDCo, 2012). In Addis Ababa for instance, it is mostly the river ecosystems, wetlands and highland areas that has fallen prey to informal activities. Such land parcels are usually associated with pockets of land that is lowly priced (Gondo,

2011). However, according to the church elders, the Orthodox churches usually prefer to establish on hilltops for the following major reasons: to make the church visible from afar and prepare the devotee spiritually while hiking on the hills.



(a): Location of churches

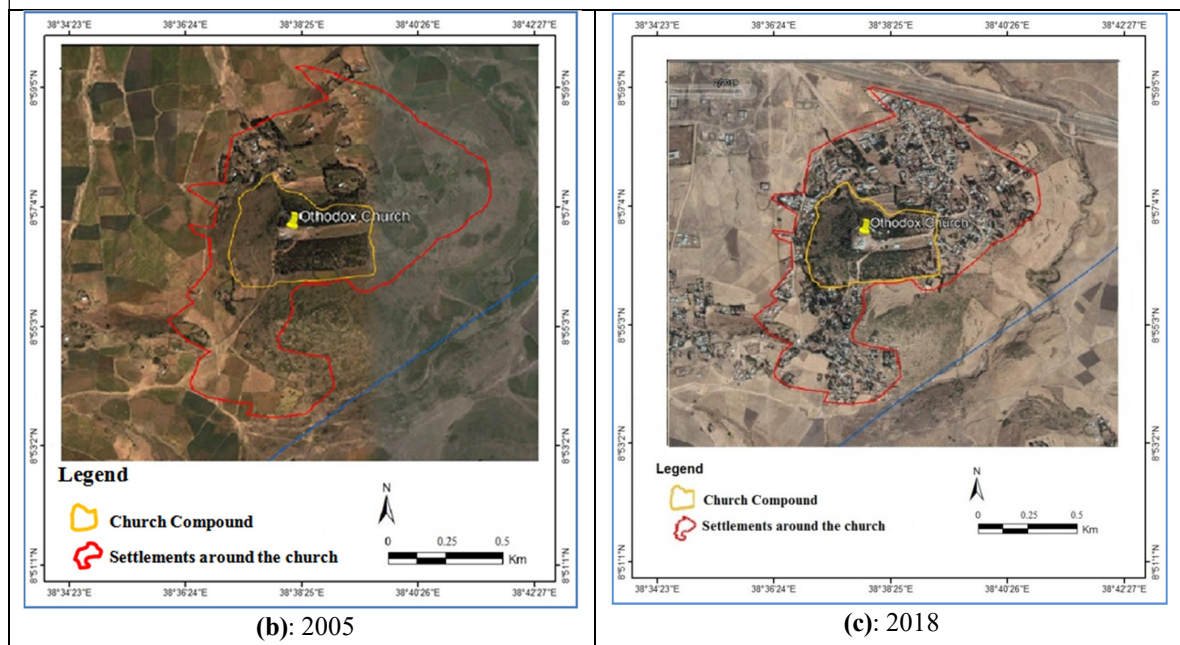


Figure 4.25: Preferred location of Orthodox churches on hills and Rivers banks (a) and illustration showing how an Orthodox church derives and intensified settlements around its compound (b, c) in the Sebeta town

In fact, researches show that the churches have been protecting various vegetation and other natural elements within their compounds (Sahle et al., 2021), but in terms of urbanization, it has attracted informal settlers and caused the depletion of the surrounding vegetation in the Sebeta town (Figure 4.25 b, c)

A similar phenomenon is observed following the churches established on the riverbanks, which are also placed there for searching holy water for spiritual cleansing. In these cases, churches protect rivers from pollution. However, spontaneous and informal settlements tend to follow the establishment of churches and subsequently pollute the rivers with solid and liquid waste. On the contrary, according to a study conducted by Ahmed & Dinye (2012), churches are also among the built-up spaces that prefer to be located along river banks, with their toilet facilities being channeled into rivers. As a result, churches are either directly or indirectly inducing built-up areas that may pollute rivers and their banks.

In addition to the social-cultural services hotspots that derived the inception of settlements in the Sebeta town, physical infrastructures like the Addis Ababa - Jimma main road crossing the Sebeta town, and the main road connecting Alemgena (*Kebele 02 of Sebeta town*) with Butajira (Figure 4.23) largely contributed for the intensification of settlements in the town. This finding complies with a research conducted by Meskerem et al. (2017), which proved that proximity to existing roads and other infrastructures such as water and electricity were the primary driving factors for urban land use change from the early stages of urban development.

4.3.1.2. Consequences on the first structure plan of the Sebeta town

The traditional weekly market area which was served as the center for goods and product exchanges, educational facilities which was largely serving as a center of trained manpower, palace that served as the seat of government and center of command, Orthodox churches which have been serving as areas of worshipping for the large number of Ethiopian population were the main pull hotspots for the emergence of spontaneous settlements in the Sebeta town.

In addition to the above social-cultural services related driving factors for the emergence of spontaneous settlements in the town, the physical infrastructures aggravated the intensification of settlements in the town. Incapable of early management of the driving factors for the genesis of spontaneous settlements contributed largely to the emergence of haphazard settlements. These in turn led to the formation of slums like the settlements around the first local weekly market area of the town (Figure 4.26b).

The areas are characterized with unorganized settlement patterns, unclear morphological aspects, dilapidated houses built with poor materials, and narrowed and bottlenecked access roads. Such slum characterized settlement patterns affected the plan making processes of the town as the areas forced urban planners to keep the irregularities to avoid the economic and social costs of demolishing houses and related infrastructures such as roads, waterlines, and electricity.

areas framed with regularizations (*details are elaborated under the title ‘challenges and implications’ in the following section*).

4.3.1.3. Challenges ahead and implication

Drivers of urban form and character are dynamic; the existing situation shapes current forms and the new urban context of today becomes basis for future development.

In the Sebeta town, the newly emerging spontaneous urban developments as a result of the driving factors may take on the character of the existing slum areas in the town's old and central areas (Figure 4.27). In the long run, the trend has stalled, resulting in the current slums in Ethiopian urban areas ranging from the capital city of Ethiopia to emerging towns like Sebeta.

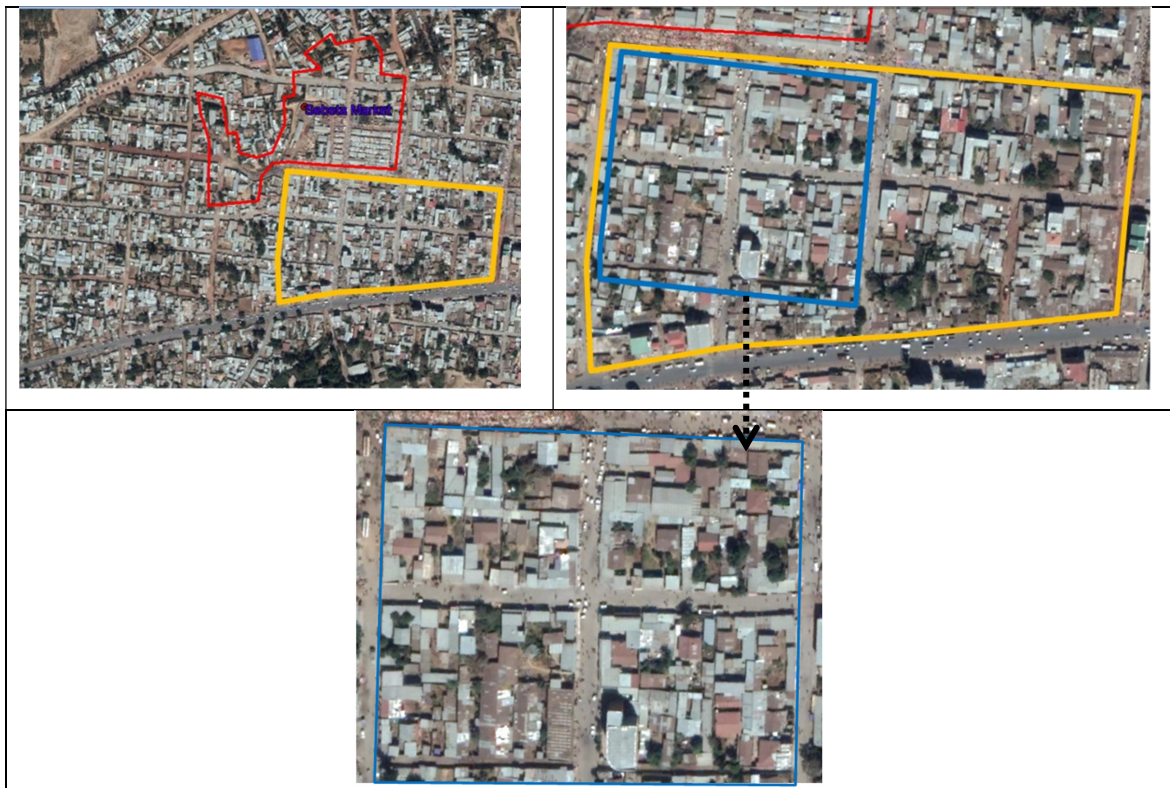


Figure 4.27: A typical slum area around the Sebeta Market in Sebeta 01 Kebele

If appropriate urban management measures are not taken, the consequences of such development will continue. For the effectiveness of the urban management particularly to the Sebeta town, the town elicits the following challenges that planners should proactively consider for the town and other similar cases, mostly for urban areas in the developing countries as they are currently experiencing rapid urbanization trends: **(i).**

Morphological and technical challenges: The formation of slum area is the character of unhealthy urban growth. It prevents proper parcelation of the land and creates difficulties for an adequate layout of physical infrastructure such as roads, water, and sanitary lines. It also increases difficulty in integrating the natural and working landscapes in urban areas. Spontaneously developing settlements and informal land ownership are also the major causes of segregated and chaotic urban development that contribute to the preparation of ineffective plans and inadequate implementation of the plans. **(ii)**

Economical challenges: Unplanned urban growth also increases the costs of subsequent formalization processes. It can lead to an increase in the demolition of informal settlements with higher compensation costs after the destruction. For example, the demolition and rehabilitation of settlements are often noticed during the implementation and construction of basic infrastructures, like widening of roads. All of these activities become an economic burden on society and governments. Most of these financial challenges arose during the implementation of plans like in the case study town, Sebeta.

(iii) Social-ecological challenges: Haphazardly growing settlements tend to deplete natural and working landscapes as they arbitrarily occupy public spaces where they grow unplanned, resulting in unsanitary and overcrowded settlements. For example, the

degradation of hilltop vegetation, the invasion of farmland and the pollution of the riverbanks like in the town of Sebeta.

4.3.2. Gaps in urban plans and implementation

4.3.2.1. Major affected land uses

In the Sebeta town, the land-uses majorly converted to the built-up areas are categorized under Open spaces and Environmental sensitive areas (OES). The inclusion of this land-use category in the structure plan of an urban area in the country is aimed for different out-door recreational activities, necessary for the preservation of natural resources; helpful for the production of resources; encompass open spaces reserved for public safety against risks from environmental elements (MUDCo, 2012; OUPI, 2010).

4.3.2.1.1. Rivers and river banks

The protection of river and river banks usually starts from the river buffer (MUDHo & GIZ, 2015; MUDHo, 2016), as it provides various benefits for the society and nature which includes: increasing water quantity and improve its quality, screening of human disturbance/ changes in land-uses, serve as hazard mitigation zone, core habitat protection and other environment values.

The Structure Plan guideline of Ethiopia (2002) proposed three minimum river buffer options to address that: the first is a variable-width buffer of a 30 m base width, the second is a variable-width buffer with a 15 m width, and the third is a fixed width buffer of 30m. The first option is considered ‘conservative’ as meets most scientific recommendations, while the second and third are seen as ‘riskier’, because could be

overwhelmed during heavy rain, floods, or poor management (MUDHo & GIZ, 2015). Additionally, the revised Structure Plan guideline of Ethiopia (2012), and the Ethiopian National Urban Green Infrastructure Standard, NUGIS, (2015) further detailed the minimum riparian buffer width in terms of stream stabilization (15m), Water quality protection (30m), Riparian/ wildlife habitat protection (100m), Water fisheries protection (45m), Flood attenuation -100 year flood plain plus 8m.

Furthermore, the NUGIS also specify the land uses which can potentially pollute water bodies and the distances it should be set back from any water bodies. For instance, Storage of hazardous substances (50 m); Above or below ground petroleum storage facilities (50 m); Drain fields from on-site sewage disposal and treatment system (30 m); Raised septic systems (80 m); Solid waste landfills or junkyards (100 m); Confined animal feedlot operations (80 m); Subsurface discharges from a wastewater treatment plant (30 m).

There are many rivers and streams run in the Sebeta town (Figure 4.28b). The town's residents and its nearby rural areas have been using these water bodies mainly for domestic utilizations (Figure 4.28a), farm irrigation and drinking water for livestock (OUPi, 2008), but these rivers and its banks are the neglected natural landscape.

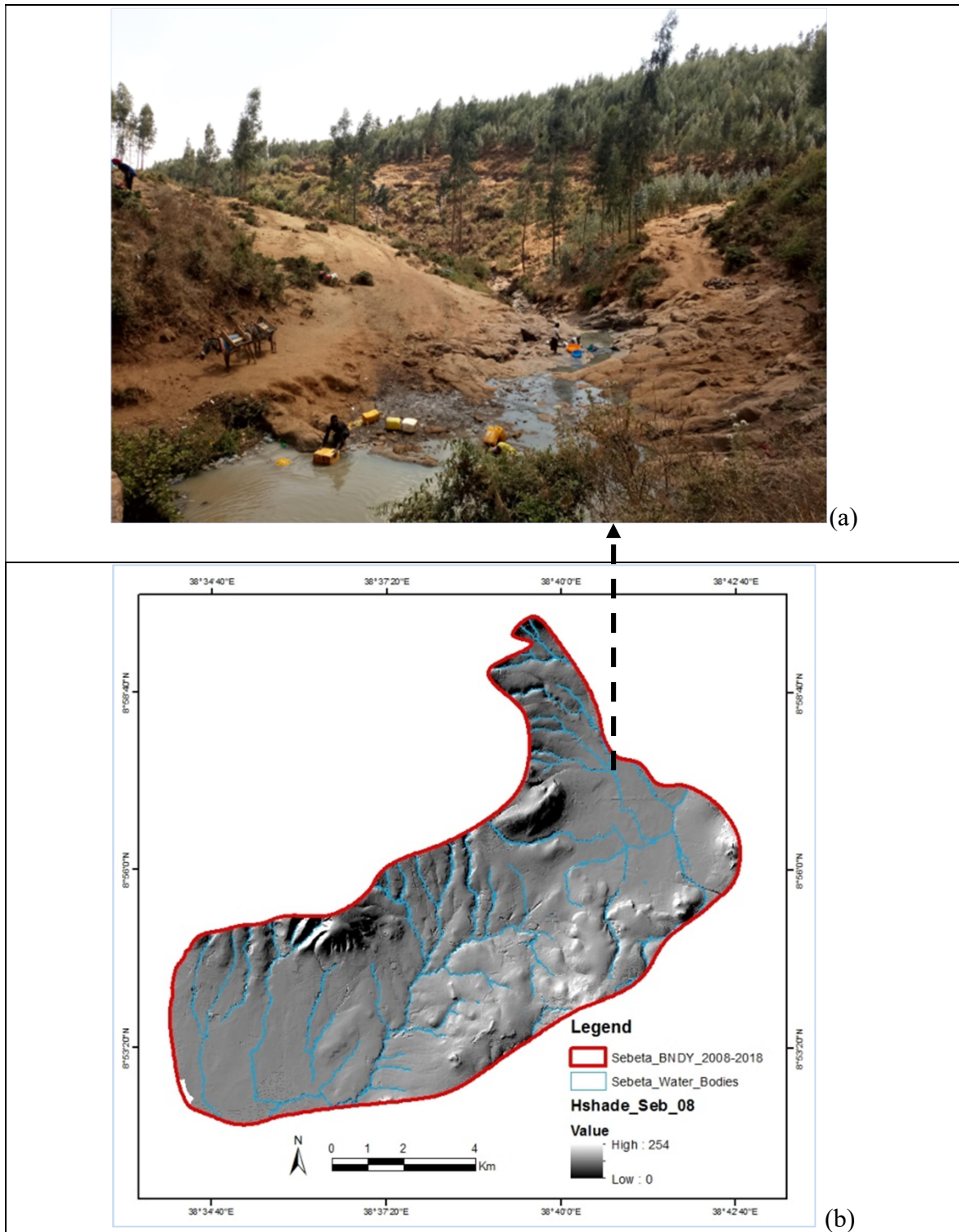


Figure 4.28: Rivers draining through Sebeta town (a) and some of their uses at upper catchments (b)

According to the 2012 Ethiopian SP guideline, the 15-30 m buffer delineations should be set along river banks. A river buffer of 15m was uniformly set in the 2008 structure plan of the Sebeta town and some rivers/streams were not indexed in the preparatory phase (Figure 4.29). In addition, it has been constantly applied in the same fashion to floodplain areas and even on areas that do not need buffering.

The management failure are standards set in the delineation of rivers buffer and their banks; plan evaluation and monitoring the implementation in the SP. Although the buffer zones were incorporated into the plans with this limitation, it was even poorly implemented, which in turn attract informal settlements on the sides of rivers.

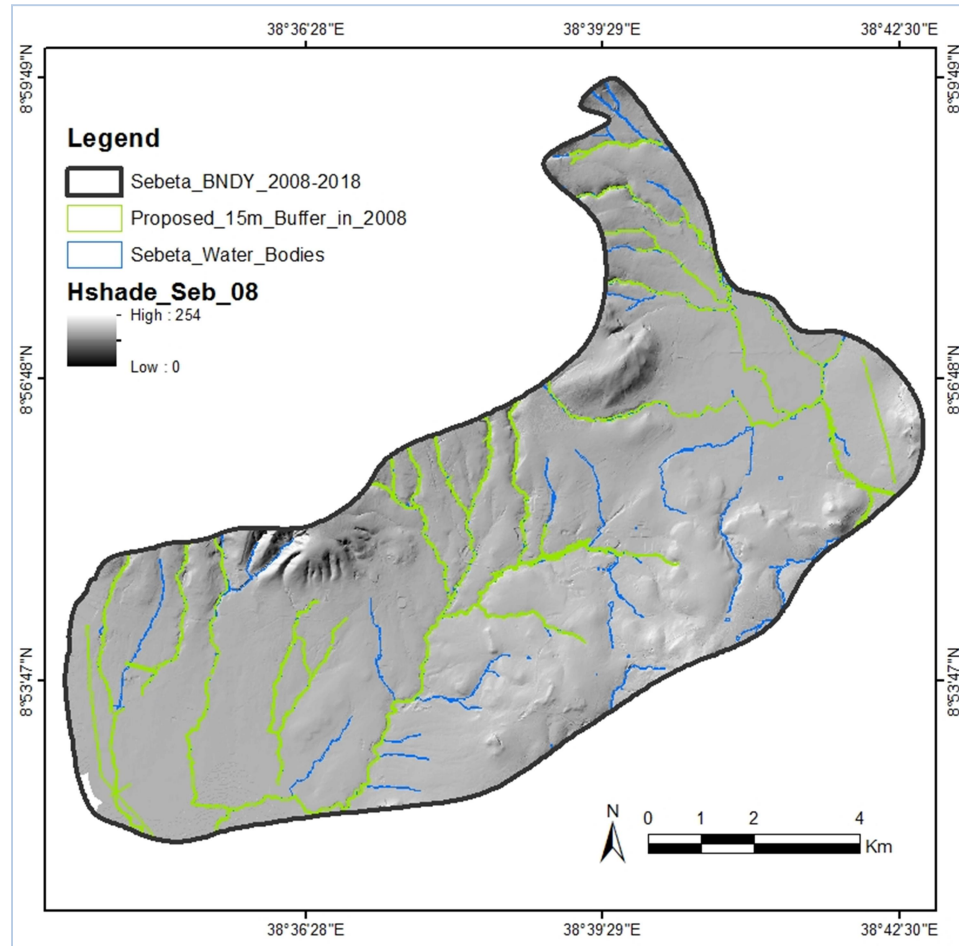


Figure 4.29: The 15m Rivers buffer proposed in the 2008 structure plan of the Sebeta town, and some non-buffered rivers/streams/

The standards set were also intended to prevent water pollution by prohibiting incompatible land uses off the rivers and their banks, but the buffers proposed in the 2008-2018 structure plan of the Sebeta town were practically not implemented due to the negligence given to those areas, the decision making gaps and financial constrains to implement the buffer zone. The 2018 land-use/cover within the minimum (15m) and maximum (100m) rivers buffer contain: settlements covering (164.42 ha; 1,232 ha), Agriculture (165.62 ha; 972 ha), Vegetation (54.47 ha; 204 ha) and Quarry sites (4.26 ha; 22 ha) respectively (Figure 4.30a, b). This shows that large areas within the buffer covered with settlements.

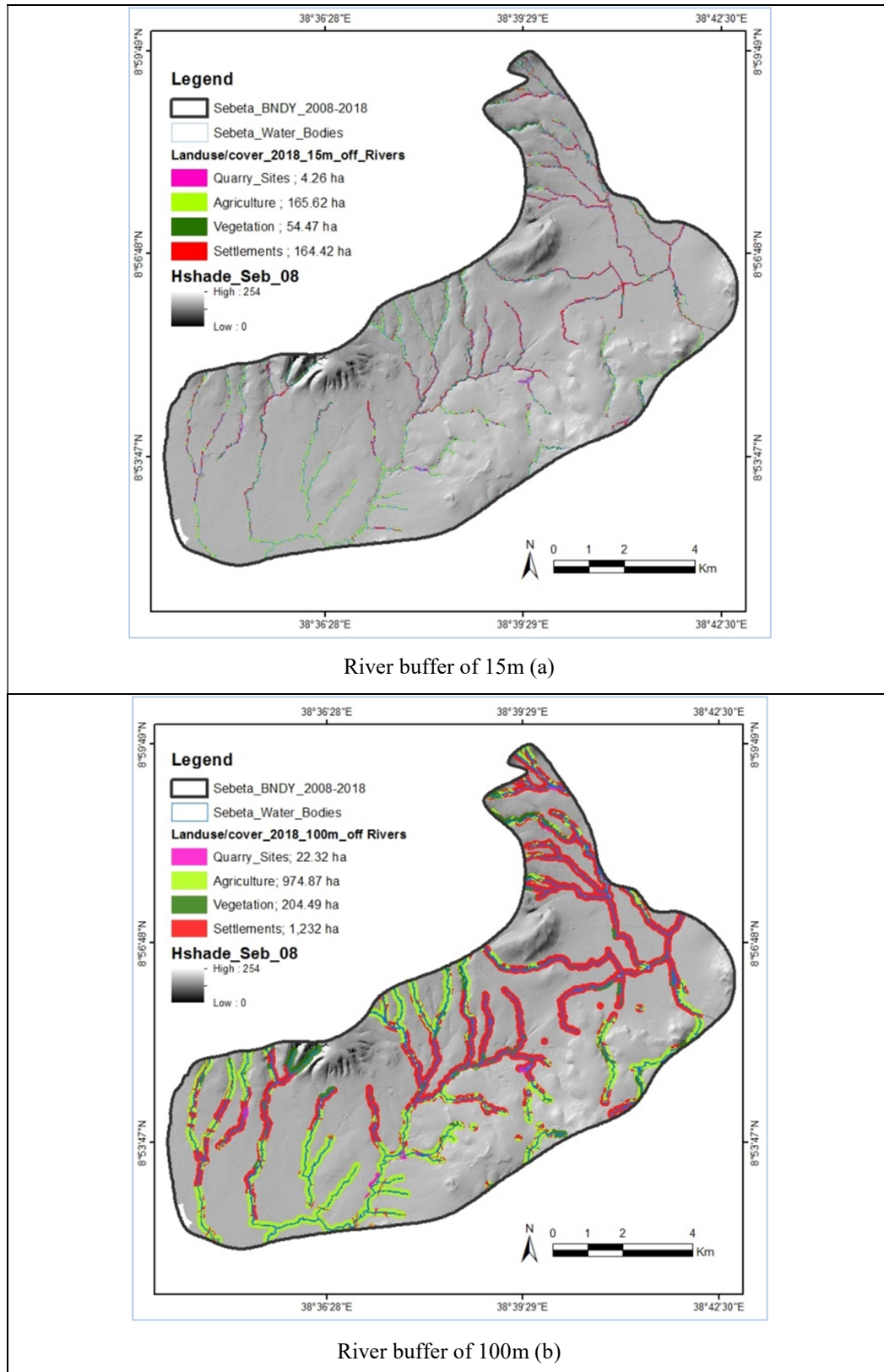


Figure 4.30: The 2018 Landuse/cover of the Sebeta town in a distance of 15m (a) and 100m (b) off the Rivers

As a result, both point and non-point source liquid and solid pollutants are discharged to the rivers from houses, industries and farm lands located within and nearby the buffer zone, and/or connected to sewer and other waste disposal lines. For instance, out of 155 manufacturing industries, covering 1401.53 ha or 14.3 % of the total area of the town, 40 are located on the edges of the Sebeta Rivers (Figure 4.31). Moreover, the OUPI (2008) stated that most tanning, alcohol, soap and plastic-related factories have been discharging their wastes to the rivers without any treatment, which has been confirmed *in situ* (Figure 4.32).

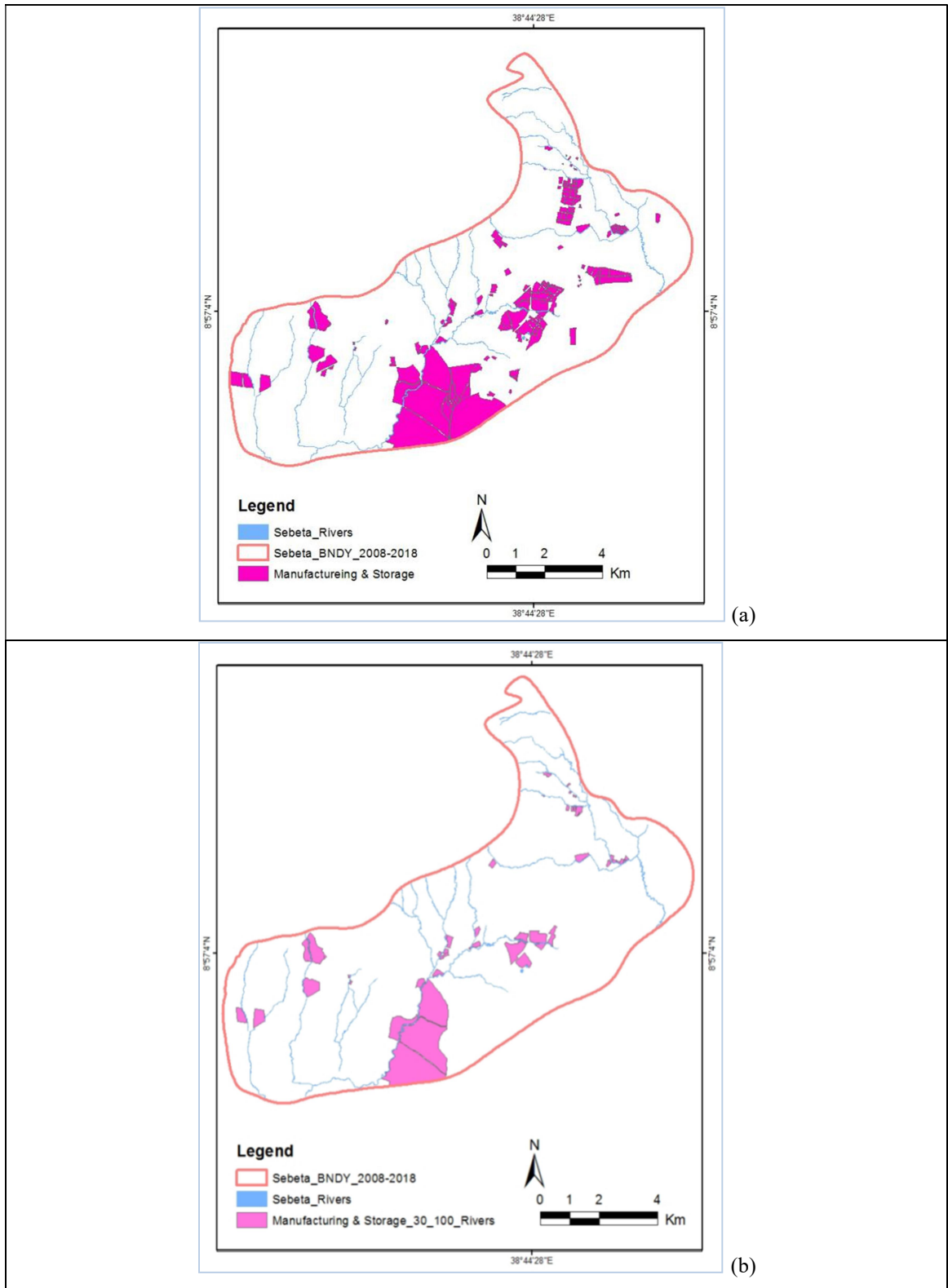


Figure 4.31: The existing Manufacturing and Storage in the Sebeta town (a) and those located within (30-100m) off the rivers (b).

The town driven polluted rivers are draining to some rural *Kebeles* living on the lower catchment of the rivers. They have been used for agricultural activities, for domestic water usage, and also as drinking water for animals (Figure 4.32).

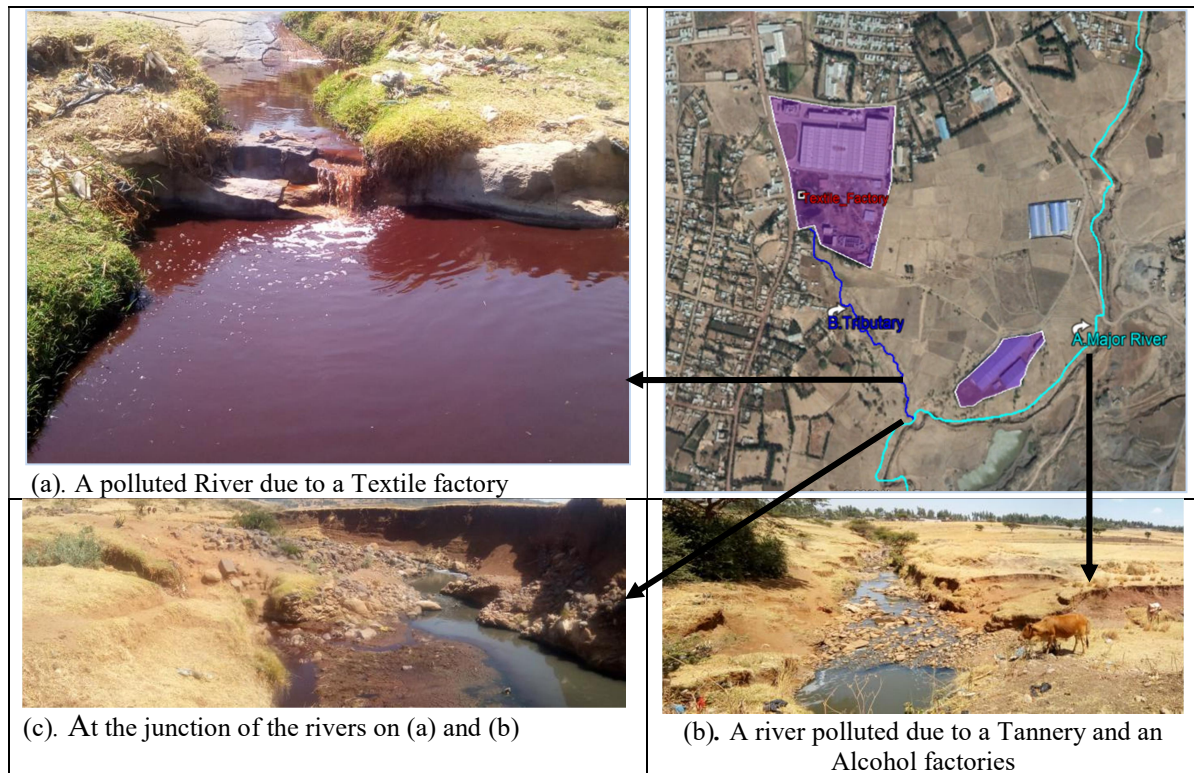


Figure 4.32: Photographs showing the common river pollution (a-c) in the Sebeta town (Researchers, 2020)

In conclusion, the location and compatibility of land use related to river bodies are well defined in the structure plan manuals of the Ministry of Urban Development and Construction and the Oromia Urban Planning Institute; the problem has majorly resulted from the poor implementation of the criteria which is mostly raised from the incapability of experts to consider it, the involvement of the non-experts and equally negligence on those issues, zoning and land use change by political decisions, not enforcing the implementation of environmental impact assessment and absence of environmental auditing.

4.3.2.1.2. Spiritual and cultural sites

Some bare lands to the eyes of non-natives have cultural and historical values for indigenous communities. *Melka Sebeta Irecha*² site is the most prominent (Figure 4.33). The area previously covered with forests and pastures and used by the Oromo people for their *Irecha* ceremonies was progressively deforested and converted into a horticultural greenhouse operation (Figure 4.34).



Figure 4.33: Photographs showing the existing and partially reclaimed Irecha sites with respect to the existing horticulture

The 2004 satellite image (Figure 4.34a) shows the site was majorly covered with dense shrub lands, riparian vegetation, pastures, agricultural lands and few constructions for horticulture farm was started in the area. Between 2005-2010 the farms had been intensified and were partly finished (Figure 4.34b) although there were some parts of the shrub, pasture and agricultural lands.

² *Irecha* is the Oromos' thanks giving ritual for *Waaqaa* (God). Irecha is part of the 'Gada system' an indigenous democratic, cultural and socio-political system of the Oromo people (UNESCO, 2016a). These ceremonial sites exist on the natural landscapes with peculiar elements, such water bodies or hilly areas; which besides provide other societal benefits

From 2011-2017 further expansions were made and almost all the site was converted to horticulture farms (Figure 4.34c) and fully converted until reaching a total area of 19.75ha in 2018 (Figure 4.34d).

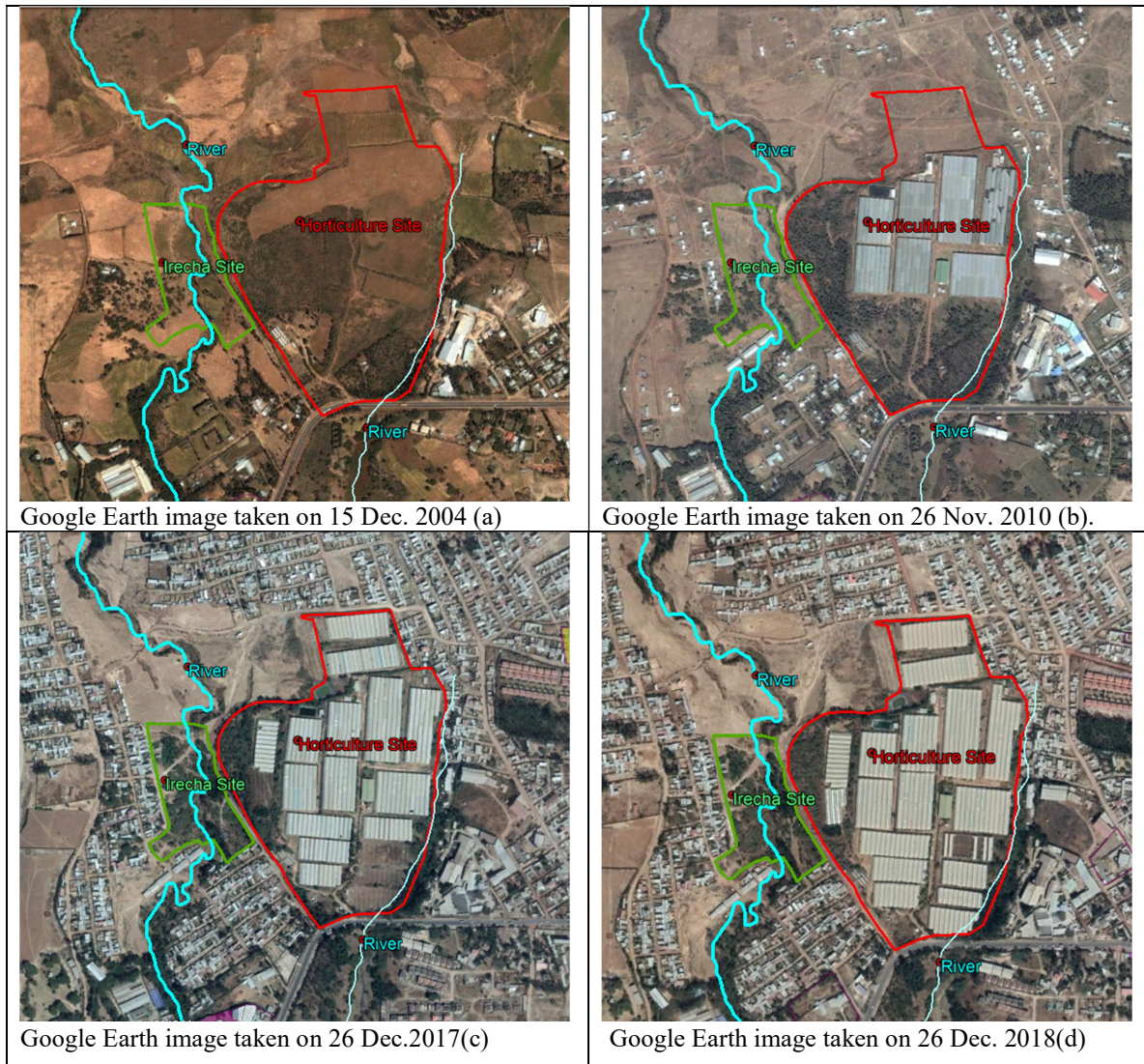


Figure 4.34: Land-cover conversion around the 'Melka Sebeta Irrecha' site from 2004-2018

Currently the *Irrecha* site is limited to a restricted zone of about 7,410 m² in 2018 and proposed to scale-up to the area of about 44,025 m² for 2018-2028 planning years (Figure 4.35).

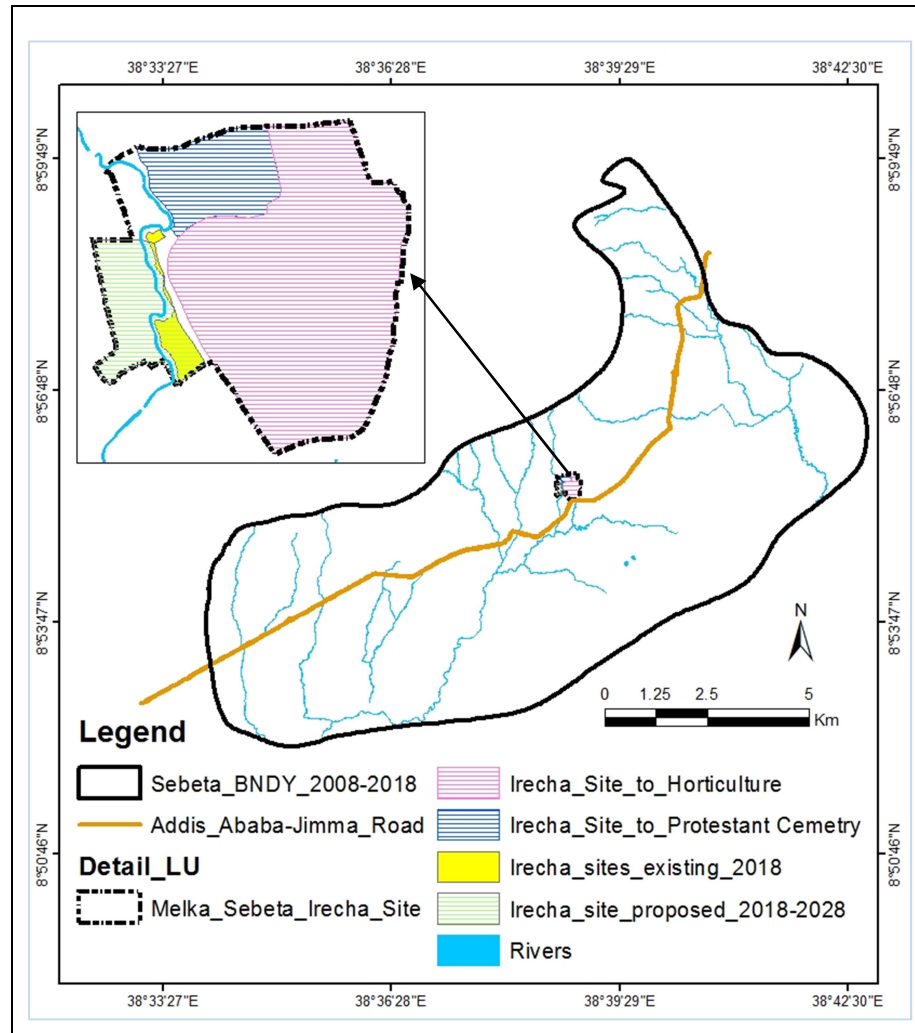


Figure 4.35: Previous, existing and proposed Irecha site and converted areas

Despite the fact that detailed socioeconomic data should be thoroughly investigated based on the existing Ethnic groups around the 'Sebeta Melka Irecha,' some interviewed locals argue that”*abuse of the space in polluting the Melka Sebeta river at its upper stream is the result of the substitution of Oromo societies by non-Oromo ones, who neglect or ignore the cultural value of the river*”. Furthermore, the site is not identified as one of the important areas that should be protected in the town's 2008 structure plan, and only a few statements are included in the structural plan reports. Therefore, the town administration

who pose decision for the horticulture and the planners have a lion share in abusing the Irecha site.

4.3.2.1.3. Fertile Agricultural lands

Cities depend on large amounts of food being brought in from outside (Deelstra & Girardet, 1990), and growing food locally is therefore an important survival strategy, as a result cities including the congested ones have started to produce food (Madaleno, 2000).

Historically urban agriculture has been an important element of cities in many developing countries; recent concerns about economic and food security have resulted in a growing movement to produce food in cities (Lovell, 2010). In the regions of US, urban agriculture offers a new frontier for land use planners and landscape designers to become involved in the development and transformation of cities to support community farms, allotment gardens, rooftop gardening, edible landscaping, urban forests, and other productive features of the urban environment (Lovell, 2010). Agriculture has grown in absolute terms and has played an important part in Israel's economy for over five decades (Fedler, 2020). In Germany, agriculture and forestry are not only a part of the economy, they are also a part of their society, culture, and environment, and agriculture and forestry take up 17 and 11 million hectares, respectively, which is more than half of the area of the country (BMELV, 2010) .

The experiences of the developed countries show that an urban is naturally not a treat for what people can eat and drink. Additionally, producing environmentally sustainable types of fruits and vegetables add variety to meals and enhances the nutrition of the urban poor (Madaleno, 2000).

According to FAO “Urban and peri-urban agriculture (UPA) is defined as the growing plants and raising animals within and around cities. UPA provides food products from different types of crops (grains, root crops, vegetables, mushrooms, and fruits), animals (poultry, rabbits, goats, sheep, cattle, pigs, fish, etc.), as well as non-food products (e.g. aromatic and medicinal herbs, ornamental plants, tree products). UPA also includes trees for producing fruit and fuel wood, as well as tree systems integrated and managed with crops (agro forestry) and small-scale aquaculture”. Urban agriculture usually aims to complement food supply to cities and to strengthen urban households' food security (Mougeot, 1999)

The Ethiopian structure plan manual (2012) adopted this definition, and included criteria to allocate it in the urban plans: (i) It may take place in locations inside the cities, river banks, allocated zones or peri-urban areas. (ii) It may be carried out on the homestead (*on-plot*) or on away from the residence (*off-plot*); on private lands (owned, leased), on public land (park, conservation areas, along roads, stream, rivers and railways), or semi-public land (school yards, grounds of schools and hospitals). (iii) The areas designated for horticulture, grazing and other farming activities, are usually situated along water streams, swampy and flood-prone areas. (iv) The areas suitable more for agricultural use, should not be used preferably for other urban uses. (v) Animal husbandry should be proposed against the prevailing wind direction of the town. (vi) The slope should be gentle (*vary between 1-10%*).

Therefore, urban agricultural production is becoming not "the antithesis of the city" but rather an integrated urban activity that contribute to the resilience of cities (Barthel &

Isendahl, 2013). Accordingly the Ethiopian government targeted to ensure the food security of the urban society through the implementation of intensive urban agriculture carried out in different green urban areas (MUDHo, 2016a). Such landscape should be integrated into the urban land-use plans, although nowadays is among the mostly neglected land-uses in the urban areas in Ethiopia. (NUGIS, 2015)

In the particular case of Sebeta, the town has experienced high rate conversion of fertile agricultural lands into urban uses. The comparison of land-use/cover of 2008 and 2018 show that the agricultural land covered about 5446 ha (55.42 %) in 2008 was reduced to 3500 ha (35.62%) in 2018 (Figure 4.36a, b).

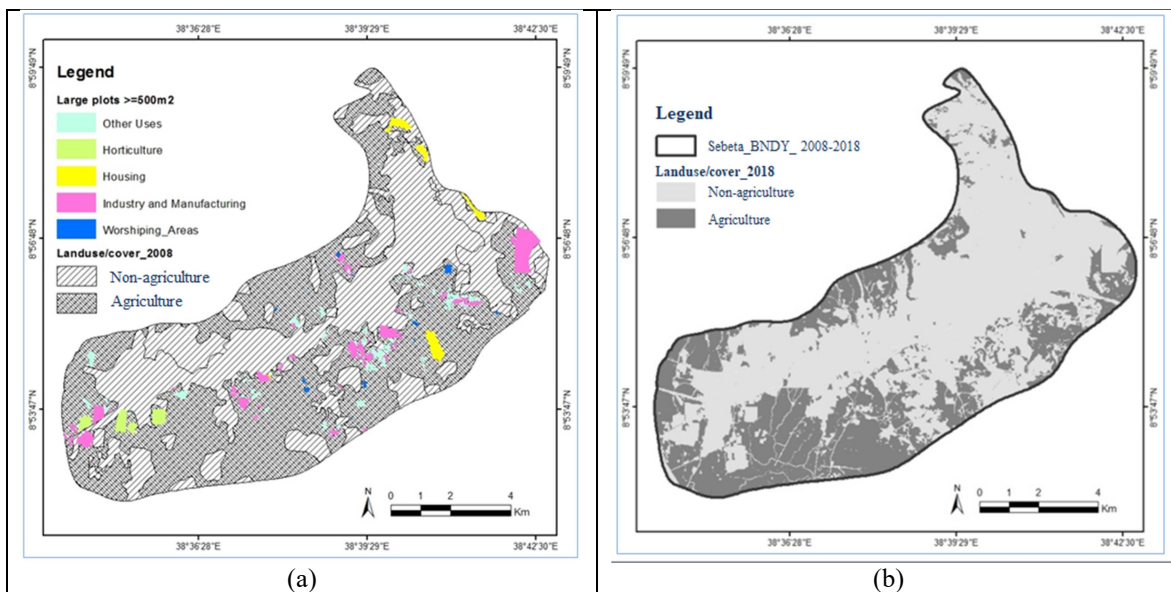


Figure 4.36: The coverage of Agricultural lands in 2008 overlapped with the 2018 large plots of other landuses having areas of $\geq 500m^2$ (a) and Agricultural land with other landuses in 2018(b)

Beside the pressure for housing, the major causes for agricultural land depletion are the built up development that requires large plot area such as floriculture farms, industrial areas (Figure 4.37a). For instance, the floriculture plots shown on Figure 4.37b occupy

about 116.24 ha of Agricultural lands (a), and similarly about 200 ha of agricultural and forest lands in 2005 (c) were converted to formal and informal housing in 2018 (d).

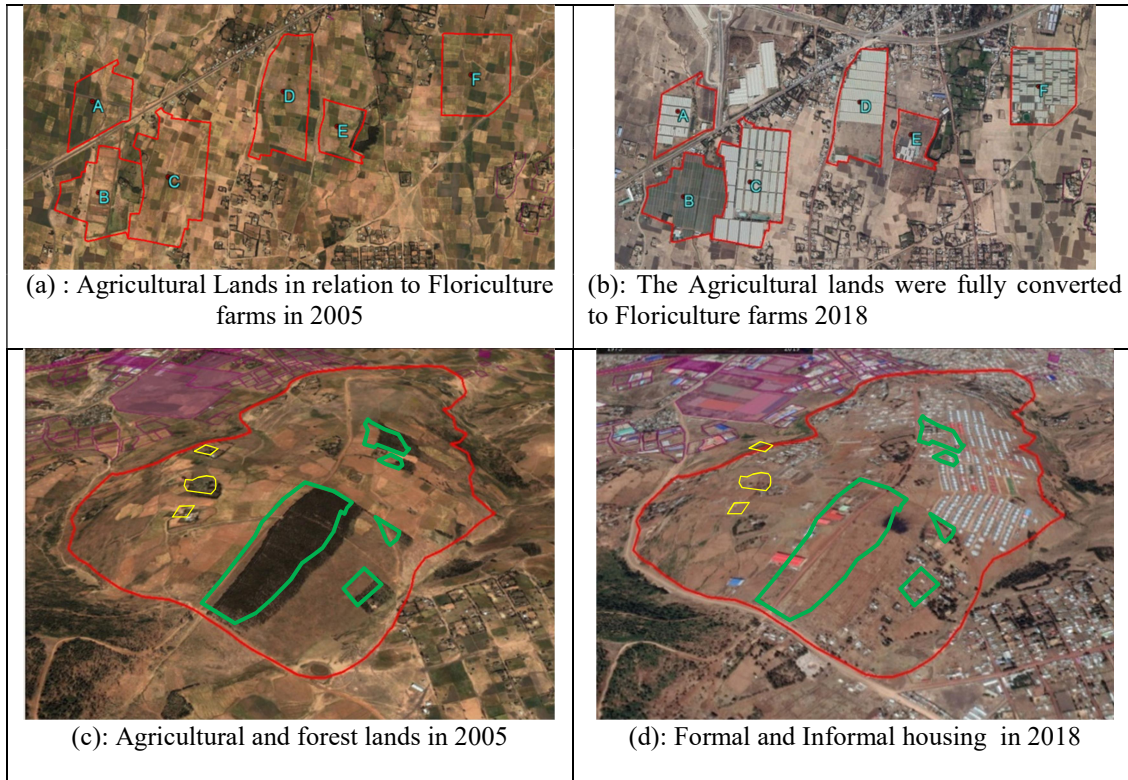


Figure 4.37: The agricultural Lands in 2005 (a &c) were fully converted to floriculture and housing in 2018 (b &d)

4.3.2.1.4. Mountains and forested areas

Mountains such as the ‘*Mogile*’, ‘*Wochecha*’ and *Furi* (Figure 4.38) are the sources of rivers that run in the Sebeta town (OUPI, 2008) and these areas were also covered with vegetations. Vegetated areas in the Sebeta town including the mountainous areas have been degraded. Between 2005 and 2018 about 181.60 ha of forest land were converted to built-up spaces (Figure 4.38b).

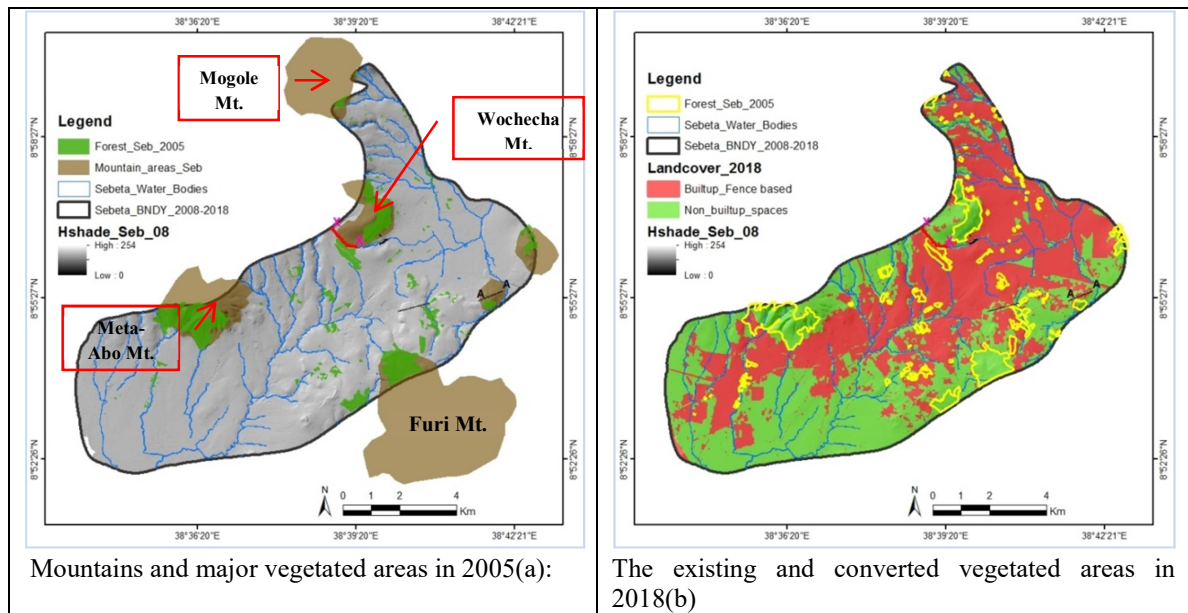


Figure 4.38: Major vegetated areas in the Sebeta town and their extent of conversion between 2005-2018 years

Spaces under the Wochecha Mountain are completely transformed to built-up spaces (Figure 4.40). Some high-rise developers, hotel owners and other investors living there relate their preference to the potential good view of Wochecha Mountain.

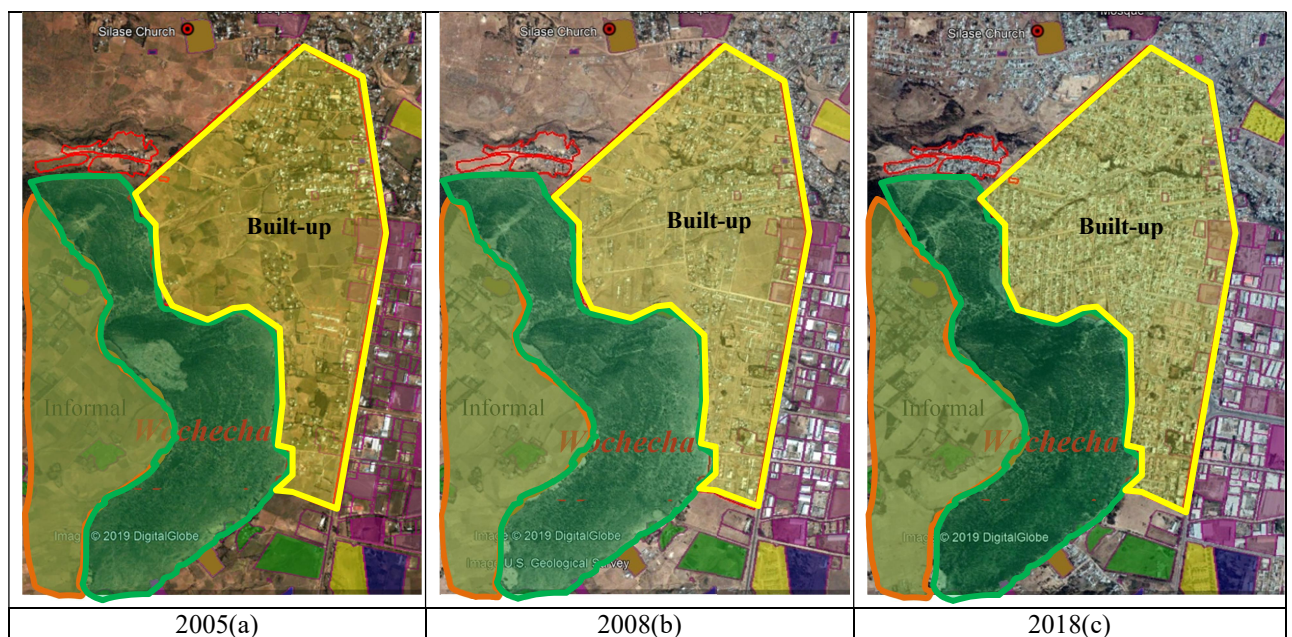


Figure 4.39: High rate of natural landscape conversion around mountainous areas

The good point is that although the agricultural and pasturelands around the mountain have been converted to built-up spaces, the mountain vegetation are still maintained, see the historical images on (Figure 4.40).



Figure 4.40: The 3D Satellite image showing *Wochecha* Mountain and the intensified settlements around the area

Among the industries existing in the nearby of mountain (Figure 4.40), bottled water factories like ‘YES WATER’ were established because of the potential groundwater around there.

Charcoal is one of the main energy sources in the area as well as in the country and its preparation boosted the deforestation of vegetation around the mountain and riverbanks. Most of the vegetation existing around the riverbanks, including high terrain areas, were planted by individuals. These led to high deforestation trends as they usually cut the vegetation at the time they require to do so. The access roads mostly opened by informal settlers living in the nearby the riverbanks also facilitated the degradation of vegetation along riverbanks (Figure 4.41).

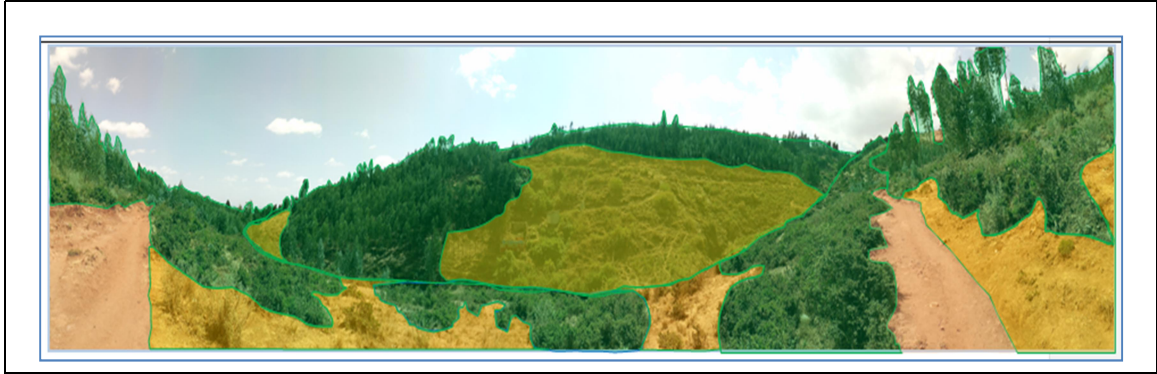


Figure 4.41: Riparian vegetation on an upper catchment of a river

Furi Mountain is other most important mountain for the Oromo societies living in the Sebeta area. It is one of the most sacred areas and serves as an Irecha site practiced on mountains yearly during autumn. There are patches of vegetation around the mountain, but following the emergence of an industry occupies large portions of areas at the bottom of it. The historical images in Figure 4.42(b-c) show settlements intensified as the industry emerges regardless of the high terrain of the mountain.

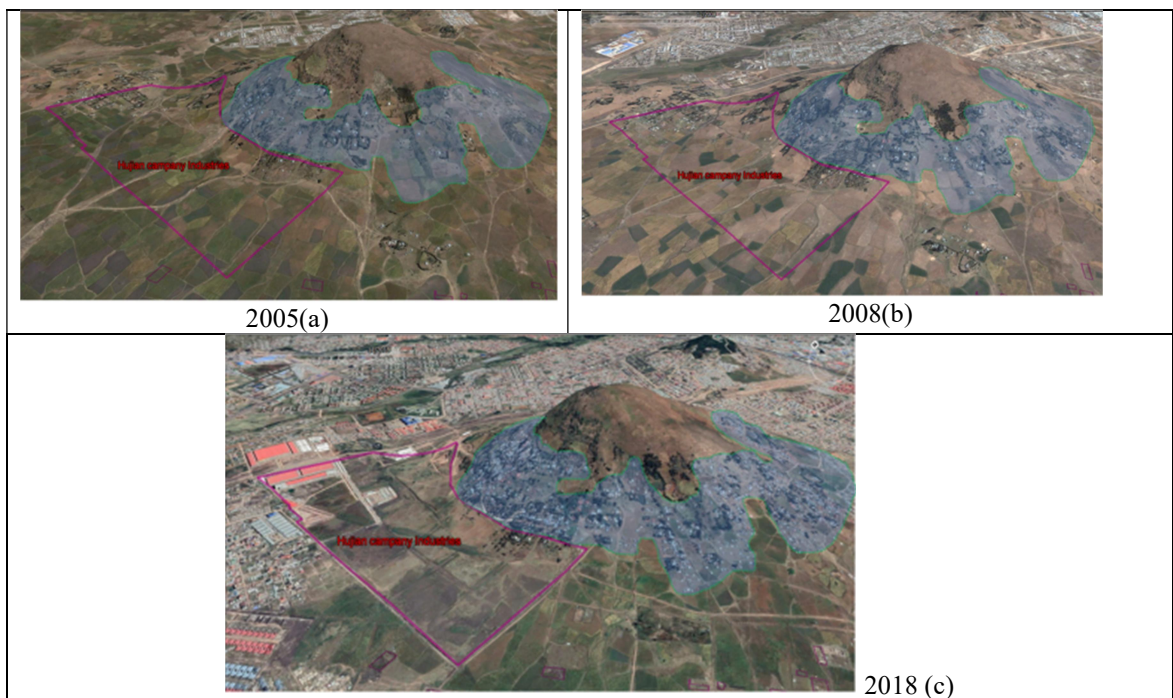


Figure 4.42: Illustration of historical Google Earth images showing settlement intrusion and intensification around the Furi Mountain

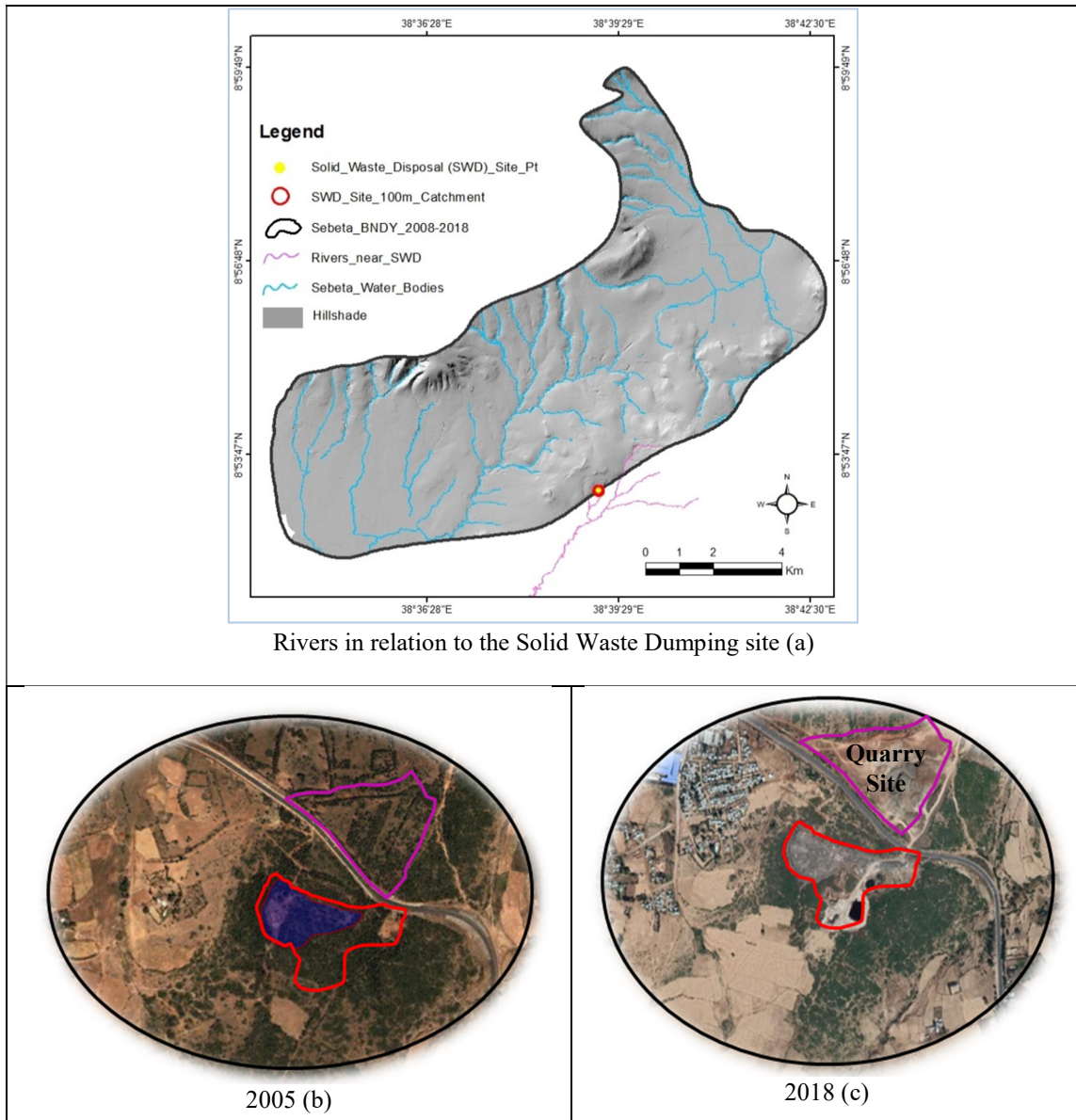


Figure 4.43: Forested land in 2005 year (b) partly converted to Solid Waste dumping site (c)

4.3.2.2. Focus on physical planning and poor implementation of the structure plan

Limited focus given to the Open spaces and Environmental Sensitive (OES) land uses and their poor implementation is the major driving factor for the frequent land use changes and alarmist expansions of settlements in the Sebeta town.

The results gained through focus group discussion and the Sebeta town structure plan analyses indicate that more encouragement on the physical planning limited land suitability and compatibility analysis. As a result, built-up spaces were proposed on unsuitable land and not permitted for constructions, while those suited for them were not, and incompatible land-uses were mixed.

For instance, the slope is one of the determining factors in the land-use allocation in Ethiopia's urban planning, and consequently, slopes with $< 1\%$ and $> 20\%$ are not recommended for settlements because of their water logging potentiality and difficulties of infrastructure layouts, respectively (MUDCo, 2012; OUPI, 2010). Accordingly, the 2008 structure plan of the Sebeta town is evaluated in terms of land-use suitability with the indicated slope categories (Figure 4.44). As a result, about 3,300 ha of land or 33.58 % of the total area of the town were proposed on areas having a slope of < 1 and > 20 , of which housing accounts (1860.26 ha), business and commerce (204.75 ha), Social Services (131.17 ha), Manufacturing and Storage (604.37 ha) and Infrastructure and Transports land-uses accounts about 499 ha.

Therefore, the seek for physical planning in Sebeta town was beyond the areas suitable for the urban developments. As a result, about 3,300 hectares of lands that should have been assigned for the OES land use were allocated for the other land uses. This means about 33% of the land use proposed for 2008-2018 were assigned on areas having the ground water recharging potential and flood plain zones and on steep slope, which are more susceptible to erosion and land sliding.

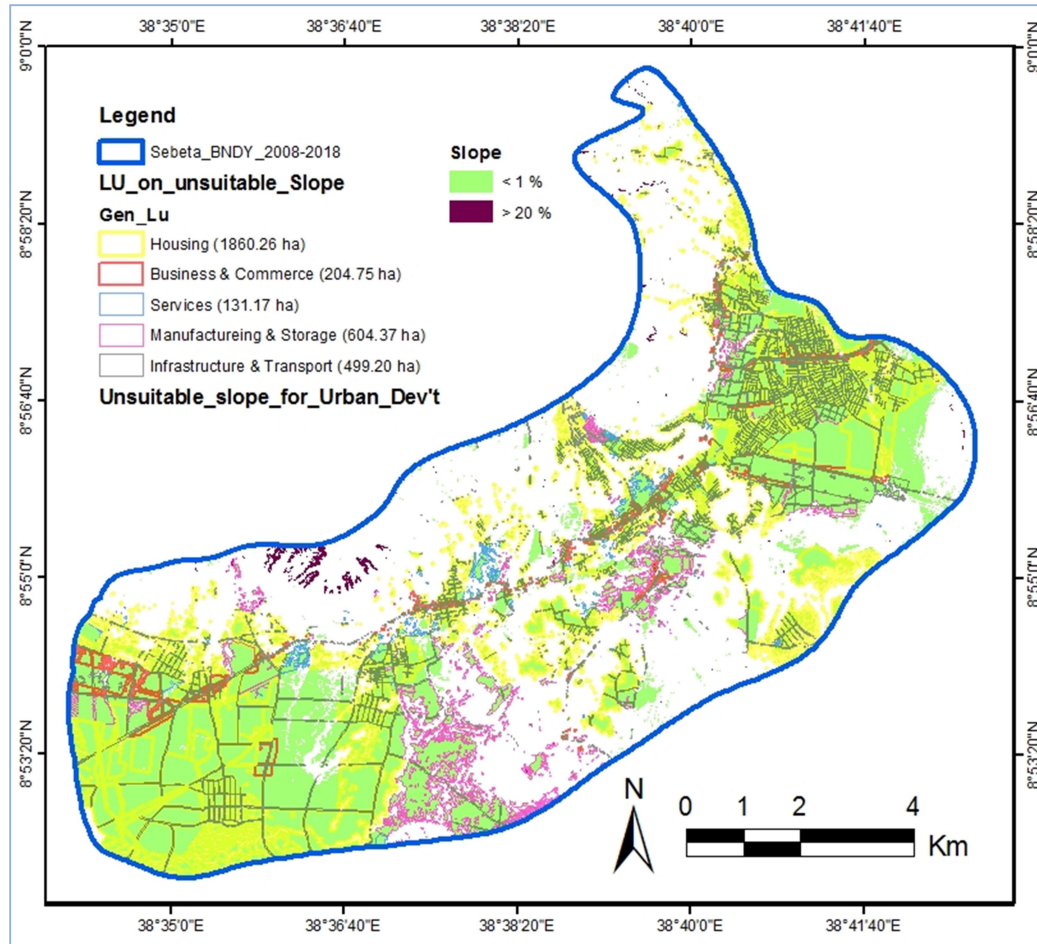


Figure 4.44: Land uses of Sebeta town allocated to unsuitable slopes for urban development.

The other factor for the increment of built-up spaces is limited enforcement of standards and poor implementation of the OES. According to the proclamation no 65/95 of the Oromia Urban Planning Institute (OUPI), Sebeta town is categorized under the 2nd level urban center (45,000-100,000 population). Furthermore, the OUPI plan preparation standard states as the 2nd level urban centers should have OES 15-20 % of their total area, which is also the same in the country level. The structure plan manual also prohibits major built-up spaces on the land use categorized under the OES areas (OUPI, 2010).

With its limitation, the 2008-2018 structure plan of the Sebeta town allocated about 1,115 hectares (11.35 %) of land for Open area and Environmental Sensitive landuse , but the data extracted from the 2018 land-cover analysis of the town shows about 376 hectares (33.72%) of lands proposed for the OES are converted to built-up spaces (Figure 4.45). This shows that the proposed structure plan allocated about 4-9 % less OES land use than the standard given by OUPI, and even about one- third of the proposed OES were not implemented.

Additionally, the Sebeta town administration has majorly focused on developing the landuses proposed for manufacturing, residential and commercial purposes, but the other landuses like OES were less prioritized in the formal development trends, and have been abused by informal settlements. For instance, the converted OES land uses are majorly visible on areas set as buffer zones and on hilly areas (Figure 4.45). Experts expressed that those areas have been got less development priority by the government so that opportunities were opened for the informal settlers. The informal developers mostly invaded the Riverbanks as the proposed river buffers were not implemented. People were also unaware of the spaces left for the river buffers, and most of them assume the spaces as leftovers where the government does not need for any developments. The assumption has increased the informal land developments within the river buffer areas and on hilltops.

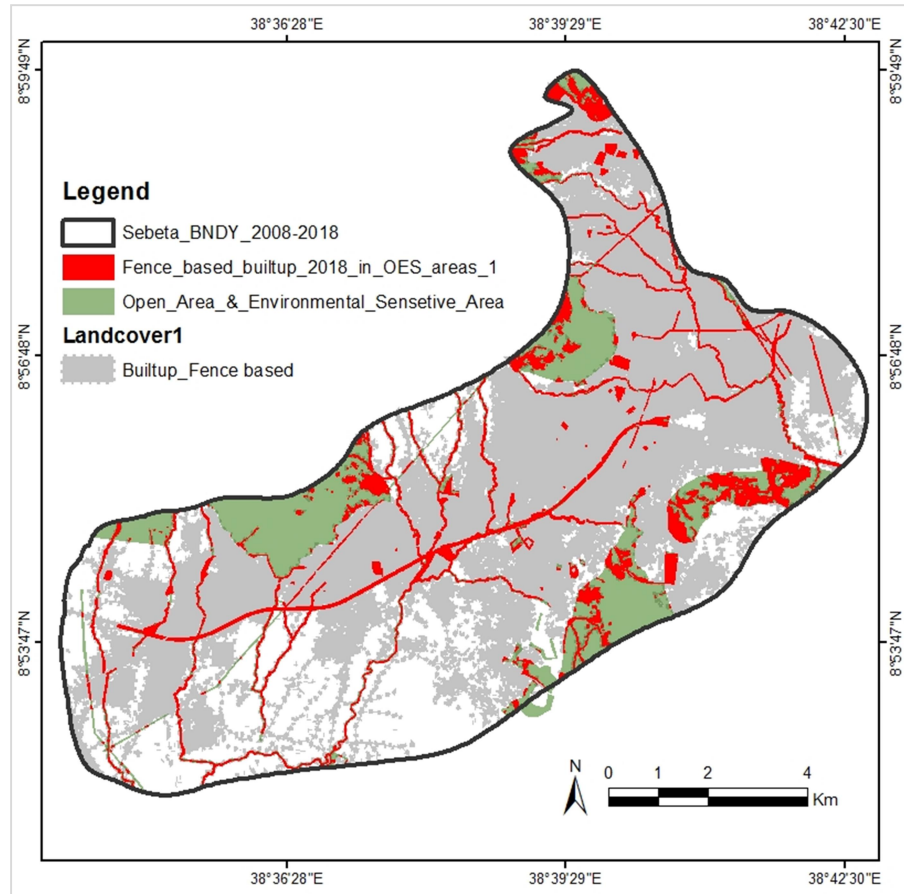


Figure 4.45: The built-up spaces in 2018 in relation to the OES landuses proposed in the 2008-2018 structure plan of the Sebete town

Besides the depletion of the landscapes categorized as OES areas, the focus on physical planning in the town was majorly ambitious to space utilization for investments like manufacturing industries while loosely considering the issues of compatible urban land uses planning (Table 4) have imposed both social and environmental problems.

Table 4: Urban land-use compatibility matrix in Ethiopia (*Adopted from MOFA, 2005*)

Compatibility Matrix							
Land Use	Residence	Commerce	Large-scale Industries	Small-scale Industries	Social Services	Cultural Center	Administration
Mixed	√	√	X	√	√	√	√
Center	√	√	X	√	√	√	√
Manufacturing & Storage	X	√	√	√	X	X	X
Green Frame	X	√	X	X	X	√	X
Services	?	X	X	X	√	√	X
Transport Centers	X	√	X	√	X	X	?
N.B.	√ Denotes compatibility ? Denotes partly compatible but to be decided depending on the specific situation X Denotes incompatibility of functions						

For instance, the manufacturing and storage landuse are not compatible to residential, social services, cultural and administration land uses, but the industrial zones which were built in 2005 were mixed with the residential houses (Figure 4.46 a & b).

Such a decision by city officials and politicians did not consider the consequences of these industries in future urban developments. As a result, the existing residential areas are affected by the industries from their neighborhoods. Another example is the location of the Solid Waste disposal of the Sebeta town (Figure 4.46c & d). It was proposed in 2008 on dense forest areas and has started to function.

The aim of having compatibility land use is reducing environmental damage and increasing the human comfort (Talashi and Bishehii, 2012). Pollution and nuisance arising from industries have various physical, environmental and social-economic

aspects, hence it needs a process that can provide an appropriate location for the industrial unit and physical conditions of access, proximity, distance and so (Jabareen, 2006; Talashi and Bishehii, 2012).

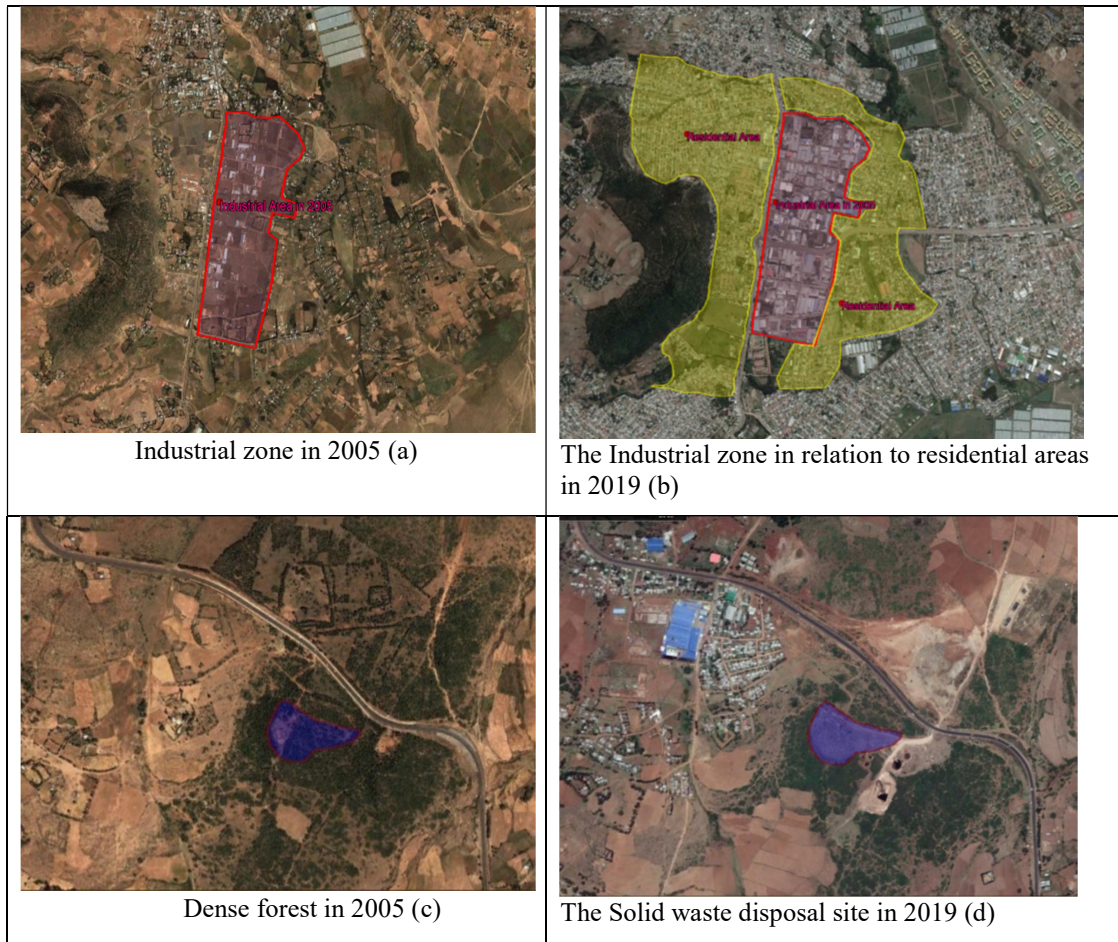


Figure 4.46: Non-compatible Land uses (a, b) and improper site selection (c, d)

4.3.2.3. Extended and unclear boundary setting of the Sebeta town

One of the basic principles set out in Article 5/4 of the Ethiopian Urban Plan Proclamation 574/2008 also states that "the delineation of a spatial frame for urban centers should be in view of efficient land utilization", but the Sebeta town Plan contradicts this principle. The Sebeta town is characterized by a subsequent boundary extension to the adjacent rural areas in its previous planning years. The boundary of the basic plan of the Sebeta town, which served until 2008, covered an area of 740.8 ha. The follow-up structure plan proposed for 2008-2018 extended the town's boundary to 9,827 hectares, including 9,086.2 hectares of land in nearby rural areas. Similarly, the town's revised structure plan for 2018-2028 extended the boundary to an area of 17,503 hectares, which means 7,676 hectares of land added to the 9,827 hectares of the 2008-2018 plan (Figure 4.47). In its boundary extension, the natural landscapes and agricultural lands have been converted to other urban uses.

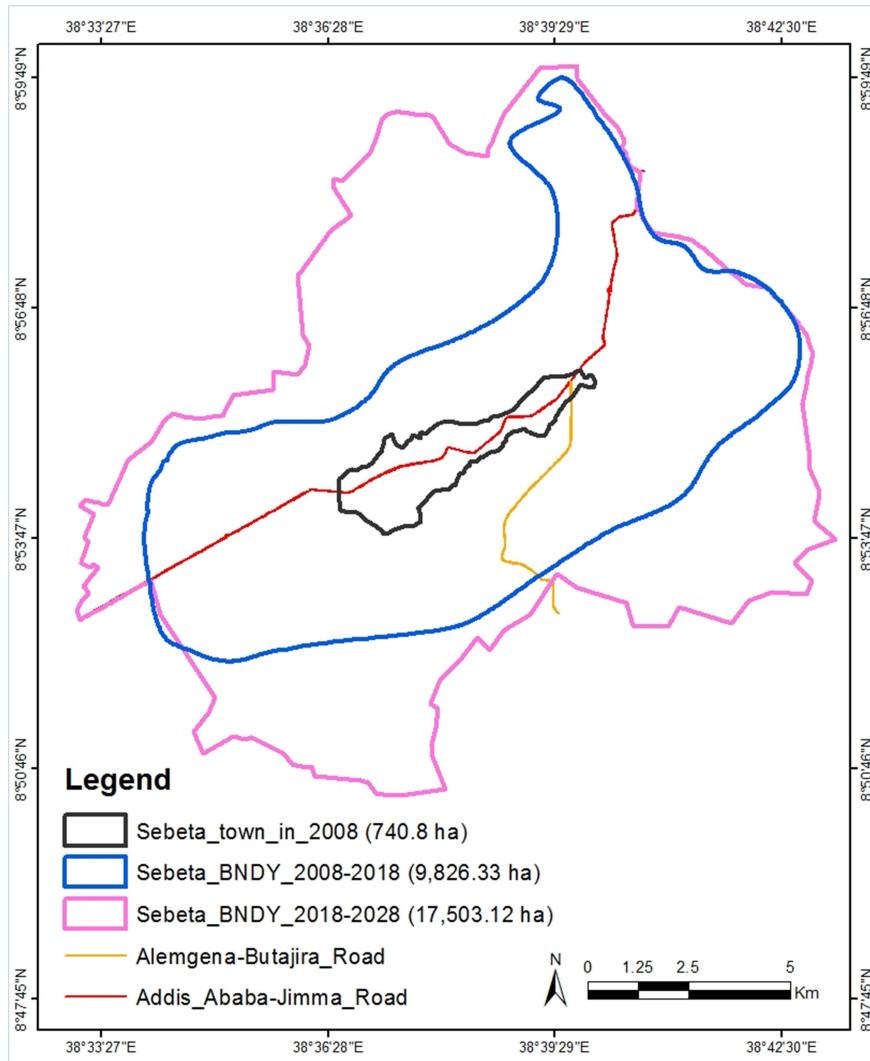


Figure 4.47: Sebeta boundary extensions within the 2008-2028 planning years

The planners engaged in delineating the boundaries of the town of Sebeta in 2008 and 2018 set a fuzzy boundary demarcation that was not framed by permanent landmarks and peculiar features. The urban planners of the Oromia Urban Planning Institute (OUPI) involved in the revision of the structure plan of the Sebeta town in 2008 and 2018 were asked. They argued that the boundary extension was mainly based on hosting *"extra land required for the allocation of additional housing needs, additional services and other urban land use within 10 years, i.e. the planning period."* Furthermore, an additional criterion was added in 2018, *"If more than 50 percent of a rural Kebele is included in the*

urban boundary delineation process, the entire area of the Kebele should be absorbed within the boundary set."

However, contrary to the rationale given by the planners, the results of the 2018 satellite imagery land cover analysis within the (2008-2018) boundary of the Sebeta town show that there are still large areas of land left undeveloped and there was no need for such successive boundary expansion (Figure 4.48).

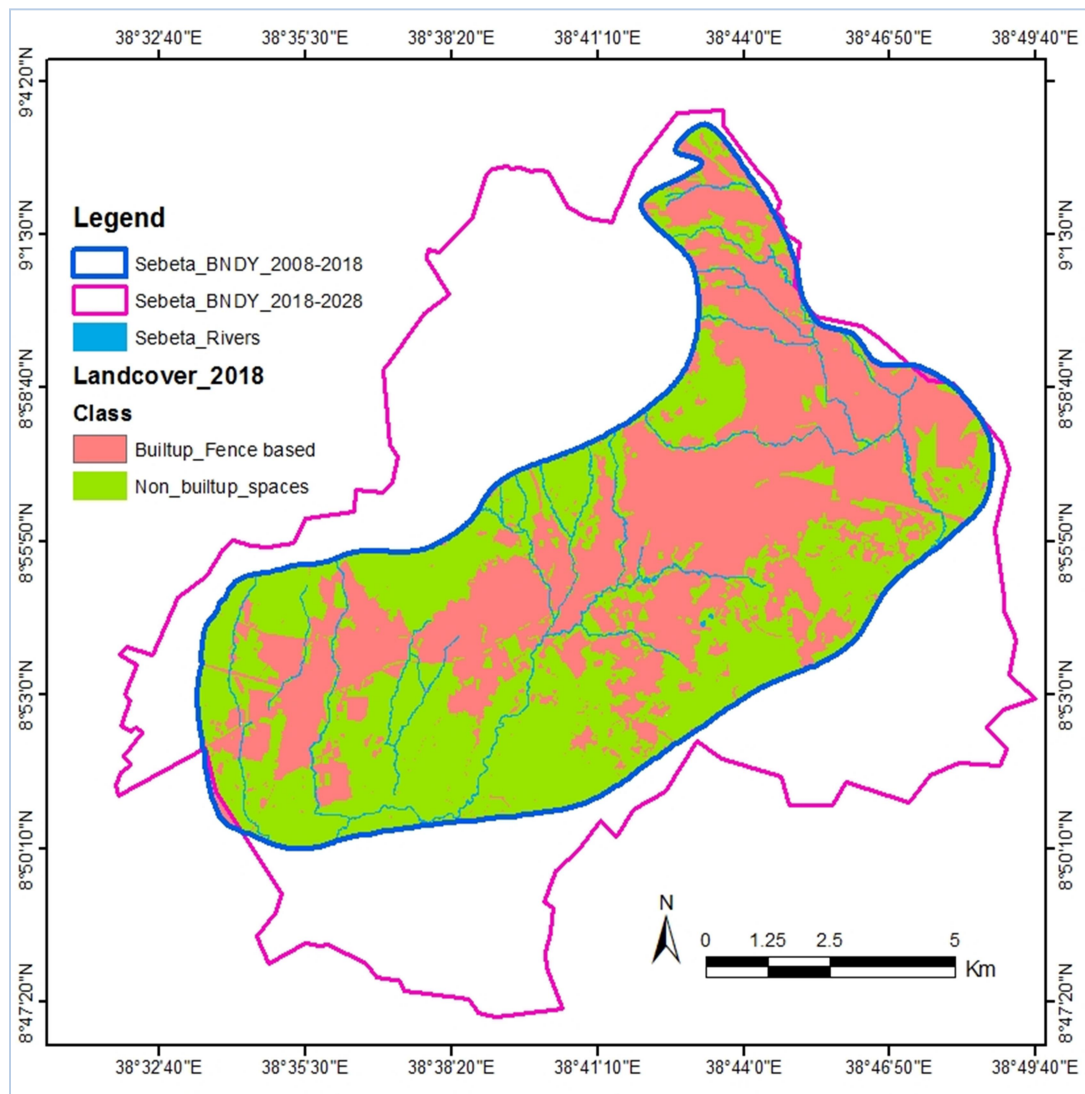


Figure 4.48: The 2018 land cover analysis of the Sebeta town within the (2008-2018) boundary

Table 5 shows that the total area of the Sebeta town boundary planned for 2008-2018 is 9,826.33 hectares. Out of this total area, the plot (fence) based built-up area covers 5,570.22 hectares (56.69%), while the unbuilt area accounts for 4,220.67 hectares (42.95%) and the remaining 35.44 hectares (0.36%) of rivers.

Table 5: The 2018 land cover of the Sebeta town within the (2008-2018) boundary

	Land cover	Shares	Area (ha)	Coverage in percent	
Total boundary of Sebeta town (2008-2018) : 9,826.33 ha	Fence based built-up spaces (5,570.22 ha)	Big Fences	1,356.96	24.36 %	56.69 %
		Other Blocks	2,979.56	53.49 %	
		Dispersed Buildings	1,233.70	22.15 %	
	Non-built-up spaces (4,220.67 ha)	Vegetation	663.02	15.71 %	42.95 %
		Agricultural land	3,499.36	82.91 %	
		Bare lands and related	58.29	1.38 %	
		Rivers and other water bodies		35.44	0.36 %

Non-fill development (leapfrog development) in the inner part of the Sebeta town has led to a horizontal expansion of the town in every planning year. There are a lot of fenced, non-functional spaces with very few buildings within these built-up spaces (Figure 4.49). These plots are mainly occupied by manufacturing and storage facilities, flower farms, worship and cemetery areas.

Considering the maximum allowable plot size of 500m² for residential land-uses set out in the Oromia urban land lease system, there are about 921 large plots with surface area of 522-836,693 m² and about 7,544 buildings with areas ranging from 1m² to 237,116 m² were built on these large plots. Plots with a surface area of ≥ 500 m² cover approximately 12,969,054 m² with only 3,160,874 m² (24.37%) of built-up spaces. This is due to the availability of many large fenced plots, but idles of all constructions and services Figure 4.49(a) and Figure 4.49(b). The Built-up Area / Plot Area (BAR) ratio = $3,160,873.53 \text{ m}^2 / 12,969,053.79 \text{ m}^2 = 1\text{m}^2 / 4.10 \text{ m}^2$. The photograph in Figure 4.49(b) shows a typical large fenced plot that has been considered as built-up areas, but reality shows that there are fenced, non-built large areas.

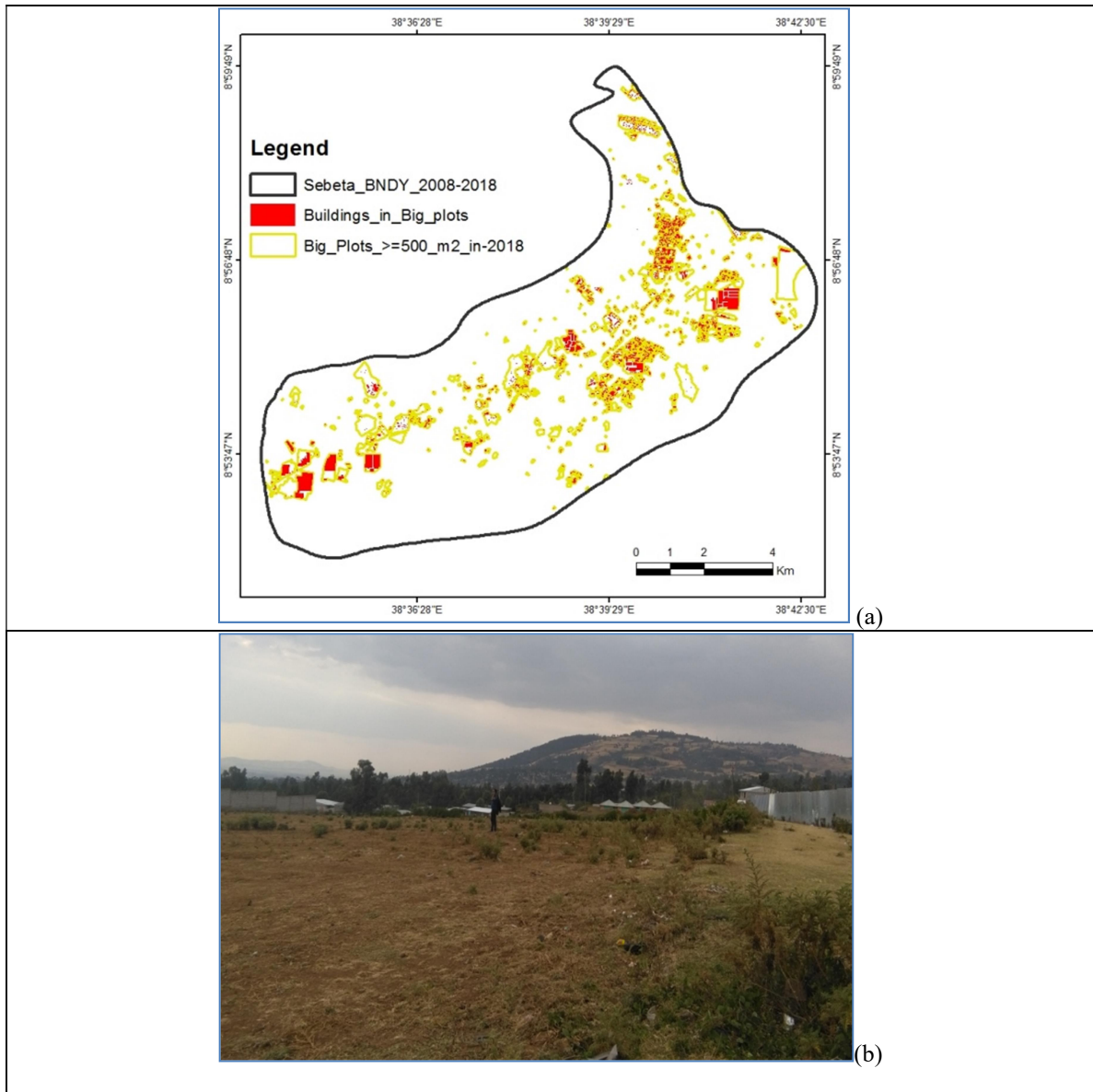


Figure 4.49: Big plots (≥ 500 m²) and buildings in the plots in 2018 within the 2008-2018 boundary of the Sebeta town (a) and a sample photograph showing common large vacant spaces in the inner part of the Sebeta town (b)

Regardless of the existing void spaces, the proposals for a plan (2018-2028) extends the boundary further to include, in part or whole, 16 rural *Kebeles* (Figure 4.50) with a total area of 7,140.43 ha. Almost all the residents in these *Kebeles* were engaged, and their livelihoods depended on agricultural activities.

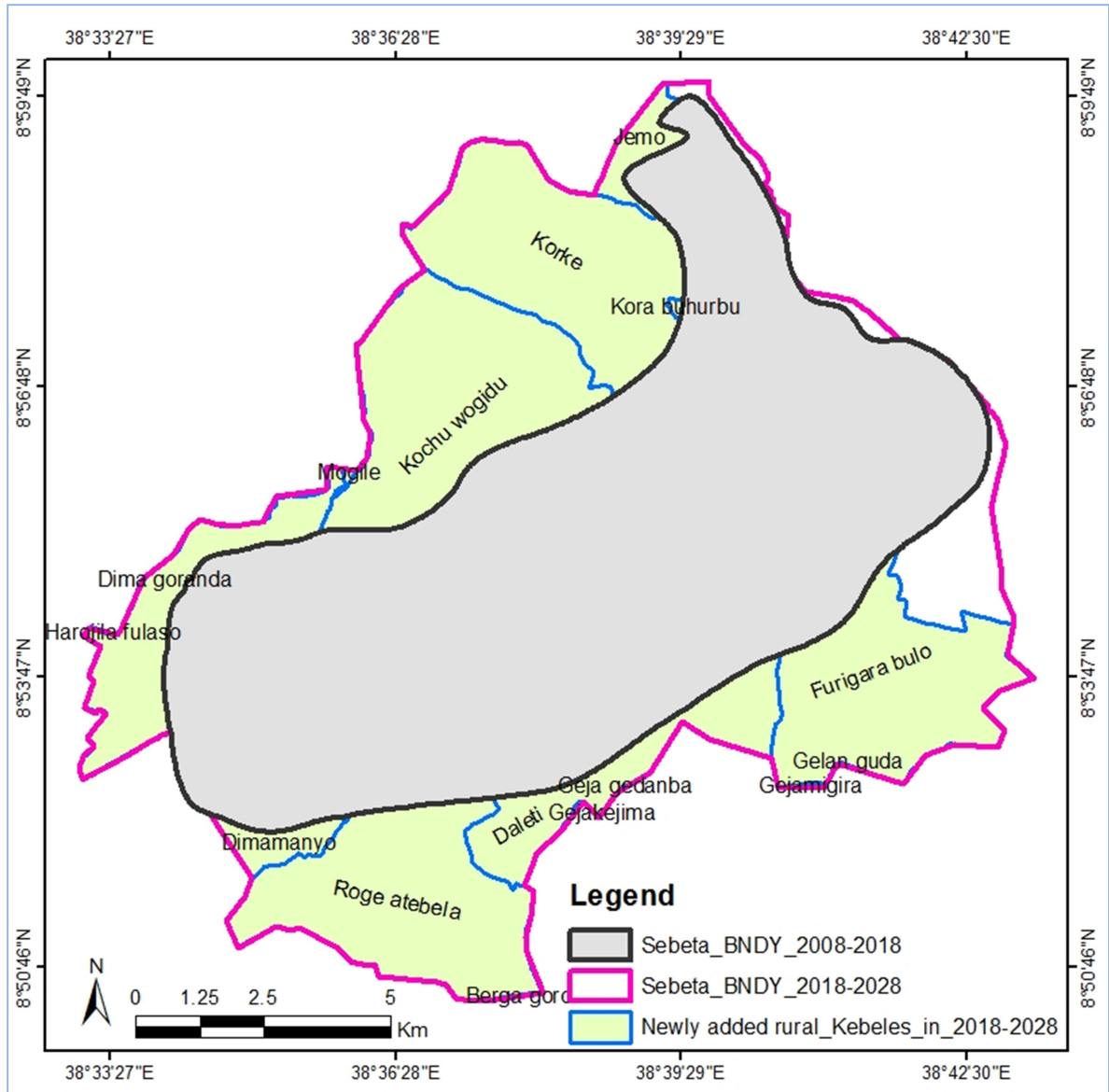


Figure 4.50: Newly added Kebeles in 2018-2028 revised structure plan of the Sebeta town

This research also explored the lack of effective land auditing and the absence of thorough investigation of existing resources in the study area contributed to the proposal of the extended boundary in the study region.

4.3.3. The regional planning gaps and related social-ecological challenges

4.3.3.1. Overlapping boundary setting between the Addis Ababa city Administration and Sebeta town

The 2008-2018 defined boundary of the Sebeta town and the 2016-2026 established boundary of Addis Ababa city, there is about 1,414 ha of shared land. Furthermore, the Addis Ababa city's boundary intrudes about 248 ha into the rural areas of Sebeta, which indicate its urbanization footprint extends beyond the urban area of the Sebeta town (Figure 4.51). As a result, the shared boundary between the Addis Ababa city and the Sebeta town is characterized by being ambiguous and overlapping.

Furthermore, neither of the two urban areas has fully recognized the precise defining elements of their respective urban areas, and they are only competing for the region indicated as the overlapping area. As a result, parts of two Kebeles (03 and 04) of Sebeta town of the Oromia regional state, as well as two sub cities of the Addis Ababa city administration (i.e. Kolfe Keranio and Nifas Silk Lafto) are indistinguishably located to determine which of the two urban areas they belong to.

In general, the nature of the two urban areas' boundaries is very complex, and they are not framed by fixed landscape features. Furthermore, there are no written documents stating the defining features of their boundaries, with the exception of the administrative bodies of the two urban areas saying orally that their urban areas are already defined by natural features such as rivers and mountains. According to Alem (2021), the current urban planning practice and related legal provisions in Ethiopia override citizens' right, and vague land policy constrains interregional cooperation in planning and land

governance, and she call calls for people focused planning, the revision of policy and legal frameworks to facilitate cross-boundary land governance.

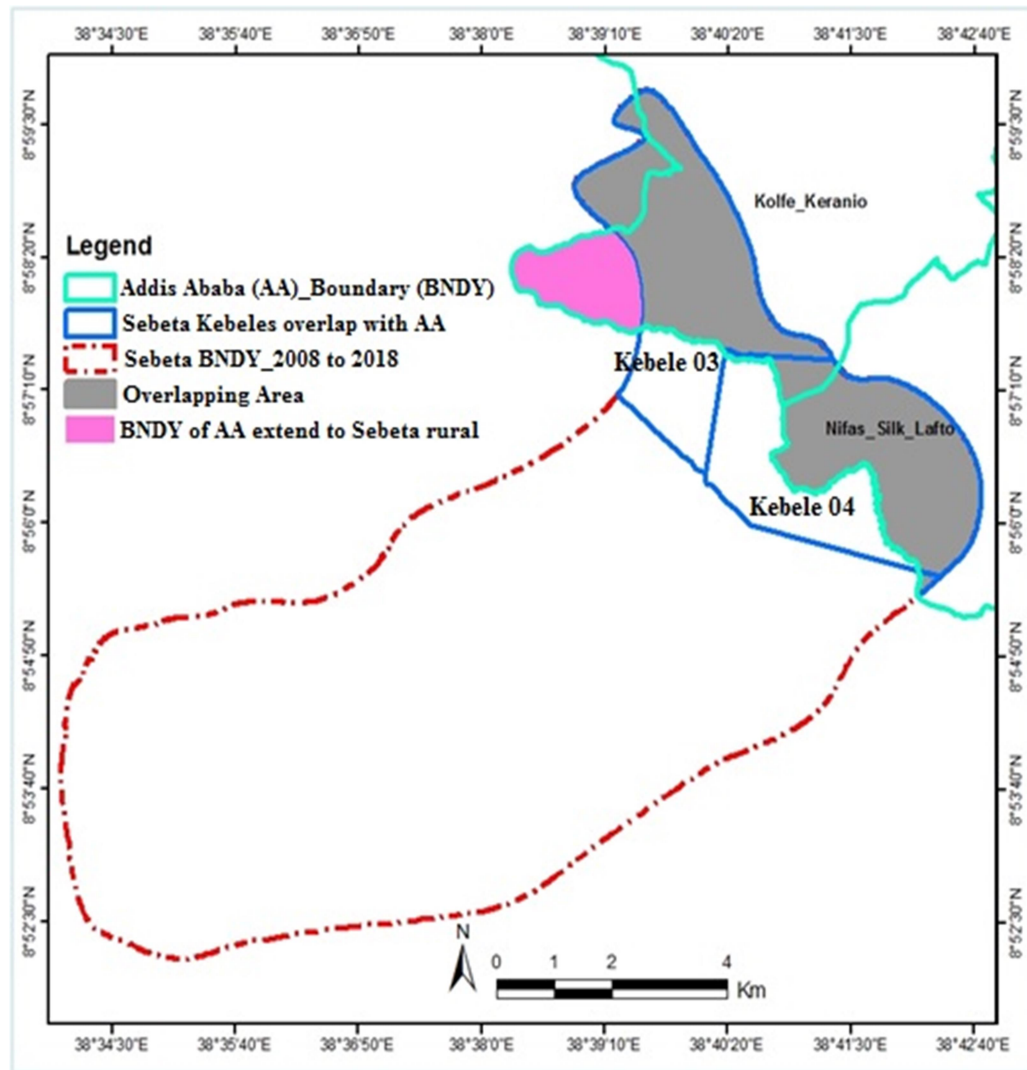


Figure 4.51: A Map depicting the overlapping region between Sebete town and Addis Ababa city

In the process of urbanization of the Addis Ababa city and the Sebete town, the unmanaged horizontal urban expansion of the two urban areas contributed to the overlapping boundary setting. Because of the overlapping region's unclear ownership of the land, its existence has largely resulted in a conflict of interests between the Sebete town administration, which represents the interests of the Oromia Regional State, and the

Addis Ababa city administration. Basically, Addis Ababa is interested in horizontal expansion and occupying large vacant land in its peri-urban areas for various investments that require large plots, whereas the Sebeta town is interested in retaining the city's further expansion to the Oromia Regional State boundary.

As a result, the main reason for the overlapping area's major socio-ecological challenges is a conflict of interest on land between the two regions, and the identified challenges are elaborated under the following themes: the conversion of large portions of non-built-up spaces to built-up spaces, mismatching and incompatible land uses, and unclear property ownership rights.

4.3.3.2. Fast rate conversion of the natural and working landscapes

The high rate of conversion of the natural and working landscapes is one of the first social-ecological challenges of the overlapping boundary. Land-use/land cover changes caused by the overlapping boundaries pose challenges that extend beyond the overlapping region. As a result, the entire areas of the two Kebeles (03 and 04) of Sebeta town, as well as some portions of two sub-cities (*Kolfe Keranio and Nifas Silk Lafto*) of Addis Ababa city containing the overlapping region, which covers about 2,578 ha, were mainly affected (Figure 4.52).

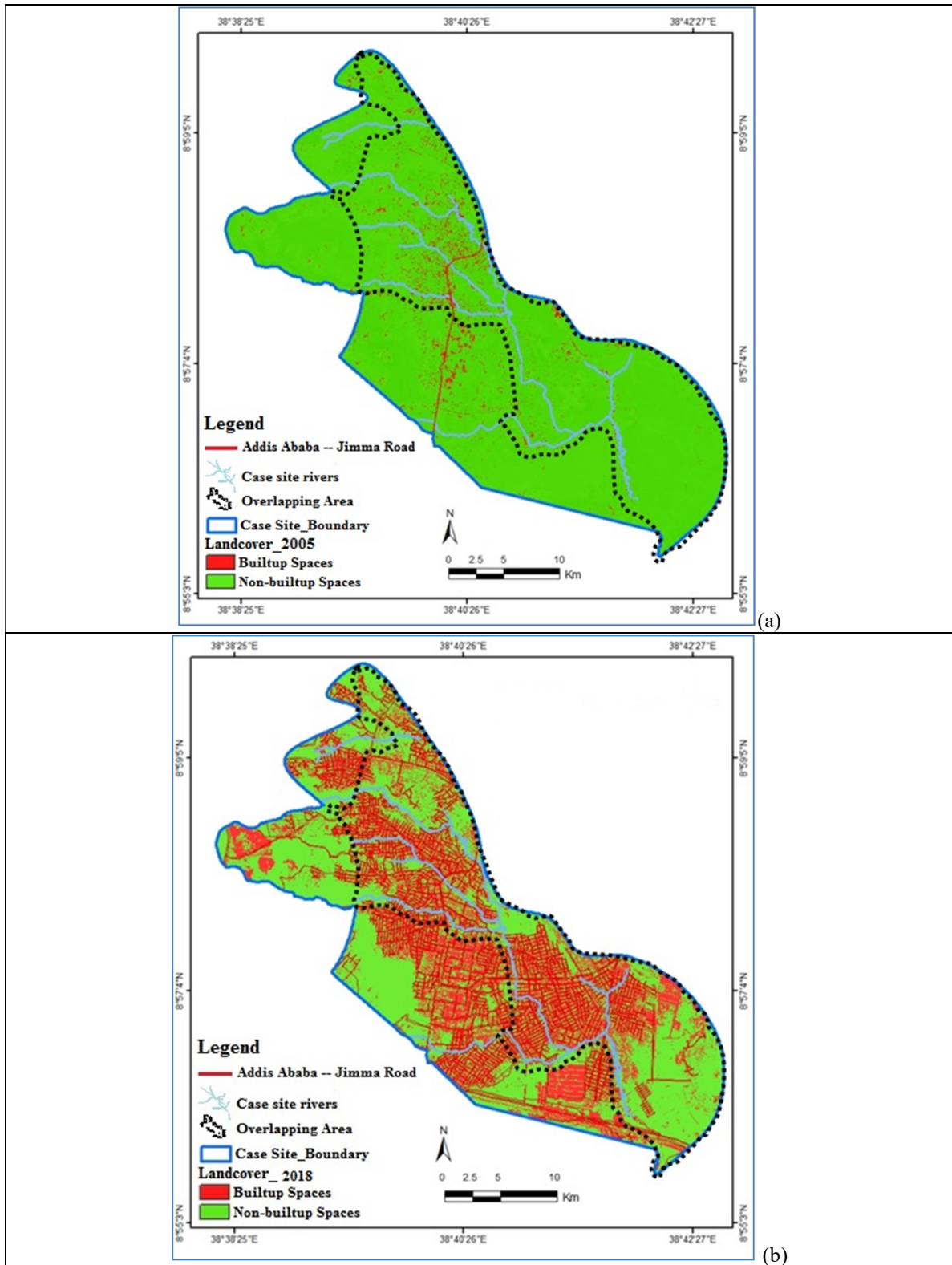


Figure 4.52: Land cover around the overlapping region in 2005 (a) and in 2018 (b)

Out of the 2,578 ha of the total areas, the total built-up spaces in the case site area comprising the overlapping region was about 70 ha in 2005, and increased to 754 ha in 2018 (Table 6), which indicates about 1083% increment whereas the non-built-up spaces that majorly included the natural and working landscapes reduced by 73% within the last thirteen (13) years.

Table 6: Land cover categories and their dynamics between 2005-2018

	Land cover categories	Total Area			
		2005		2018	
		Hectare (ha)	Percent (%)	Hectare (ha)	Percent (%)
1	Non-built-up Spaces	2,508.32	97.30	1,823.52	70.73
2	Built-up Spaces	69.67	2.70	754.47	29.27
Total area of the Case Site Boundary		2,577.99 ha			

The main reason for the converted large portions of non-built-up spaces to built-up spaces indicated in Figure 4.52 was a conflict of interest between the Oromia regional state, as reflected in the Sebeta town administration, and the Addis Ababa city administration on the overlapping area. In addition to the competition for land occupation in the peripheral areas caused by the two urban areas, which exacerbated the conversion of natural and working landscapes to other land uses, the absence of clear land administration on the overlapping region provided opportunities for unmanaged land invasion, both formally and informally.

Many previous researchers have shown the impacts of the increment of unmanaged built-up spaces. They pointed out that it degrades both natural and working landscapes (Benti et al., 2021), potentially reduces ecosystem services (Kindu et al., 2016), reduces urban

green areas and natural vegetation (Degife et al., 2019; Girma et al., 2019), increases the formation of heat islands (Arsiso et al., 2018), enforces surface runoff (Erena et al., 2018) and increase pollution (Mohamed & Worku, 2021). Furthermore, the fast rate of socio-ecologically related landscape changes should be managed as early as possible (Benti et al., 2021). It requires various urban planning models, integrated planning methods, and a better understanding of different land-use planning and policies (Gibson & Quinn, 2017; Kindu et al., 2018).

4.3.3.3. Conflicting land-uses

Another challenge on the overlapping area is the availing of two structure plan proposals containing contradictory land-uses. The first one is the Addis Ababa city structure plan proposal (2016-2026) which was prepared by the Addis Ababa Master Plan Project Office (AAMPPO). The second is the Sebeta town structure plan (2018-2028) which was prepared by the Oromia Urban planning Institute (OUPI) in collaboration with the town administration. This demonstrates that the structure plan proposals were prepared under different authorities, years of plan preparation, and service periods. The failure of the two regions to conduct integrated works during the structure plan preparation process resulted in contradictory land use proposals in the overlapping region.

Moreover, the Addis Ababa land-use plan is un-detailed considering the overlapping region as the outskirts of the city and allocated the region for investment related land use that require large areas. On the other hand, the Sebeta town land use plan is detailed around the overlapping region because the town administration considers the region as the most important place because of its locational advantage to the capital city, and the

town administration have also been requested more urban development demands around the region (Figure 4.53).

The level of contradiction of the proposed plans of the two urban areas against the 2016 existing land uses on the overlapping region varies. The Addis Ababa city's proposed plan considers poorly the existing reality of the area and contradicts largely the existing land-use plans. In contrast, the Sebeta town's proposed structure plan is better integrated into the existing land-uses.

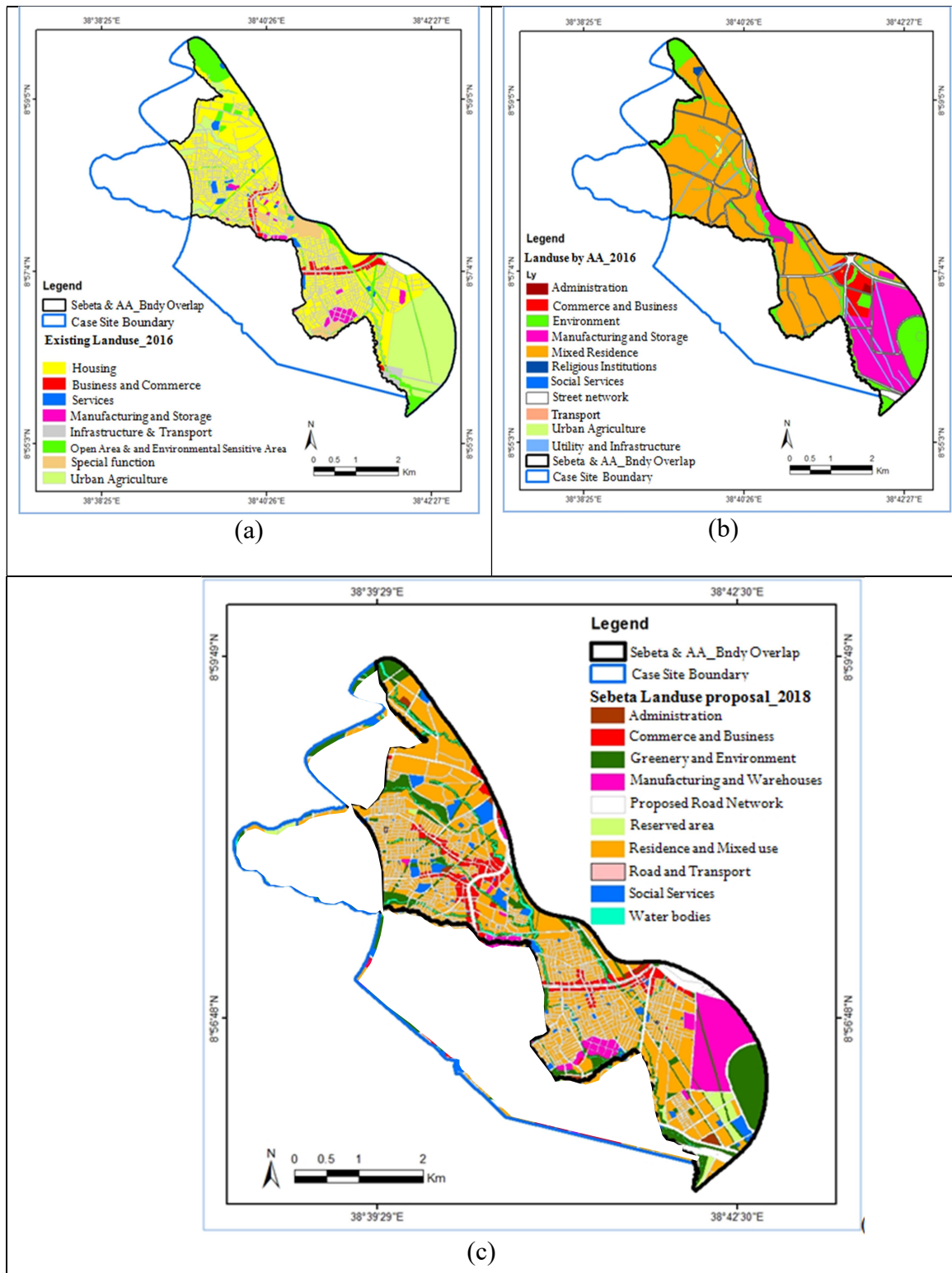


Figure 4.53: The 2016 existing land-use (a), the proposal by Addis Ababa city for 2016-2026 (b), and the proposal by the Sebeta town for 2018-2028 (c).

Some of the hotspots indicated in Figure 4.54 and Figure 4.55 show that Sebeta town better considers the existing land use, while the proposal by the Addis Ababa city is very general and mismatch with the various activities on land.

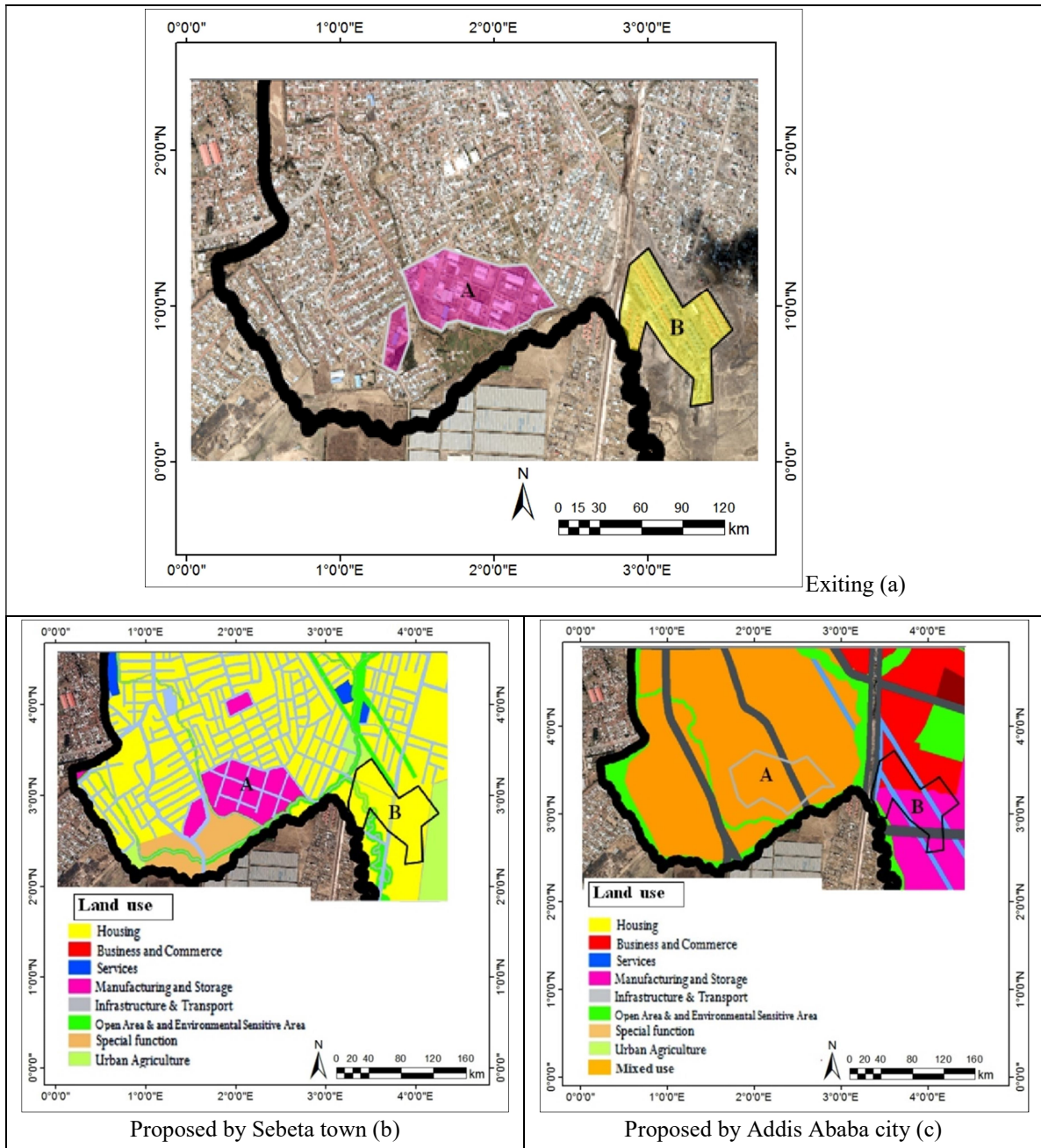


Figure 4.54: Hotspots showing Level of contradiction (a-c)

Existing physical infrastructures like roads and other social services were not indicated properly in the Addis Ababa city proposal whereas they are shown clearly in the Sebeta town proposal.

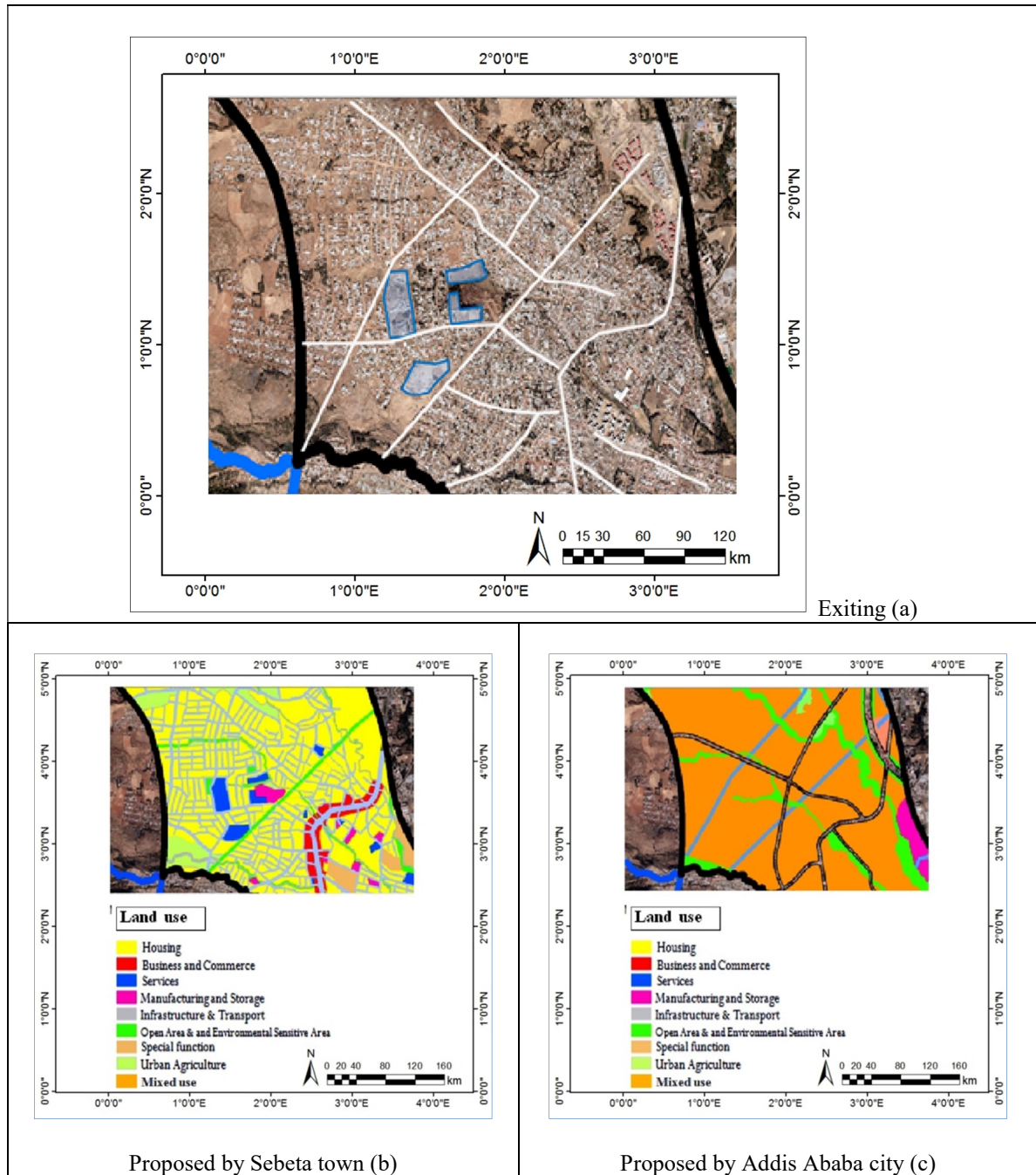


Figure 4.55: Hotspots showing Level of contradiction (a-c)

In addition, the proposed street networks by the two administrations also contradict each other. In this regard, the road networks proposed by the Sebeta town is very detailed and better fit to the existing situations; whereas the Addis Ababa proposal does not show all major roads, were poorly integrated into the existing road networks, and there are cases where major roads proposed by the Addis Ababa city discontinue and passes on blocks containing settlements (Figure 4.56).

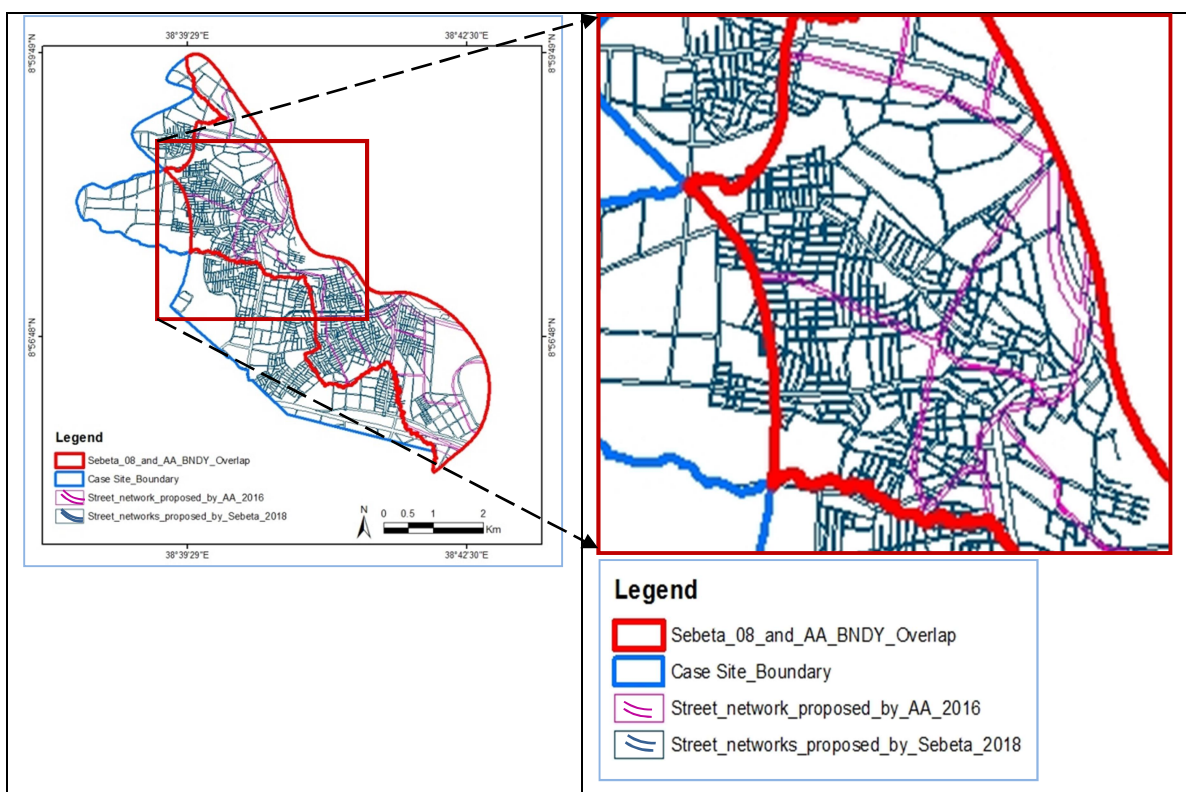


Figure 4.56: Level of integration of street network proposed by Addis Ababa city in relation the existing overlap

The contradicting land uses is the result of non-integrated urban planning trends, as the two administrations prepare their plans at different planning periods. In addition, the contradiction is resulted due to limited assessment of the proposed land use plans of each other while preparing their urban plans at different time frames; and moreover, lack of

regional plans which bottlenecked to cross-check and monitor the level of contradiction between the two urban areas and with the existing landuses. Further more, undetailed assessment of existing land use plans specially in the case of Addis Ababa city. These all can be generalized to the limited professional commitment and the political driven needs behind the curtain.

One of the challenges of the overlapping boundry is contradicting landuses: The consequences of contradicting land uses are significant threats to conservation (Rajvanshi, 2005), causing ownership insecurity (Magsi et al., 2017), increasing ecological degradation such as riverine ecosystems (Valle et al., 2015) primarily on landscapes classified as natural and working. According to Jong et al. (2021), overlapping land right is one of the root causes of conflict related to land use and related changes, which supplement the case study area.

The result shows that the conflicting land uses mostly resulted due to a non integrared land uses planning. The works of some scholars indicate that integrated land use planning is a tool for guiding decision-makers by presenting development plans that prevent land use conflicts (Mann & Jeanneaux, 2009; Wehrmann & Schmitz, 2011). In addition to, governance and institutional arrangements for collaborative regional and local landscape planning (Mann & Jeanneaux, 2009) are also crucial in reducing conflicting land use allocations.

4.3.3.4. Unsecured ownership of property

The undetailed and ambiguous criteria for boundary setting in the Ethiopian urban planning documents are a major cause for the demarcation of the overlapping boundary in the study area. There are also very limited formal land registration data that clearly defined the belongingness of each parcel of land in the overlapping region to which urban administration.

These and other related causes contributed to unclear land ownership in the boundary overlapping area between the Addis Ababa city and the Sebeta town administrations, and created conflicting interests.

Consequently, the residents in the overlapping region feel unsecured property ownership right, because the urban land management offices of either the Addis Ababa city or the Sebeta town permits land related development. Some of the residents living in the overlapping area stated that experts from the two urban planning offices approached them and prepared their plans at different times, and therefore they do not trust registering their properties to any of them. Such insecurity prevents them to invest in their lands. Besides creating the unsecured individuals' property ownership, the boundary overlap has also led to mismanagement of communal land.

Residents in the area pointed that there were many cases where such spaces are abandoned for many years. In addition, there are also cases where communal spaces have been used for mass housing like condominiums and the houses have been transferred to different urban administrations that lack the right ownership of the land. For example, the condominiums constructed by the government located within the overlapping area. The

overlap of buildings and boundary lines also shows that there are instances where a block of buildings falls within different administrative boundaries, which is unavoidable (Figure 4.57).

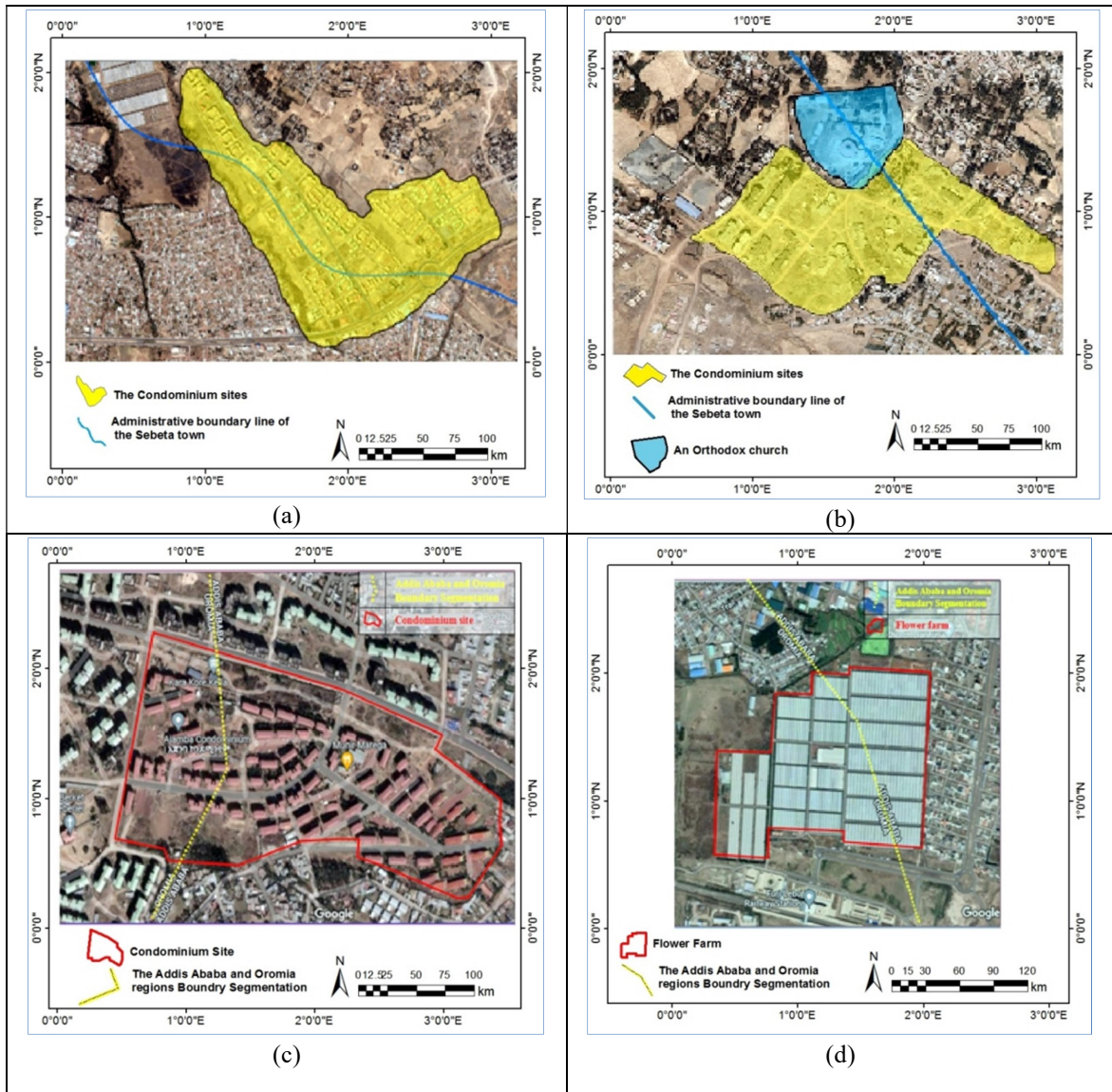


Figure 4.57: The Condominium sites [Jemo (a), Fanuel (b), and Ajamba (c)] and Flower farm (d) are some examples of large projects located in ambiguous and overlapping regions

Different scholars have stated that land tenure is a condition for establishing land for housing and access to other services (McLees, 2011). In contrast, insecure land tenure is the main characteristic of informal settlements (Zárate, 2016), mainly relating to the lack

of title and formal registration (Ávila & Ferreira, 2016). Although there are numerous cases where informal land ownership has contributed to insecure property ownership in the overlapping region, the main cause is a lack of formal registration security caused by an unclear definition of each parcel of land to which urban administration it belongs.

Brown (2010) indicated that insecure tenure or contested resource makes local people vulnerable to dispossession from their land, and it may also increase investors' reputational risk. In addition, insecure tenure also results in the loss of land, especially when alternative livelihood and housing options are limited (Reale & Handmer, 2011).

Researchers also included some effective methods of securing land ownership. For example, adequate tenure security and sustainable land use are critical components of effective urban land governance (Alemie et al., 2015). As a result, a more sustainable land management strategy could ensure the sustainability of ecosystem services (Sahle et al., 2019). Similarly, the Economic incentives (EIs) simulations have aided in controlling land ownership transfer (Suroso & Kombaitan, 2018).

Furthermore, without a sufficient understanding of non-formal land rights, land procurement proposals for the public infrastructure upgrades can be frustrated by the individual or group claims on the land. This would make it impossible to provide services, particularly in the peri-urban areas where informal settlements are common.

These challenges have contributed to the unsustainable social-ecological related land use changes in the urban areas. Some studies back up the findings of this study. They demonstrated that overlapping administrative boundaries among urban areas complicates

urban land management, and allows for the expansion of edge built-up zones that potentially harm natural and agricultural lands (Benti et al., 2021). Furthermore, the ambiguous and overlapping boundaries attract informal settlers (Achamyeleh, 2014; Benti et al., 2021). The increase in informal settlements is due to the fact that illegally subdivided plots located outside of a municipal boundary, which are typically supplied by local peri-urban landholders, are relatively cheap and affordable to the urban poor for the construction of a residential house (Achamyeleh, 2014).

4.3.4. Challenges of Public ownership of land policy in the built environment development process

Some experts pointed out that the public ownership of land has not contributed to the responsiveness of the built environment development process as much as expected. They argue that it was poorly implemented and paved a way for corruptors and speculators to facilitate informal land holding. They also stated that no one can be sure of their land's ownership because it can be expropriated by corruptors in the name of government for public service developments, either with a few compensation or none at all.

In the absence of a clear implementation of public ownership of land policy, urban land ownership is usually ambiguous whether the land is government or private. As a result, informal land holding and informal settlements have depleted the public spaces that can be classified as natural and working landscapes.

Basically in Ethiopia the majority of the urban development process, particularly in the towns, informal settlements have been expanding at an alarming rate (Lirebo, 2006). In Sebeta town, such settlements are identified as a driving factor for the rapid increment of

built up spaces and unplanned expansions of settlements in the town while majorly depleting the natural landscapes, farmlands, and related features.

According to Chaka (2018), more than 51 percent of the total residential houses in the Sebeta town are covered with informal settlements, resulting in violation of urban plans and uneconomical use of urban land. The results show that the intensification of informal settlements in the town extensively occurred mainly following the 2008 structure plan of the town with three main arguments: The first idea falls under the experts guided informality that sometimes fits to the structure plan. This majorly brought farmlands invasions which induced the loss of fertile agricultural lands at fast rate. The second idea is that the informality resulted from the expectation that the town will grow following the plan. This resulted in the informal land invasion, especially along riverbanks, on mountains and forested lands mostly by urban poor, and construction on farmlands by the land speculators through buying from farmers with a little money. Thirdly, the increment of the informalities resulted from fear of farmers about their land expropriation following the prepared structure plan with a few compensations, which induced them to sell their properties to other bodies, especially to the land speculators and the haves. Therefore, actors such as investors, corrupted experts and officials, brokers, speculators, and the urban poor majorly drove the informal settlements in Sebeta town.

The informal settlements are mostly found on lands usually accessed by invasion, and developed against planning and ownership regulations (Abbott, 2001), and causes a high rate of green spaces depletion (Girma et al., 2019); bringing conversion of farmland to settlement (Meskerem et.al., 2017); and results in pollution, deforestation and consuming agricultural lands (Mohammed H. and Muhammad S., 2006).

On the other hand, the causes for the formation and increment of informal settlements were lack of well-documented land information systems (Gebeyehu A., 2015); un-affordability to pay formal land transfers (Gebeyehu A., 2015; Marutlulle, 2017) ; migration and high rate of population growth (Matt Burdett, 2018a), governments' inability to meet the demand for housing in a formal system (Meskerem et al., 2017), rapid urbanization (Mohammed H. and Muhammad S., 2006), unemployment and increasing residential house rental prices (Mwacharo, 2012) and alike.

Some inducing factors for the implementation gap of the public ownership of land policy in the study area:

4.3.4.1. Speculators and Land base corruption

Experts strongly believe that illegal landholding in the Sebeta town may be higher than the legal one; and often, chains of brokers and corrupted government officials are associated with land legalization, land transfer, and displacement of indigenous landowners.

The other land speculators contributing to the land invasion in the Sebeta town include investors/ the haves/, landowners (especially farmers), corrupted planners, and corrupted leaders and alike. The land speculation in the town majorly relates not using land rather hold cheaply until land price increases and preparing for future sale. In this process, the land speculators promote their self-esteem and profiteering in which the land became a business and encouraged the brokers to shift their jobs to land and land-related issues. As a result, land invasions induced by land speculators distort the image of the town through

creating disorganized morphology of settlements and reducing the landuses related to natural and working landscapes.

In fact, the Article 40 (3) of the 1995 constitution of Ethiopia states that "Land is a common property of the Nations, Nationalities, and Peoples of Ethiopia and shall not be subject to sale or other means of exchange", but following the 2008 structure plan prepared for the Sebeta town, the farmers who were included in the town administration have been selling their agricultural and pasture lands mostly to land speculators. It has resulted mostly from the fear of land expropriation by the government who pays low compensation (*about 50-59 Birr/m²*) while the land speculators have been paying more money (*>1000 Birr/m²*) for the farmers.

In this property selling and buying process, land brokers in the Sebeta town are not only the facilitators but also land jobbers. There are many cases where the researcher observed that the land brokers buy farmers' properties and construct small houses for resell to the other informal land seekers and speculators with higher profit. Therefore, the chains of brokers and other land speculators have also escalated the informal urban land price in the town.

Interviewed land brokers said that people prefer to settle around the pioneer settlements, churches and related services. The preferences around those areas are resulted from the assumption of securing their land appearing themselves, as a family of the pioneer settlements and the expectation of basic infrastructures like roads, drinking water, electricity and alike will be fulfilled following those areas. These trends continue, and the prices of land around these areas have increased, and the researcher experienced that

brokers mostly set the prices. As a result, most of the informal houses built near to these basic infrastructures have attracted the haves, and the poor were mostly forced to occupy plots on environmentally fragile areas.

In the informal selling and buying process, the sellers and buyers usually make local agreements. Most of the agreements are written as the seller borrowed the amount of money paid for the plot sold. That plot appears as collateral, indicating a defined payment and expropriation period. The researcher also observed cases when the pioneer settlements built houses for the buyers as for their own and ask extra money.

Experts also pointed out cases when the informal land invasions in the Sebeta town fit its 2008 land-use proposal. This shows that corrupted experts and officials have guided some informalities. In the informal landholding process, a parcellation type proposed for residential landuses (Figure 4.58) have also eased the guidance. They were adopted from the Oromia Urban Planning Institute (OUPI) and contain four rectangular blocks having equal dimensions (40m x 90m) and arrangements for built-up spaces and in the middle, a square block having dimension (40m x 40m) as a neighborhood open space. The combinations of such blocks were used and were distributed across the different landscapes of Sebeta town, including important natural landscapes and fertile farmlands uniformly.



Figure 4.58: Common block arrangements for the towns planned under the OUPI and particularly to Sebeta town (Plan review by the researcher, 2020)

These all area parcellation increased land-based corruptions which were ignited by corrupted municipal engineers, officials, and brokers. The corruptors sell major areas of the parcellation for the speculators and the halves informally. It has reported as the transfer was done to the developers as per the existing regulations. It was evidenced through informal interview with some farmers living in the town administrative boundary. Most of them said that their agricultural lands were expropriated with a few compensations before the town's growth reached around their living areas.

Therefore, these trends of land invasion have induced unsustainable land conversion in the town, which brought the difficulties of managing the increments of settlements and poor implementation of the proposed plan, and led to the alarming depletion of both the natural and working landscapes and pressurized the livelihood of most of the farmers.

4.3.4.2. Political and administration factors

The **first** inducing factor is land administration incapability of the Sebeta town administration. It is majorly related to non-early managing the informal urban landholding and the delay in securing the title deed (property right) for those legally

owned lands. This has increased the informal built-up-spaces which in-turn degraded the natural and working landscapes in the town.

Experts involved in the FGD mainly related the administrative incapability of the Sebeta town administration to control informal land invasion at their early stage of development with the lack of reliable urban land information system, non-cooperativeness of societies, political unrest and frequent official changes.

Un-detailed urban land information system incapacitates the Sebeta town administration to manage its land and related resources, record and disseminate information related to ownership and control informal settlements. Following the recent urban land lease proclamation 721/2011 of Ethiopia, the town administration has used historical satellite imageries to differentiate informal settlements. The houses built before 2011 have been considered illegal occupants, and some have been demolished. The demolishing of houses of the so-called informal settlers is a reactive measurement, which has brought socio-economic problems while not recovering the lost ecological attributes of the town. Additionally, most of the informal residents of the town are trying to backdate all documents of their premise of residences to the years before 2011, which opened another door for corruptors.

Basically, a land Information System is a tool for legal, administrative, and economic decision-making and aid for planning and development such as cadastral and land-use planning (Babarinde & Tagicakibau, 2015; UNECE, 1996). Similarly, in the country level, both urban and rural land administration and related documentations are very poor.

They are significantly affecting the urban environments during urban plan preparation and implementation (Asmamaw Y., Amezene R. *et.al.*, 2017).

The non-cooperation of the community is because of most of the residential areas in the town are informally occupied, and they do not want to accuse themselves. Rather new illegalities increase daily by expecting the property legalization to be considered for all residents at a uniform time. An expert expressed the perception of some of the residents with an ‘*Afaan Oromoo*’ (Oromic language) proverb saying “*badiin biyya waliinii badhaadhina*” (let us do what other did and take the reward together).

The political unrest that crippled town administration was primarily brought on by the 2005/2006 Ethiopian elections, which partially continued until the 2010 election, and the 2015-2018 Oromo youth uprising against Addis Ababa’s master plan, which included assimilation of its surrounding towns of the Oromia regional state.

All of these add to an aggravating factor in the Sebeta town's conversion of its working and natural landscapes to built-up areas.

The **second** driving factor related to the political and administration that driven the increment of built-up spaces is government policies and job inducing projects. In this regard, experts from OUPI and the Sebeta town administration pointed out, ... “*Political (Administrative) driven decisions so far include the selection of sites for housing, industrial areas and horticultural investments, zoning changes, enforcement of the non-compatible land-uses and permitting large plots for a different type of investments.* Realizing the necessity of establishing special administrative and development strategies

for areas surrounding Addis Ababa city (*‘Finfine’* in Regional language), the regional State of Oromia restructured these areas as the “Urban Fringe Zone of Finfine City” in 2008 (OWWDSE, 2011).

The intension behind the Oromia regional state's proposal of the Sebeta town as one of the strategic development areas led to an increase in the town’s built-up areas. Since 2008, the town has been serving as the potential area for large industries such as agro-processing, mineral bottled water companies, and floriculture. These industries brought job opportunities, especially for youth and on the contrary, they induced the formation and expansion of built-up spaces (Figure 4.59) as the workers and land speculators usually occupy land around the industries informally. These create difficulties for town administration to control the settlements and have brought encroachments and depletion of farmlands and other natural landscapes around the industries.

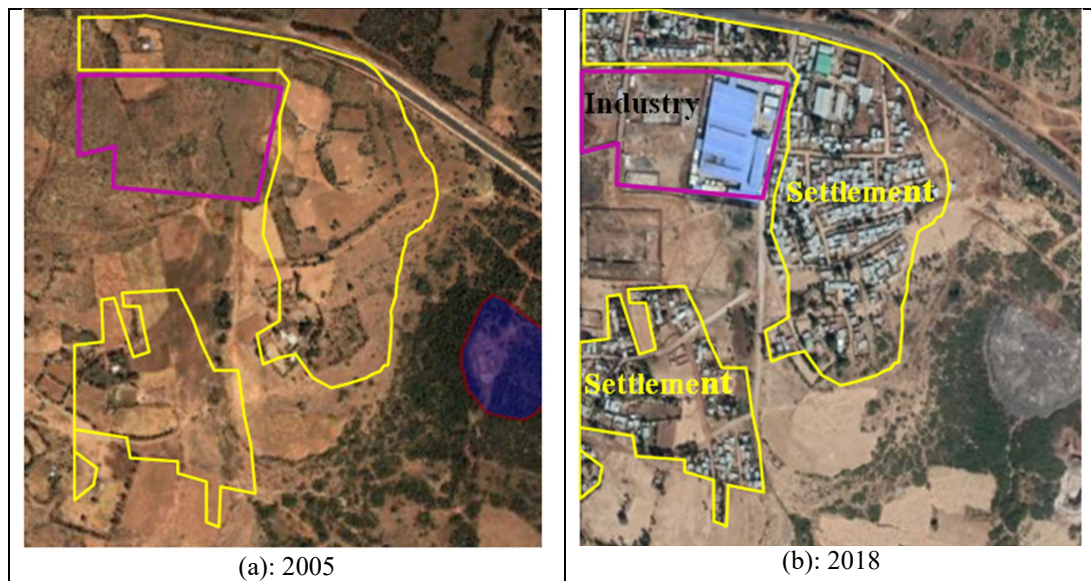


Figure 4.59: Industries induce settlement formation and expansion

The increased investment opportunities in the town have also escalated the land lease prices and the town administration has been more focused on the increasing of the money gained from the lease. This resulted in unaffordable formal landholding for the urban poor that increased land-related corruptions and informal landholding.

Another issue raised by the participants of FGD is related to the officials and governing offices: "...the lack of endowment and frequent changes of the officials and the responsible offices. These resulted in a management gap, which usually open the door to informality and corruption ...".

CHAPTER FIVE : ENVIRONMENTAL RESPONSIVE URBAN DEVELOPMENT FRAMEWORK FOR EMERGING TOWNS IN ETHIOPIA

5.1. Introduction

The contextual literature review and the results of the previous objectives of this research indicate that there are few and low level of urban areas in Ethiopia although unsustainable changing natural and working landscapes are becoming their main features. This problem is primarily evident in the capitals of the country and regionals, and the problems have escalated in their process of transformation. Consequently, the developed approach considered lessons learned from the large urban centers for not repeating the same problems in the future emerging urban areas of the country.

Similarly, the developed approach is based on the assumption that the availability of a less urbanized environment in the country and the existence of many urban centers at their early stage of development is considered as an opportunity for properly plan and

manage urban areas in a timely manner that could potentially cope with the current high rate of urbanization trends in the country. These open opportunities to include the potential attributes of the natural and working landscapes in the future urbanization process of Ethiopia.

Therefore, this research identified the opportunities of the low-level urbanized areas in Ethiopia and forwarded possible planning approaches for the future sustainability of urban growth in the country.

5.2. Rationale and conceptual framework of the proposal

Figure 5.1 illustrates the typical transformation process from rural settlements into town, and conceptualizes the idea that the physical and socio-ecological imbalances occurring in the current urbanized environments in Ethiopia (*findings in previous chapters*) could have been better managed if they had been involved in considering small towns in their early stages of development.

The figure contains two sections: (i) It illustrates the current trends in the initial urban planning (Basic Plans) which have been prepared after the increment of the socio-ecological related problems.(ii) It combines the idea of focusing more on the existing socio-ecological factors that have served in the formation of towns with the aim of creating better concepts of the Basic Plan that could potentially reduce the disturbance and degradation of natural resources and minimize the loss of cultural values and identity.

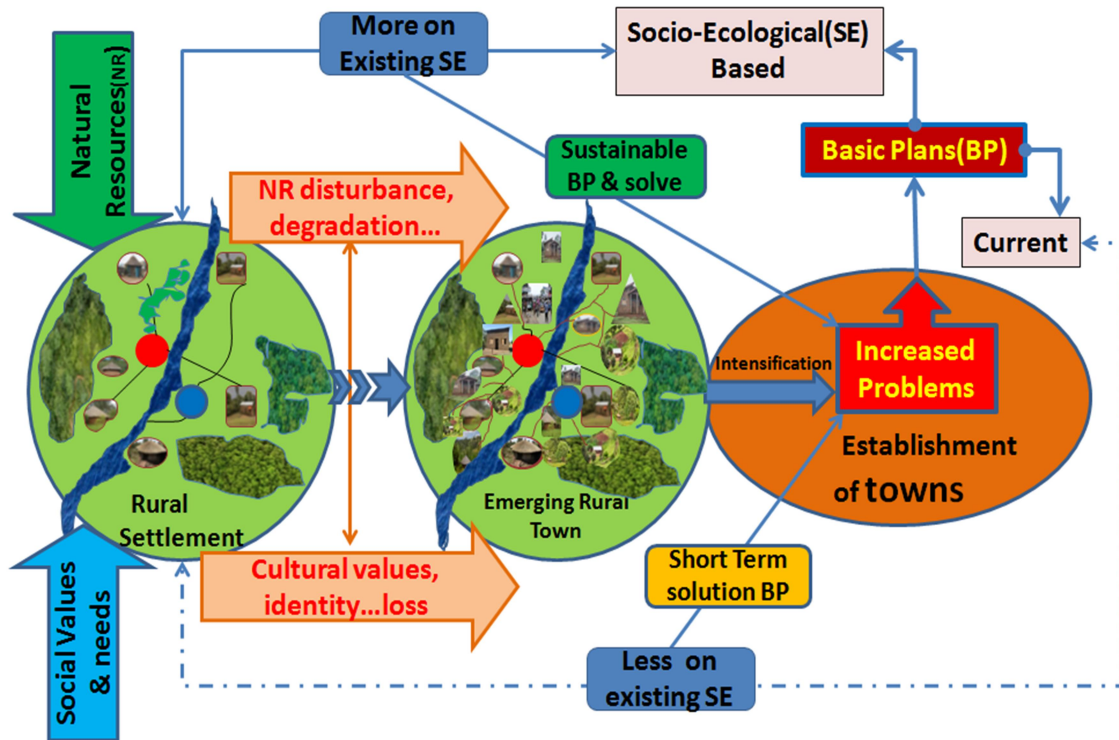


Figure 5.1: A generalized concept on trends in the development of urban areas in Ethiopia and current trends in the preparation of the Basic Plan and a socio-ecological planning alternative (Source: Researcher's illustration, 2022)

Smart town/city/growth can be enhanced by the sustainability of its planning concepts. For sustainable urban growth, a detailed mapping of existing socio-ecological elements can be started at the emerging stages of rural towns (Figure 5.1), which is extracted from the second stage of the urbanization process indicated in Figure 5.2. This could be achieved by mapping of natural resources and associated constraints, socially valuable spaces and facilities, and participation of local communities to identify local knowledge that can be used for the concept of a sustainable basic plan. The concept helps to propose sustainable urban plans, including structure plans to guide the development of smart cities.

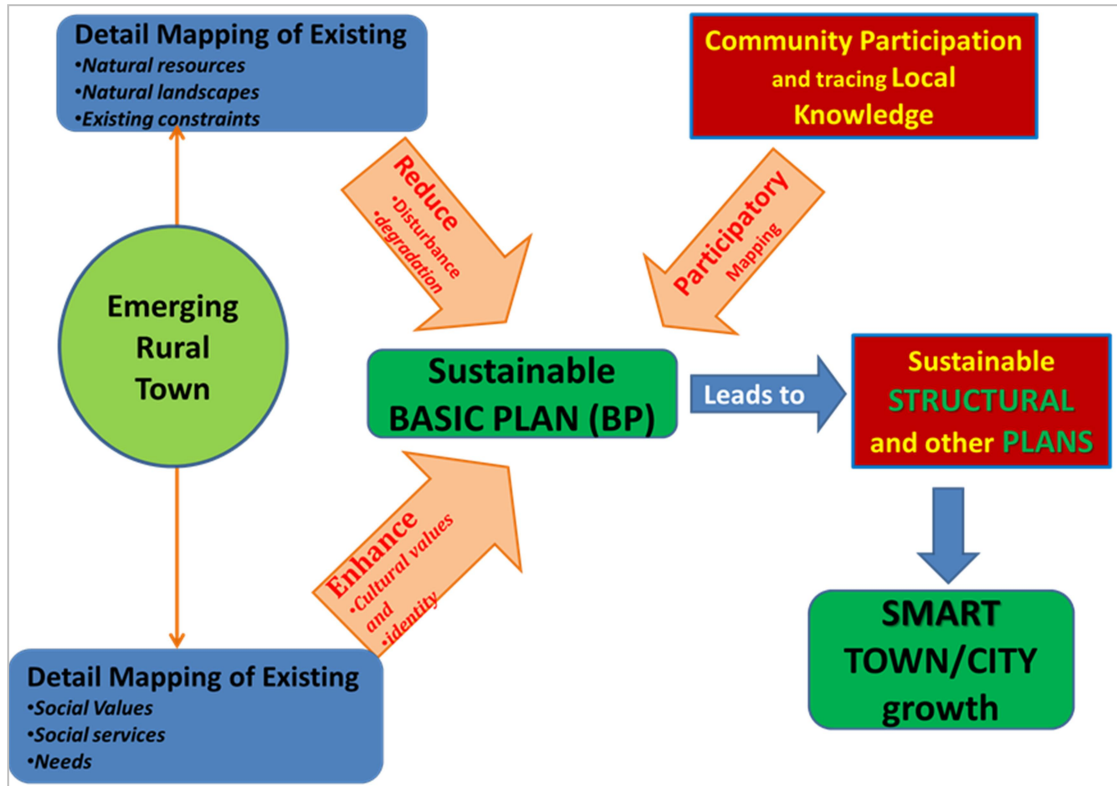


Figure 5.2: A conceptual model illustrating what has to be mapped and at which stage and the final importance of early mapping of socio-ecological elements of an area (Source: Researchers' illustration, 2022)

Researchers argue that it is now impossible to enhance the environmental functions of urban spaces with current trends in urban planning in Ethiopia. In this regard, Meskerem Z. et.al. (2017) demonstrated that Ethiopia's conventional urban planning approach sets urban built-up first and allocates natural landscapes to leftover and waste lands which led to the degradation of ecosystem functions. They also suggested shifting from this conventional planning approach to a landscape analysis approach that helps proactively differentiate areas of protection, excavation, deposition, ecosystem services and scenic areas from areas of development / buildable areas.

In addition to the conceptual base limitation of the current approach to urban planning in the country, challenges such as the inability to manage early on the emergence and

expansion of spontaneous settlements, unclear and fuzzy urban boundaries, deficient analysis and mapping of landscape suitability, limited stakeholder participation, more focus on physical planning have also hindered the integration of ecological and socio-cultural valuable spaces into the current process of urban planning in Ethiopia. This requires a better approach to urban planning. Therefore, the proposed approach should also include socio-cultural services and physical infrastructure that have so far contributed to the development and intensification of settlements and related developments.

5.3. Environmentally Responsive Local Urban Spatial Development Framework

5.3.1. Proactive measures: an approach to acknowledge early developments

Approximately 80 percent of the Ethiopian population live in rural areas and most of these rural communities are accessing their basic services from nearby small towns, which prompted rural-urban migration in search of better services and also resulted in urban expansion.

The migration and the expansion patterns are becoming the key triggers of the increasing degradation of natural landscapes that is currently taking place. These require approaches that can guide the small towns with proper plans from their early stage of development, while at the same time protecting the natural landscapes that contribute to the sustainable transformation of small towns and advance wise rural-urban linkages in order to improve the living standards of rural communities.

It is therefore, recommended to plan for Self-sustaining rural towns from their early stages of development, which can be done by making use of the opportunities of less

urbanized environments in Ethiopia as a leapfrogging potential for sustainable natural landscape transformation in the country's future emerging urban areas.

In addition, minimal proactive measures were applied to mitigate the negative effects of existing urban areas on natural landscapes from their early development stages. As a result, a lot of money has been invested in reactive measurements intended to restore the degraded natural landscapes in large urban areas of the country since last few years. E.g. the Addis Ababa River side project office, which was established for the restoration of rivers, such as the cleaning of polluted rivers and river banks; a significant amount of money has been spent on planting trees in the urban environments of Ethiopia to reforest areas devoid of vegetation following various constructions of housing and infrastructure.

Beside the reactive measurements, the availability of fewer urban areas in Ethiopia can also open up possibilities for a less expensive approach, i.e. proactive measures:

- (i) By identifying the problems faced so far in the natural landscapes due to the expansions of urban areas and other planning failures, and by changing the nature of urban problems as learning opportunities for the planning of future emerging towns in Ethiopia. For example, non-proportional allocation of land-use related to natural and working landscapes. In the existing structure plan manual of Ethiopia, the proportion of landuse for "*Open Spaces and Environmental Sensitive Areas*" to be proposed for small towns is relatively smaller than those for large urban areas. Therefore, the urban planning manuals of Ethiopia should be modified by incorporating more proportion of land-uses related to the open spaces and environmental sensitive areas for small towns than the big urban centers as the

nature related landscapes in small towns should not be affected from their emergence.

- (ii) By applying the socio-cultural and nature-related local knowledge and practices for the early management of the impacts of future urban developments on natural landscapes in the country. For example, the indigenous nature protection knowledge of the *Oromo Gadaa System in Ethiopia*. In addition, the availability of less urbanized areas in Ethiopia helps to adopt international and local planning principles that have so far been demonstrated in minimizing the burden of urban environments on the natural landscapes. In this regard, in the global context, using various urban planning approaches, different urban planning terminologies have been developed on the basis of the dimensions that need to be followed in the plan and the issues that need to be addressed in urban areas. Socio-ecological urbanism, for example, is a recent and interdisciplinary approach. It is a scientific upgrade to the concepts of ecological and landscape urbanism and follows the paradigms of smart growth and sustainable urbanism (Barthel et al., 2013), a new paradigm of urban sustainability and development that relies on the framework of Ecosystem Services and Resilience Thinking (Carpenter & Folke, 2006; al Rawaf, 2017). In view of the great complexity of contemporary urban issues (Roggema et al., 2011), the socio-economic , environmental and physical processes taking place in cities are highly interdependent and multi-scale (Pickett et al., 2013). A system-wide holistic approach, i.e. the socio-ecological dimension (C. Wilkinson, 2012), is therefore considered to be the focus of urban planning in Ethiopia, as it is crucial in order to find more efficient ways to manage and design cities.

5.3.2. Conceptual Proposals

The methodology developed is a Natural and Working Landscapes Responsive Urban Planning framework that guides in the integration of the landscape in Ethiopia's Future Emerging Urban Development. As a result, the proposed urban planning options due considered: the opportunity of the very low urbanized area in Ethiopia, the availability of the majority of urban areas at their early development stages and the need to sustain social-ecological related landscapes in the future emerging urban environments in Ethiopia. Therefore, a **pre-formal land management plan approach is proposed through Green field level planning**, including the following concepts:

5.3.2.1. Including a Pre-formal Plan Stage in the formal process of urban planning in Ethiopia

The idea of including a pre-formal plan stage in the process is (Figure 5.3) aimed at approaching land management at Green field level, the stage of very limited settlements. It is recommended to respond early to the urban development and intensification drivers and helps to control the spontaneous growth of settlements, which usually emerge before areas get an urban entailment and formal plan are developed.

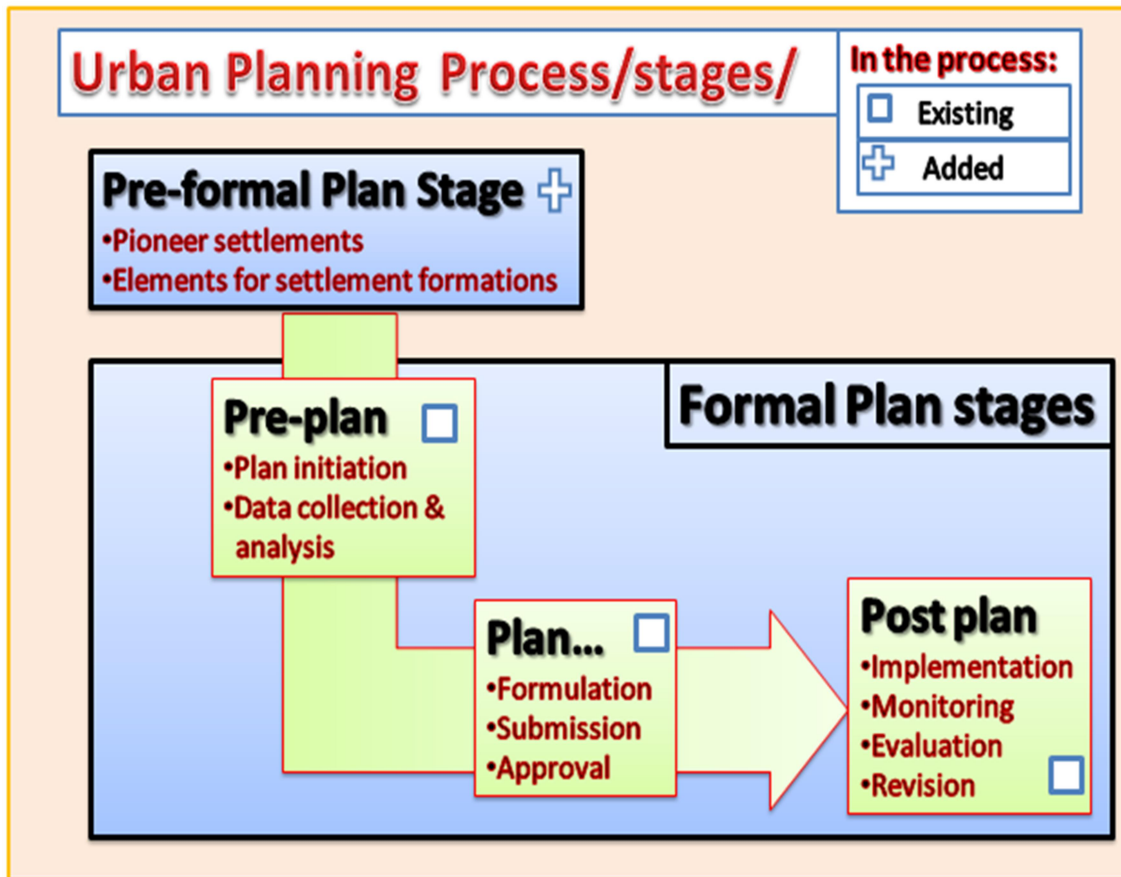


Figure 5.3: Combined the formal urban planning process in Ethiopia with a new pre-formal planning stage (Illustrated by the researcher, 2022)

The proposed pre-formal plan stage essentially considers detailed assessments of the socio-ecological attributes of places at the Greenfield level (Figure 5.4). A detailed land information and planning system at this level is important to ensure sustainable land management from scratch and to support the effectiveness of the formal planning phases.

Green field level planning should start from the identification, recoding and mapping of:

(i) naturally existing landscapes such as *Water bodies*, *Natural landforms (Natural topography)*, and *Vegetations* existing before any built-up developments; (ii) the most prominent socio-cultural services and physical infrastructure so far contributed for the genesis and intensification of settlements and related developments which includes

existing pioneer settlements, local markets, worshiping places like churches and Qaalluu houses, schools, health facilities, local administrative offices (Kebeles) and other related factors.

Green- field level planning should begin with the identification, re-engineering and mapping of: (i) naturally existing ecosystems such as Water sources, Natural Landforms (Natural Topography) and Vegetations existing prior to any build-up; (ii) the most prominent socio-cultural services and physical infrastructure to date have led to the creation and intensification of settlements and re-engineering.

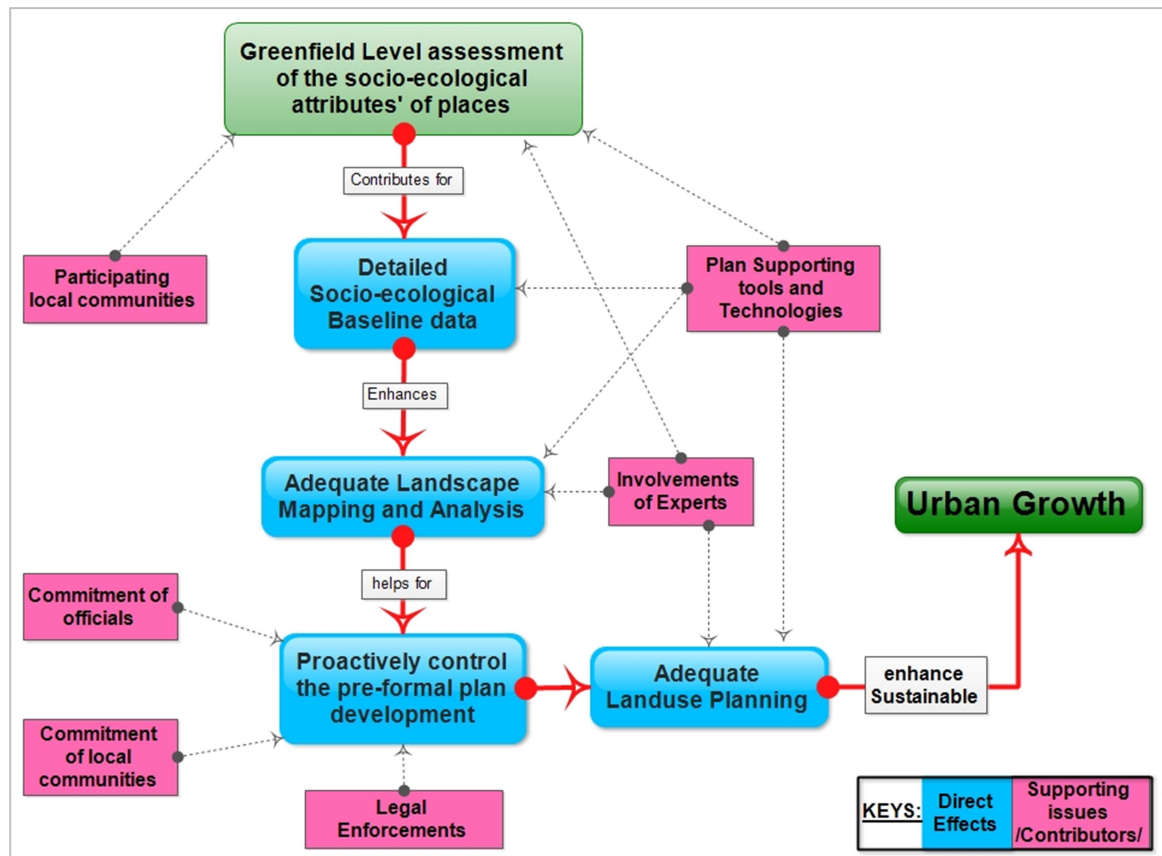


Figure 5.4: A Proposed Greenfield Level approach to socio-ecological mapping and analysis

5.3.2.2. Methodologies for planning at the Greenfield level in Ethiopia

The following methodologies (**A and B**), to be used in Ethiopia's future urbanization, are formulated based on the existing challenges that impose difficulties in the managing of urban areas in Ethiopia. The proposed methodologies focus on issues to be addressed at the Greenfield level. They aim to lay down certain criteria and considerations that may help for early manage the growth and impacts of urban areas possibly emerge in the future. It also indicates the issues to be included, the areas to be addressed and the methods to be applied.

A. Green Field Level Land Management for non-urbanized areas

The **Green Field level Land Management (GFILM)** could be practicable through the applications of the following five (5) major methods and considerations (GFILM-1 -- GFILM-5):

GFILM-1. Technologically supported, participatory and ownership-based detail land resources inventory at plot Level.

In Ethiopia, the land ownership information on the rural lands is not well supported by technologies. This resulted in an ineffective way of rural land transformation to urban areas. Therefore, detailed ownership mapping of each plot of lands with their household information and their respective land-use/cover within urban and non-urban areas is very crucial (i) for easily controlling the dynamic land-use/cover changes (ii) for managing the illegal land invasions related to land speculators, corruptors, informal settlers and other land invaders (iii) to curb unsustainable land conversion, and (iv) are highly valuable for

easily manage the future urban development through integrating it in the preparation of sketch and basic plans.

The mapping of every plot of land is possible because each plot belongs to either to government or individual or private companies or others, however, to reduce the financial, capacity and other related challenges, the ownership-based mapping may more focus on farmlands, vacant spaces, grasslands, open spaces, and others spaces around different social and physical infrastructures triggering the formation of urban areas in the country.

Therefore, the existing plots should be technologically audited and recorded along with their owners through consulting the landowners and concerned bodies. Land owners will be asked to locate his/her lands and can be recorded by using GPS and accurately digitized on Satellite images. Along the plot recording, the owners' family members should be recorded to control land transfer to non-family members with false information (Figure 5.5).

GFILM-2. Land Characterization in terms of its uses and Environmental settings: constraints, resources and other pertinent site specific attributes.

GFILM-3. Detail Mapping of existing scattered settlements, social services (worshiping, education, health, market and etc) and physical infrastructures (streets including foot paths) triggering settlement inception and intensification.

GFILM-4. Defining lands allocable for urban built-up development (Table 7)

Table 7: Methods of differentiating land allocable for Settlements

	Land allocable for settlements = TBA-(NS+NP)				
	[Total boundary of an area](TBA)	<i>minus</i>	[Not suitable areas (NS)]	<i>Plus</i>	Not permitted areas (NP)]
			Topographic constraints (Very Hilly and very lowland). For instance .> 20% and <1%		River buffer and the banks of other water bodies
			Non structure carrying Soils		Forested lands
			Land sliding and gorge areas		Cultural Sites and/or Historical areas
			Seismic zones		Fertile Agricultural lands

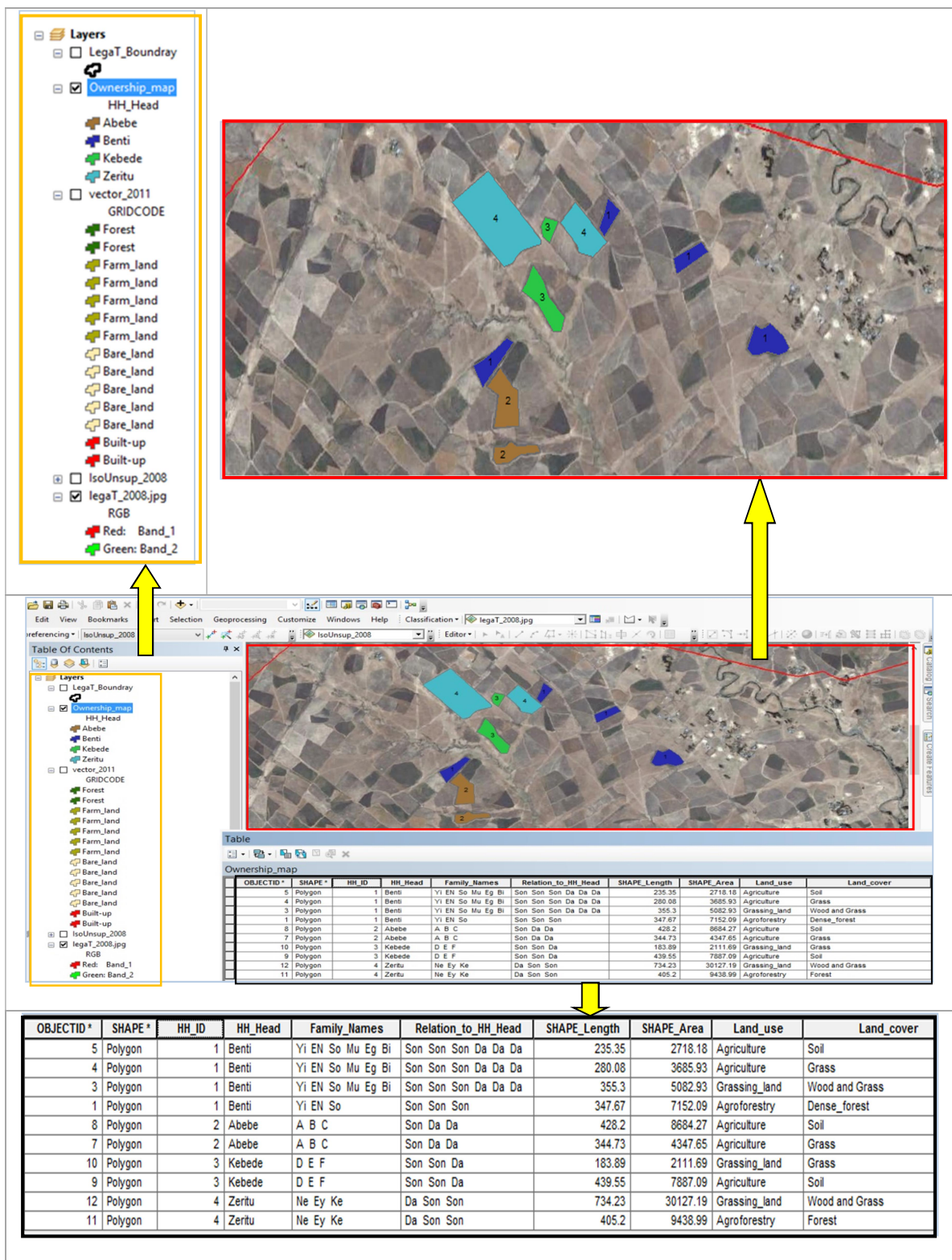


Figure 5.5: An illustration showing possible land-use/cover and ownership based landscape analysis.

GFiLM-5. Controlling spontaneous developments possibly happens prior to formal plans through awareness creation. Every new construction should be reported to the concerning bodies (for instance establishing Land record and management office) who got mandates to control the land. Otherwise demolishing of the constructed elements should be effective. This helps to manage changes on land at its early stages and reduce illegal land conquests

B. Urban Entitlement Stage (UrES)

UrES-1. Fixed Boundary delineation. This could happen at a time when an area needs to be planned preferably based on the natural landmarks such as rivers, mountains, green infrastructures, and non-dynamic manmade features. A fixed boundary leads to outbox thinking which helps to come up with other options rather than considering horizontal expansion of urban areas for every need to be raised during a planning period. In this regard, if additional backlogs in certain planning years require additional lands, other smart growth options can be considered rather than extra spaces by extending urban boundaries.

UrES-2. Boundaries can be defined by rural *Kebeles* which need to be included under an urban area. This is very important to define and manage the extension of the urban boundary clearly. It is recommended if the residents of the rural *Kebeles* will be consulted and consensus will be made in defining urban boundaries.

UrES-3. For each type of urban development to be proposed on areas permitted to allocate settlements (*based on the GFiLM-4*), relevant land-use suitability and compatibility should be made.

UrES-4. Planning and designing can easily be done and fits to the existing mapped and recorded land and its resource inventory at their green stage (**GFiLM--1-5**).

CHAPTER SIX : CONCLUSION AND RECOMMENDATION

6.1. CONCLUSION

Natural and working landscapes are rarely appearing in urban areas of Ethiopia. These landscapes suffer from a high level of degradation ranging from the capital city of Ethiopia to the emerging town like Sebeta.

The first conclusion is the challenges and prospects to sustain natural and working landscapes in the urban areas in Ethiopia. The socio-cultural, institutional, planning and policy related challenges are the primary reasons for the unsustainable transformation of the natural and working landscapes to other urban land uses.

In these settings, some challenges emerge from the cumulative effects of poor management of urban areas at their early stage of development (i.e., small town). This results in spontaneous urban growth lead to the formation of slum areas. Through time, the slums areas contribute to dilapidated urban centers lack ecologically and socio-culturally valuable spaces.

The other challenges refer to the limited focus on the landscapes during the urban planning process. The problem majorly resulted from the availing of less proportion of land-uses for the landscapes than the percentages given to the built-up spaces (physical planning) in the urban planning standards of Ethiopia. The focus on physical planning resulted from the tendency to rely on short-term plans, address immediate needs, and underestimate the benefits of broader planning on long-term sustainability.

The institutional and expertise-related challenges also add gaps for proper management of the landscapes. These include limited urban planning offices and urban planners, technological un-advancement, and un-enabling working environments. These have resulted in the random allocation of different land-uses after deficient landscape suitability analyses and mapping, incapability to cover all urban areas with plans, and less enforcement to implement urban plans.

The prospect to apply proactive measurements to integrate the landscapes in the Ethiopia's future urban planning process is because of about 80 % of the country is still rural, and the majorities of the existing urban areas are at their lower level of urban hierarchies. In addition to the application of this measurement, there are also the chances to consider reactive measurements to re-incorporate the landscapes in the large urban areas during the renewal or redevelopment of their slum areas. Therefore, for the sustainability of the natural and working landscapes, both proactive and reactive urban management options are recommended to minimize the impacts of the specified challenges at all stages of the Ethiopian urban planning process.

The second conclusion is the social-ecological change dynamics and the changed hotspots of the Sebeta town between 2005-2018. The natural and working landscapes related uses in the Sebeta town were converted at large extent in the last 13 years (2005-2018) that led to the degradation of the ecosystem services of the landscapes.

Among them: (i) ***Loss of provisioning services*** resulted due to the degradation and pollutions of the River and River banks, and the converted fertile agricultural lands to built-up spaces . (ii) ***Loss of regulatory and cultural services*** following the deforestation

of natural forests due to the human encroachment to fragile /environmental sensitive areas/ like *Furi and Wochecha* mountains. (iii) ***Loss of cultural services*** due to the deformations of natural sceneries and demolishing of the cultural and historical sites like *Irrecha* site and *Furii Gaara Bal'oo*.

The other major problem is the sprawl of the Sebeta town. Such expansion is resulted from unmanaged land considering all fenced large spaces existing in the inner parts of the town as built-up spaces although majority of the fenced plots are un-built and idle in use. Therefore, proper and geographic information based existing spaces auditing, and compact urban development are the most promising urban development management options that enhance sustainable natural and working landscape transformation.

The third conclusion is the driving factors for the urban built up development process in the Sebeta town.

The main drivers of BEDP responsiveness gaps on the NWL are failure management gaps, including its absence, which has resulted in the spontaneous built environment development process, and its inadequacy in terms of the absence of federal and sub-federal land use plans, as well as gaps in urban plans and their implementation. Furthermore, public land ownership has not contributed as much as expected to the responsiveness of the built environment development process.

The spatial drivers behind the spontaneous built up development process in the Sebeta town, which also contributed in the country's increasing haphazard urbanization process are:

The presence of patches of pioneer settlements within urban boundary at the time when an area get urban entitlement; The social-cultural services are more prevalent at the inception of urbanization, typically forming patches of spontaneously emerging settlements. On the other hand, physical infrastructures driven connectivity of the patch of settlements and increased the intensity of the built up spaces, and determined the growth directions of the town. Therefore, this research paper has demonstrated that spontaneous urbanization process are the emergence of unexpected social and physical service factors. Underestimating, failing to recognize the triggering factors and ineffective management of such spatial determinates has long-term consequences and eventually resulted in the country's costly haphazard urban growth. This is because non-early consideration of those drivers in the process of urban transformation incapacitates urban planners and forces them to plan on early slum areas, which further increases unplanned urban developments. The presence of the unplanned areas from their inception contributes to inner-city decay and is a major challenge to the sustainability of natural and working landscapes.

The fourth conclusion is the challenges of absence of regional plans in urban areas sharing common boundaries, focusing on the Sebeta town and Addis Ababa city. This research also identified that in the absence of standards for delineating clear urban boundaries, their determination is usually based on the level of experts' interpretation, and it contributes to the indistinct and overlapping urban boundary settings.

The other issue concluded from this research finding is that the overlapping and ambiguous urban boundaries complicate urban land management. Overlapping boundary-

setting facilitates the increment of built-up areas, causes conflicts, attracts informal settlers, and creates contradicting development. Therefore, this study suggests that clear urban boundaries should be delineated using well-defined and permanent natural and human-made features like mountains, networked green infrastructures, rivers, and monuments.

Another conclusion from this study is that non-integrated urban planning and absence of regional planning for urban areas sharing boundaries contributes significantly to the proposal of conflicting landuses and maximizes overlapping urban boundaries. Besides technical solutions, policymakers should promote and pave the way for integrated urban planning trends especially for urban areas sharing borders. This facilitates a proper integration of necessary socio-economic services while reducing the environmental footprint of the urban areas around shared boundaries. Comprehensive socio-economic characterization of overlapping urban boundaries in the study region will also be the gap for future researchers.

Moreover, the case specific issues of urban boundaries within a country, in this case Ethiopia, can be enlarged to any urban areas existing in the bordering of different countries although the rate and level of the challenge varies. The validation of this research also extends beyond the urban territorial administrations as it can also contribute to any urban-urban or rural-urban or rural-rural areas having shared boundaries and located at any global territories.

6.2. RECOMMENDATION

This research recommends a proactive urban management approach to be guided by land information systems, based on land suitability and begin at a *Greenfield Level*. It helps to control built up developments that potentially emerge around the socio-cultural services and follows physical infrastructures. Such management approach help to reduce slum formations and improve sustainable urban development as it early include intrinsic values of natural and working landscapes.

Beside the focus on spatial determinants, the authors recommend that future researchers consider a detailed analysis of the country's social-economic related drivers of urbanization and combine it with the findings of this study. In addition, alternative approaches for spatial analysis using the combination of ERDAS IMAGINE, ENVI, GIS, R and other geospatial analysis and statistical software can be applied in the availability of all the necessary high-resolution satellite images in addition to the Google Earth images. Moreover, in the unlimited spatial data, spatial changes and Morphological characterization of settlements around the spatial drivers can be mapped and analyzed from the year when each drivers in place to the current spontaneity.

REFERENCES

- (UNEP), U. N. E. P. (2016). *Mainstreaming into National Planning Processes*. 31(1), 97–99.
- AACPPO. (2017). *Addis Ababa City Structure Plan*. <https://c40-production-images.s3.amazonaws.com>
- Aalto, H. E., Marcus, L., & Torsvall, J. (2018). Towards a social-ecological urbanism: Co-producing knowledge through design in the Albano Resilient Campus project in Stockholm. *Sustainability (Switzerland)*, 10(3). <https://doi.org/10.3390/su10030717>
- Abo-El-Wafa, H., Yeshitela, K., & Pauleit, S. (2017). Exploring the future of rural–urban connections in sub-Saharan Africa: modelling urban expansion and its impact on food production in the Addis Ababa region. *Geografisk Tidsskrift - Danish Journal of Geography*, 117(2), 68–81. <https://doi.org/10.1080/00167223.2017.1350926>
- Abou-korin, A. A. (2014). Small-size urban settlements: Proposed approach for managing urban future in developing countries of increasing technological capabilities , the case of Egypt. *Ain Shams Engineering Journal*, 5(2), 377–390. <https://doi.org/10.1016/j.asej.2013.12.001>
- Achamyeleh, G. A. (2014). Urbanization and the Struggle for Land in the Peri-Urban Areas of Ethiopia. *Bahir Dar University*.
- Aguilera, F., Valenzuela, L. M., & Botequilha-Leitão, A. (2011). Landscape metrics in the analysis of urban land use patterns: A case study in a Spanish metropolitan area. *Landscape and Urban Planning*, 99(3–4). <https://doi.org/10.1016/>

- Agus, F. (2011). Environmental and sustainability issues of Indonesian Agricultural. *Jurnal Litbang*, 30(4).
- Ahmad, I., & Hussain, M. A. (2014). National Education Policy (NEP 2009-2015) In Pakistan: Critical Analysis and a Way Forward. *Journal of Social Sciences and Humanities*, 53(2).
- Ahmed, A., & Dinye, R. D. (2012). Impact of land use activities on Subin and Aboabo Rivers in Kumasi Metropolis. *International Journal of Water Resources and Environmental Engineering*, 4(7), 241–251. <https://doi.org/10.5897/IJWREE12.036>
- Ahmed, A., Sara Taha, A. ., Sundas, R. Q. and, & Man-Qun, W. (2021). Heavy Metals and Pesticides Toxicity in Agricultural Soil and Plants: Ecological Risks and Human Health Implications. *Toxics*, 9.
- Al Khalifa, F. (2021). An approach to define smart sustainable urbanism locally through expert's perspective. *International Journal of Sustainable Building Technology and Urban Development*, 12(1). <https://doi.org/10.22712/susb.20210003>
- al Rawaf, R. (2017). *Social-Ecological Urbanism : Lessons in Design from the Albano Resilient Campus*.
- Alaci, D. S. A. (2010). Regulating urbanisation in Sub-Saharan Africa through cluster settlements: Lessons for urban managers in Ethiopia. *Theoretical and Empirical Researches in Urban Management*, 5(5), 20–34.
- Aladesote, O. J. (2022). Cost-Benefit Analysis of Green Infrastructure for Sustainable Stormwater Management of the Built Environment. *International Journal of*

Research Publications, 97(1). <https://doi.org/10.47119/ijrp100971320222992>

Alberti, M. (2008). Modeling the urban ecosystem: A conceptual framework. In *Urban Ecology: An International Perspective on the Interaction Between Humans and Nature* (pp. 623–646). Springer. https://doi.org/10.1007/978-0-387-73412-5_41

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 (Switzerland)*, 13(6). <https://doi.org/10.3390/su13063081>

Alemayehu. (2019). *Africa Can End Poverty: Why should ethiopians care about urbanization?* World Bank. <https://blogs.worldbank.org>

Alemie, B. K., Bennett, R. M., & Zevenbergen, J. (2015). Evolving urban cadastres in Ethiopia: The impacts on urban land governance. *Land Use Policy*, 42, 695–705. <https://doi.org/10.1016/j.landusepol.2014.10.001>

Alex Lord, M. T.-J. (2015). *Regional Planning: in International Encyclopedia of the Social & Behavioral Sciences* (Second Edi). Elsevier. <https://www.sciencedirect.com/topics/social-sciences/regional-planning>

americanrivers.org. (2022). *What is Green Infrastructure?* <https://www.americanrivers.org/threats-solutions/clean-water/green-infrastructure/what-is-green-infrastructure/>

Anderson, R. E. H. and W. D. (2001). Development at the Urban Fringe and Beyond: Impacts on Agriculture and Rural Land. *Agricultural & Applied Economics*, 1(3), 1–22.

Andualem. (2019). *From Rural Town To Ethiopia's Industrial Hub.*

<https://newbusinessethiopia.com/nbe-blog/from-rural-town-to-ethiopias-industrial-hub/>

- Antonio, E. (2009). Profiles of tools and tactics for environmental mainstreaming: ENVIRONMENTAL IMPACT ASSESSMENT (EIA). *A Product of the Environmental Mainstreaming Initiative*, 1. <http://www.sciencedirect.com/science/article/pii/S0921344995000658%5Cnhttp://scholar.google.com/scholar?hl=en&btnG=Search&q=intitle:Profiles+of+Tools+and+Tactics+for+Environmental+Mainstreaming#0>
- Antrop, M. (2004). Landscape change and the urbanization process in Europe. In *Landscape and Urban Planning* (Vol. 67, Issues 1–4, pp. 9–26). [https://doi.org/10.1016/S0169-2046\(03\)00026-4](https://doi.org/10.1016/S0169-2046(03)00026-4)
- Appelhans, N. (2016). Urban planning and everyday urbanisation: A case study on Bahir Dar, Ethiopia. In *Urban Planning and Everyday Urbanisation: A Case Study on Bahir Dar, Ethiopia*. <https://doi.org/10.14361/9783839437155>
- Arnstein, S. (1968). *A ladder of citizen participation*. Journal of the American Institute of planners, 1969 - Taylor & Francis.
- Arsiso, B. K., Mengistu Tsidu, G., Stoffberg, G. H., & 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*, 105(January), 212–223. <https://doi.org/10.1016/j.pce.2018.02.009>
- Ashiru, T. O. O. (2015). *The Roles of Planners in the Built Environment*.
- Asmamaw Yehun, Amezene Reda, A. M. and S. C. (2017). *Evaluation of Current Urban*

Cadastre Practice in Ethiopia : Case of Bahir Dar , Gondar and Dessie (Issue 8804).

Assaye, R., Suryabhagavan, K. V., Balakrishnan, M., & Hameed, S. (2017). Geo-Spatial Approach for Urban Green Space and Environmental Quality Assessment: A Case Study in Addis Ababa City. *Journal of Geographic Information System*, 09(02), 191–206. <https://doi.org/10.4236/jgis.2017.92012>

Assche, K. Van, Beunen, R., Duineveld, M., & Jong, H. De. (2012). Planning Theory. *Planning Theory*, 12(2), 177–198. <https://doi.org/10.1177/1473095212456771>

Ávila, P. C., & Ferreira, F. P. M. (2016). Insecure land tenure in the urban areas of Minas Gerais. *Urbe. Revista Brasileira de Gestão Urbana*. <https://doi.org/10.1590/2175-3369.008.002.ao03>

Babalola, D. O. (2012). *Rural Urban Transformations in The Developing Countries*. 2(3), 83–111.

Babarinde, J., & Tagicakibau, M. (2015). A Conceptual Framework for Multipurpose Land Information System (MPLIS) Application for Land Management in Papua New Guinea. *Melanesian Journal of Geomatics and Property Studies*, 1, 69–80.

Badmos, O. S., Rienow, A., Callo-Concha, D., Greve, K., & Jürgens, C. (2019). Simulating slum growth in Lagos: An integration of rule based and empirical based model. *Computers, Environment and Urban Systems*, 77. <https://doi.org/10.1016/j.compenvurbsys.2019.101369>

Bagheri, B., & Shaykh-Baygloo, R. (2021). Spatial analysis of urban smart growth and its effects on housing price: The case of Isfahan, Iran. *Sustainable Cities and Society*,

68. <https://doi.org/10.1016/j.scs.2021.102769>

Bailey, N., & Turok, I. (2001). Central Scotland as a polycentric urban region: Useful planning concept or chimera? *Urban Studies*, 38(4). <https://doi.org/10.1080/00420980120035295>

Balta, M. Ö., Tekel, A., & Tekel, H. İ. (2012). Urban Development Process of Built Environments in Metropolitan Areas in Turkey: Case Study of Angora Settlement, Ankara. *Journal of Urban Planning and Development*, 138(1). [https://doi.org/10.1061/\(asce\)up.1943-5444.0000101](https://doi.org/10.1061/(asce)up.1943-5444.0000101)

Balthazard-Accou, K., Emmanuel, E., Agnamey, P., & Raccurt, C. (2020). Pollution of Water Resources and Environmental Impacts in Urban Areas of Developing Countries: Case of the City of Les Cayes (Haiti). In *Environmental Health - Management and Prevention Practices*. <https://doi.org/10.5772/intechopen.86951>

Banerjee, S. B. (2003). Who sustains whose development? Sustainable development and the reinvention of nature. *Organization Studies*, 24(1). <https://doi.org/10.1177/0170840603024001341>

Barnes, P. (2021). *Green > Grey : Challenges , Opportunities , and Policy Implications for Delaware Green Infrastructure Landscape*. July, 1–6.

Barthel, S., Colding, J., Erixon, H., Ernstson, H., Grahn, S., Kärsten, C., Marcus, L., & Torsvall, J. (2013). *Principles of Social Ecological Urbanism: Case Study Albano Campus, Stockholm* (Issue January 2015). <https://doi.org/10.1073/pnas.0703993104>

Barthel, S., & Isendahl, C. (2013). Urban gardens, Agriculture, And water management: Sources of resilience for long-term food security in cities. *Ecological Economics*.

<https://doi.org/10.1016/j.ecolecon.2012.06.018>

- Bassett, S. (2009). New Economies of Landscape and Its New Urban Form - Eco-Tourism and Ecological Urbanism As a New Approach To Redevelopment in Post-Disaster Reconstruction in Sichuan Province , China. *The New Urban Question - Urbanism beyond Neo-Liberalism*, March, 191–198.
- Basso, B. S., Casacchia, O., Cassata, L., Reynaud, C., & Said, M. (1994). *Chapter 2 The Geographical Distribution of Urban and Rural Population*. 7–51.
- Beauchamp, M. (2007). *Sacred Places, Storied Places: Ancient Wisdom for a Modern World*.
- Bekele, W., & Drake, L. (2003). Soil and water conservation decision behavior of subsistence farmers in the Eastern Highlands of Ethiopia: A case study of the Hunde-Lafto area. *Ecological Economics*, 46(3). [https://doi.org/10.1016/S0921-8009\(03\)00166-6](https://doi.org/10.1016/S0921-8009(03)00166-6)
- Benedict, M. A., & MacMahon, E. T. (2002). Green infrastructure: Smart conservation for the 21st century. *Renewable Resources Journal*, 20(3).
- Benti, S., Terefe, H., & Callo-concha, D. (2021). Challenges and prospects to sustain natural and working landscapes in the urban areas in Ethiopia. *Current Research in Environmental Sustainability*, 3, 100071. <https://doi.org/10.1016/j.crsust.2021.100071>
- Berhie, G. K. (2016). *The effect of spatial configuration on land use and transport mode choices: Space syntax exploration on gridded and non-gridded American cities*. Texas Tech University.

- Beyene, Y. (2009). *Environmental Problems and Solutions in Ethiopia Generally and in Africa Specifically (A case study on Ethiopia)*. Jimma University.
- Birhanu, A. (2014). Environmental Degradation and Management in Ethiopian Highlands: Review of Lessons Learned. *International Journal of Environmental Protection and Policy*, 2(1). <https://doi.org/10.11648/j.ijepp.20140201.14>
- Bishop, A. B. (1997). Urban infrastructure: Transportation, Public Utilities, Waste Management and Pollution Control. *College of Engineering, Utah State University*, 176–181. <https://doi.org/10.5949/upo9781846313905.013>
- Bisu, D. Y., Kuhe, A., & Iortyer, H. A. (2016). Urban household cooking energy choice: an example of Bauchi metropolis, Nigeria. *Energy, Sustainability and Society*, 6(1), 15. <https://doi.org/10.1186/s13705-016-0080-1>
- Botequilha Leitão, A., & Ahern, J. (2002). Applying landscape ecological concepts and metrics in sustainable landscape planning. *Landscape and Urban Planning*, 59(2), 65–93. [https://doi.org/10.1016/S0169-2046\(02\)00005-1](https://doi.org/10.1016/S0169-2046(02)00005-1)
- Brown, H. C. P. (2010). Tenure in REDD: Start-point or Afterthought? *Canadian Journal of Development Studies / Revue Canadienne d'études Du Développement*. <https://doi.org/10.1080/02255189.2010.9669341>
- Brownson, R. C., Hoehner, C. M., Day, K., Forsyth, A., & Sallis, J. F. (2009). Measuring the Built Environment for Physical Activity. State of the Science. In *American Journal of Preventive Medicine* (Vol. 36, Issue 4 SUPPL.). <https://doi.org/10.1016/j.amepre.2009.01.005>
- Burgess. (2016). The Burgess Urban Land Use Model. *Hofstra University*.

- Burkhard, B., Kroll, F., Nedkov, S., & Müller, F. (2012). Mapping ecosystem service supply, demand and budgets. *Ecological Indicators*, 21. <https://doi.org/10.1016/j.ecolind.2011.06.019>
- Burkhard B, M. J. (Eds. . (2017). Mapping Ecosystem Services. In *Pensoft Publishers, Sofi*. [https://doi.org/http://dx.doi.org/10.1016/S0076-5392\(08\)61779-8](https://doi.org/http://dx.doi.org/10.1016/S0076-5392(08)61779-8)
- Burley, J. B. (2018). The emergence of landscape urbanism: A chronological criticism essay. *Land*, 7(4). <https://doi.org/10.3390/land7040147>
- Cadman, D., & Topping, R. (1995). *Property Development* (Fourth Edi). Routledge.
- Cannadine, D. (1984). The present and the past in the English industrial revolution 1880-1980. *Past and Present*, 103(1). <https://doi.org/10.1093/past/103.1.131>
- Cao, Z., Li, Y., & Chen, Y. (2019). Approaches to rural transformation and sustainable development in the context of urban-rural integration. *Dili Xuebao/Acta Geographica Sinica*, 74(12). <https://doi.org/10.11821/dlxb201912010>
- Cárcel-Carrasco, J., Pascual-Guillamón, M., & Salas-Vicente, F. (2021). Analysis on the effect of the mobility of combustion vehicles in the environment of cities and the improvement in air pollution in Europe: A vision for the awareness of citizens and policy makers. *Land*, 10(2). <https://doi.org/10.3390/land10020184>
- Careers Network (CN). (2014). *Getting into Town Planning*.
- Carpenter, S. R., & Folke, C. (2006). Ecology for transformation. *Trends in Ecology and Evolution*, 21(6), 309–315. <https://doi.org/10.1016/j.tree.2006.02.007>
- Carsten Schaber, J. W. and A. zdiara. (2016). New Planning Culture in German Cities – Topics, Priorities and Processes. *Housing and Sustainable Urban Development*.

- Chaka, S. (2018). *Impacts of Informal Settlement on Development of Sebeta City* [Addis Ababa University]. [http://213.55.95.56/bitstream/handle/123456789/15612/60.Shibru Chaka.pdf](http://213.55.95.56/bitstream/handle/123456789/15612/60.Shibru%20Chaka.pdf)
- Chalana, M. (2008). The Working Landscape: Founding, Preservation, and the Politics of Place. *Journal of the American Planning Association*, 74(June 2014), 528–529. <https://doi.org/10.1080/01944360802350509>
- Chatterjee, S., Dutta, S., Dutta, I., & Das, A. (2022). Ecosystem services change in response to land use land cover dynamics in Paschim Bardhaman District of West Bengal, India. *Remote Sensing Applications: Society and Environment*, 27. <https://doi.org/10.1016/j.rsase.2022.100793>
- Chauncy D. Harris and Edward L. Ullman. (2016). The Nature of Cities. *The ANNALS of the American Academy of Political and Social Science*, 242(1). <https://doi.org/https://doi.org/10.1177/000271624524200103>
- Chen, J. (2007). Rapid urbanization in China: A real challenge to soil protection and food security. *Catena*, 69(1). <https://doi.org/10.1016/j.catena.2006.04.019>
- Chen, W., & Wang, Z. (2014). Institutional framework for rural-urban land conversion in China and its soft constraint defect. *Zhongguo Renkou Ziyuan Yu Huan Jing/ China Population Resources and Environment*, 24(3). <https://doi.org/10.3969/j.issn.1002-2104.2014.03.010>
- Chimhowu, A. O., Hulme, D., & Munro, L. T. (2019). The ‘New’ national development planning and global development goals: Processes and partnerships. *World Development*, 120. <https://doi.org/10.1016/j.worlddev.2019.03.013>

- Cho, S. H., Lambert, D. M., Roberts, R. K., & Kim, S. G. (2010). Demand for open space and urban sprawl: The Case of Knox County, Tennessee. In *Advances in Spatial Science* (Vol. 63). https://doi.org/10.1007/978-3-642-03326-1_9
- City Club of Portland. (2005). *Portland Development Commission: Governance, Structure and Process*.
- Clark, B. D. (1967). Book Review: Garden Cities of Tomorrow by Ebenezer Howard, edited with a Preface by F. J. Osborn, Introductory essay by Lewis Mumford, Faber, 1965, pp. 168, 7/6. *Urban Studies*, 4(1). <https://doi.org/10.1080/00420986720080111>
- Cohen, B. (2006). Urbanization in developing countries: Current trends, future projections, and key challenges for sustainability. In *Technology in Society* (Vol. 28, Issues 1–2, pp. 63–80). <https://doi.org/10.1016/j.techsoc.2005.10.005>
- CollegeGrad.com. (2019). *Urban and Regional Planners: Jobs, Career, Salary and Education Information*. <https://collegegrad.com/careers/urban-and-regional-planners>
- Coompanthu, S. (2007). *THE ANALYSIS OF BUDGETING SYSTEM REFORM IN THAILAND*. KDI School of Public Policy and Management.
- Copeland, C. (2013). Green infrastructure and issues in managing urban stormwater. *Selected Issues in Water Resources and Management*, 79–113.
- County. (2016). *Natural Environment*. 1, 241–249.
- Cox, D. T. C., & Gaston, K. J. (2015). Likeability of garden birds: Importance of species knowledge & richness in connecting people to nature. *PLoS ONE*, 10(11). <https://doi.org/10.1371/journal.pone.0141505>

- Critchley, P. (2014). *Ewis Mumford, Civic Environmentalism And Ecological Regionalism*.
- CSA-Ethiopia. (2007). *2007 Population and Housing Census of Ethiopia: Results for Oromia Region, Vol. 1*.
- CSA. (2007). *Summary and Statistical Report of the 2007 Population and Housing Census* (p. 114).
- CSA. (2013). *Central Statistical Agency Population Projection of Ethiopia for All Regions At Wereda Level from 2014-2017. Federal Democratic Republic of Ethiopia, Addis Ababa. August 2013*, 1–118.
- Culpin, E. G. (2015). The Garden City Movement Up-To-Date. In *The Garden City Movement Up-To-Date*. <https://doi.org/10.4324/9781315716077>
- Curtin, S., & Kragh, G. (2014). Wildlife Tourism: Reconnecting People with Nature. *Human Dimensions of Wildlife*, 19(6), 545–554. <https://doi.org/10.1080/10871209.2014.921957>
- Dagdal Ince, C., & Aslan, B. (2017). *Analysis of Changes in Property By Using Gis and Regression Models in Urban Regeneration Projects*. 85–92. <https://doi.org/10.18509/gbp.2017.12>
- David Adams. (1994). *Urban planning and the development process* (1st Editio). Routledge. <https://doi.org/https://doi.org/10.4324/9780203857007>
- Davidoff, P. (1965). Advocacy and Pluralism in Planning. *Journal of the American Institute of Planners*, 31:4, 331–338. <https://doi.org/10.1080/01944366508978187>
- Deal, B., & Pan, H. (2017). Discerning and addressing environmental failures in policy

- scenarios using Planning Support System (PSS) technologies. *Sustainability (Switzerland)*, 9(1). <https://doi.org/10.3390/su9010013>
- Deelstra, T., & Girardet, H. (1990). *[Thematic Paper, 002 p 0043] Deelstra, Tjeerd. Urban Agriculture and Sustainable Cities* . 43–65. <https://doi.org/10.1177/095624789200400214>
- Degife, A., Worku, H., Gizaw, S., & 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(March), 178–190. <https://doi.org/10.1016/j.rsase.2019.03.005>
- 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). <https://doi.org/10.1186/s13717-020-00248-3>
- Desta, H., Lemma, B., & Fetene, A. (2012). Aspects of climate change and its associated impacts on wetland ecosystem functions - A review. *Journal of American Science*, 8(10), 1–23. <http://www.jofamericanscience.org>
- Dijkstra, L., Hamilton, E., Lall, S., & Wahba, S. (2020). How do we define cities, towns, and rural areas? *World Bank Blog*, March 10.
- Djordjevic, D., & Dabovic, T. (2004). Towards a new role for spatial planning. *Glasnik Srpskog Geografskog Drustva*, 84(2). <https://doi.org/10.2298/gsgd0402083d>
- Doxiadis, C. A. (1968). The Emerging Great Lakes Megalopolis. *Proceedings of the IEEE*, 56(4). <https://doi.org/10.1109/PROC.1968.6332>

- Drennan, M. P. (2011). Regional Planning in America: Practice and Prospect edited by Ethan Seltzer and Armando Carbonell. *Journal of Regional Science*, 51(5). https://doi.org/10.1111/j.1467-9787.2011.00748_7.x
- Du, X., & Huang, Z. (2017). Ecological and environmental effects of land use change in rapid urbanization: The case of hangzhou, China. *Ecological Indicators*, 81, 243–251. <https://doi.org/10.1016/j.ecolind.2017.05.040>
- Dubbale D. et. al. (2010). Urban Environmental Challenges in Developing Cities: The Case of Ethiopian Capital Addis Ababa. *Engineering and Technology*, 4(6), 397–402.
- Dube, E. E. (2013). Urban planning & land management challenges in emerging towns of Ethiopia: The case of Arba Minch. *Journal of Urban and Environmental Engineering*, 7(2), 340–348. <https://doi.org/10.4090/juee.2013.v7n2.340348>
- Dunn, A. D. (2008). Siting green infrastructure: legal and policy solutions to alleviate urban poverty and promote healthy communities. *Environmental Affairs*, 37(41).
- DuPont, C. M. (2017). Financing Climate Resilience in Boston: Engaging and Incentivizing Developers and Private Property Owners. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.2838269>
- Durand, C. P., Andalib, M., Dunton, G. F., Wolch, J., & Pentz, M. A. (2011). A systematic review of built environment factors related to physical activity and obesity risk: Implications for smart growth urban planning. *Obesity Reviews*, 12(5). <https://doi.org/10.1111/j.1467-789X.2010.00826.x>
- Duri, V., Sherifi, M., & Boboli, I. (2013). Structure of the rural and urban population in

- Gjirokastra circuit and its changes during the twenty years, from 1989 to 2009. *Mediterranean Journal of Social Sciences*, 4(13). <https://doi.org/10.5901/mjss.2013.v4n13p275>
- El, A., Mulla, D. J., El, S., & Knight, J. (2017). Analysis of urban growth and sprawl from remote sensing data : Case of Fez , Morocco. *International Journal of Sustainable Built Environment*, 6(1), 160–169. <https://doi.org/10.1016/j.ijsbe.2017.02.003>
- El Araby, M. (2002). Urban growth and environmental degradation: The case of Cairo, Egypt. *Cities*, 19(6), 389–400. [https://doi.org/10.1016/S0264-2751\(02\)00069-0](https://doi.org/10.1016/S0264-2751(02)00069-0)
- Elmqvist, T., Andersson, E., McPhearson, T., Bai, X., Bettencourt, L., Brondizio, E., Colding, J., Daily, G., Folke, C., Grimm, N., Haase, D., Ospina, D., Parnell, S., Polasky, S., Seto, K. C., & Van Der Leeuw, S. (2021). Urbanization in and for the Anthropocene. *Npj Urban Sustainability*, 1(1). <https://doi.org/10.1038/s42949-021-00018-w>
- Elwood L. Shafer Jr., J. (2018). Natural Landscape Preferences : A Predictive Model. *Leisure Research*, 2216. <https://doi.org/10.1080/00222216.1969.11969706>
- encyclopedia.pub. (2022). *Urbanization*. <https://encyclopedia.pub/entry/28490>
- Engelen, G., Lavalle, C., Barredo, J. I., Meulen, M. van der, & White, R. (2007). The Moland Modelling Framework for Urban and Regional Land-Use Dynamics. In *GeoJournal Library* (Vol. 90). https://doi.org/10.1007/978-1-4020-5648-2_17
- Erena, S. H., Worku, H., & De Paola, F. (2018). Flood hazard mapping using FLO-2D and local management strategies of Dire Dawa city, Ethiopia. *Journal of Hydrology*:

- Regional Studies*, 19(September), 224–239. <https://doi.org/10.1016/j.ejrh.2018.09.005>
- Ermias, A., Bogaert, J., & Wogayehu, F. (2019). Analysis of city size distribution in Ethiopia: Empirical evidence from 1984 to 2012. *Journal of Urban Management*, 8(2), 237–244. <https://doi.org/10.1016/j.jum.2018.12.007>
- Ethiopian Agricultural Research Institute (EARI). (2009). *No Title*. <https://en.wikipedia.org/wiki/Sebeta>
- Ethiopian Urban Plan Proclamations(EUPP). (2008). *Urban Planning Proclamation*. 621, 1–2.
- Ewing, R. (1997). Is Los Angeles-Style Sprawl Desirable? *Journal of the American Planning Association*, 63(1). <https://doi.org/10.1080/01944369708975728>
- Ewing, R., & Hamidi, S. (2015). Compactness versus Sprawl: A Review of Recent Evidence from the United States. *Journal of Planning Literature*, 30(4). <https://doi.org/10.1177/0885412215595439>
- Falkeis, A. (2015). Thinking out of the Urban design toolbox. In *Arts, Research, Innovation and Society*. https://doi.org/10.1007/978-3-319-09909-5_12
- Fang, X., Shi, X., & Gao, W. (2021). Measuring urban sustainability from the quality of the built environment and pressure on the natural environment in China: A case study of the Shandong Peninsula region. *Journal of Cleaner Production*, 289. <https://doi.org/10.1016/j.jclepro.2020.125145>
- FAO. (1996). *Guidelines for land-use planning*. FAO Development Series No. 1.
- Farrell, K. (2017). *The Rapid Urban Growth Triad: A New Conceptual Framework for*

- Examining the Urban Transition in Developing Countries.* 1–19.
<https://doi.org/10.3390/su9081407>
- Fashing, P. J., Nguyen, N., Demissew, S., Gizaw, A., Atickem, A., Mekonnen, A., ... & Stenseth, N. C. (2022). Ecology, evolution, and conservation of Ethiopia's biodiversity. *Proceedings of the National Academy of Sciences*, 119(50).
- Fazal, S. (2000). Urban expansion and loss of agricultural land - a GIS based study of Saharanpur City, India. *Environment and Urbanization*, 12(2), 133–149.
<https://doi.org/10.1630/095624700101285343>
- Federal Minister for Food, A. and C. P. (BMELV) of G. (2010). *German Agriculture Facts and Figures*.
- Federal Negarit Gazeta. (1995). *Proclamation of the Constitution of the Federal Democratic Republic of Ethiopia*. 16–34.
- Fedler, J. (2020). *Israel ' s Agriculture in the 21st century*. 1–12.
- Fenta, A. A., Yasuda, H., Haregeweyn, N., Belay, A. S., Hadush, Z., Gebremedhin, M. A., & Mekonnen, G. (2017). The dynamics of urban expansion and land use/land cover changes using remote sensing and spatial metrics: The case of Mekelle city of northern Ethiopia. *International Journal of Remote Sensing*, 38(14), 4107–4129.
<https://doi.org/10.1080/01431161.2017.1317936>
- Ferreira, V., Barreira, A. P., Loures, L., Antunes, D., & Panagopoulos, T. (2020). Stakeholders' engagement on nature-based solutions: A systematic literature review. In *Sustainability (Switzerland)* (Vol. 12, Issue 2). <https://doi.org/10.3390/su12020640>

- Fetene, A., & Worku, H. (2013). Planning for the conservation and sustainable use of urban forestry in Addis Ababa, Ethiopia. *Urban Forestry and Urban Greening*. <https://doi.org/10.1016/j.ufug.2013.03.004>
- Flores, A., Pickett, S. T. A., Zipperer, W. C., Pouyat, R. V., & Pirani, R. (1998). Adopting a modern ecological view of the metropolitan landscape: The case of a greenspace system for the New York City region. *Landscape and Urban Planning*, 39(4), 295–308. [https://doi.org/10.1016/S0169-2046\(97\)00084-4](https://doi.org/10.1016/S0169-2046(97)00084-4)
- Forster, T., & Escudero, A. G. (2014). *City Regions as Landscapes for People, Food and Nature*. 47. <http://peoplefoodandnature.org/wp-content/uploads/sites/4/2014/06/City-Regions-as-Landscapes-for-People-Food-and-Nature..pdf>
- Frank, H. E. M. and G. (1984). *An Introduction to Regional Economics*.
- freshcoastguardians. (2022). *Green Infrastructure Strategies*. <https://www.freshcoastguardians.com/resources/green-strategies>
- Galland, D. (2012). Is regional planning dead or just coping? The transformation of a state sociospatial project into growth-oriented strategies. *Environment and Planning C: Government and Policy*, 30(3). <https://doi.org/10.1068/c111150>
- Galtung, J. (1990). International Development in Human Perspective. In *Conflict: Human Needs Theory*. https://doi.org/10.1007/978-1-349-21000-8_16
- Gan, Q. (2011). Land resources optimization allocation based on smart growth. *International Conference on Management and Service Science, MASS 2011*. <https://doi.org/10.1109/ICMSS.2011.5998740>
- Gavriliadis, A. A., Ciocănea, C. M., Niță, M. R., Onose, D. A., & Năstase, I. I. (2016).

- Urban Landscape Quality Index – Planning Tool for Evaluating Urban Landscapes and Improving the Quality of Life. *Procedia Environmental Sciences*, 32, 155–167. <https://doi.org/10.1016/j.proenv.2016.03.020>
- Gebeyehu Admasu, T. (2015). Urban land use dynamics, the nexus between land use pattern and its challenges: The case of Hawassa city, Southern Ethiopia. *Land Use Policy*, 45, 159–175. <https://doi.org/10.1016/j.landusepol.2015.01.022>
- Gebre, T., & Gebremedhin, B. (2019). The mutual benefits of promoting rural-urban interdependence through linked ecosystem services. *Global Ecology and Conservation*, 20. <https://doi.org/10.1016/j.gecco.2019.e00707>
- Gennaio, M. P., Hersperger, A. M., & Bürgi, M. (2009). Containing urban sprawl- Evaluating effectiveness of urban growth boundaries set by the Swiss Land Use Plan. *Land Use Policy*, 26(2), 224–232. <https://doi.org/10.1016/j.landusepol.2008.02.010>
- Germany Association of Cities. (2013). *Integrated Urban Development Planning and Urban Development Management – Strategies and instruments for sustainable urban development Position*.
- Gibson, D. M., & Quinn, J. E. (2017). Application of anthromes to frame scenario planning for landscape-scale conservation decision making. *Land*, 6(2). <https://doi.org/10.3390/land6020033>
- Girma, A. (2013). *Urban Growth and Development in Ethiopia: a Case Study of Bantu Town, South West Shewa Zone, Oromia Regional State. October*.
- Girma, Y., Terefe, H., Pauleit, S., & Kindu, M. (2019a). Urban green infrastructure

- planning in Ethiopia : The case of emerging towns of Oromia special zone surrounding Finfinne. *Journal of Urban Management*, 8(1), 75–88.
<https://doi.org/10.1016/j.jum.2018.09.004>
- Girma, Y., Terefe, H., Pauleit, S., & Kindu, M. (2019b). Urban green spaces supply in rapidly urbanizing countries : The case of Sebeta Town, Ethiopia. *Remote Sensing Applications: Society and Environment*, 13(December 2017), 138–149.
<https://doi.org/10.1016/j.rsase.2018.10.019>
- Goldfield, D. (2012). Concentric Zone Model. In *Encyclopedia of American Urban History*. <https://doi.org/10.4135/9781412952620.n103>
- Gondo, T. (2011). *Linking non-urbanized areas and eco-sustainable planning : Realities and Challenges from urban Ethiopia*. 1–16.
- Gosaye, A. (2008). *physical expansion over the years*. Ethiopian Review.
<http://ethiopianreview.com/content/2983>
- Graziano da Silva, J., & Fan, S. (2017). Smallholders and Urbanization: Strengthening rural-urban linkages to end hunger and malnutrition. *2017 Global Food Policy Report*.
- Green, H. (2014). The Future of BIM - Vision Integration... Savings. *Journal of The National Institute of Building Sciences*, 2(6).
- Guntur, G. (2019). A Conceptual Framework for Qualitative Research: A Literature Studies. *Capture : Jurnal Seni Media Rekam*, 10(2). <https://doi.org/10.33153/capture.v10i2.2447>
- Guo, Q., He, Z., Li, D., & Spyra, M. (2022). Analysis of Spatial Patterns and

- Socioeconomic Activities of Urbanized Rural Areas in Fujian Province, China. *Land*, 11(7), 1–14. <https://doi.org/10.3390/land11070969>
- Guy, S., & Henneberry, J. (2000). Understanding urban development processes: Integrating the economic and the social in property research. *Urban Studies*, 37(13), 2399–2416. <https://doi.org/10.1080/00420980020005398>
- Gwamna, E. S., & Zahari, Y. (2014). The Impact of Urban Land Use Changes on Residential Property Rental Values in Kaduna Metropolis , Nigeria. *Department of Real Estate Management, Faculty of Technology Management and Business*.
- Haddad, N. M. (2015). Corridors for people, corridors for nature. In *Science* (Vol. 350, Issue 6265, pp. 1166–1167). <https://doi.org/10.1126/science.aad5072>
- Hall, P. (1974). The Containment of Urban England. *The Geographical Journal*, 140(3). <https://doi.org/10.2307/1796533>
- Hall, P. (2020). “The City of Theory.” In *The City Reader*. <https://doi.org/10.4324/9780429261732-54>
- Halliday, S. P. (1997). Architecture of habitat: Design for life. *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences*, 355(1728). <https://doi.org/10.1098/rsta.1997.0064>
- Hamza, I., & Iyela, A. (2012). Land Use Pattern, Climate Change, and Its Implication for Food Security in Ethiopia: A Review. *Ethiopian Journal of Environmental Studies and Management*, 5(1). <https://doi.org/10.4314/ejesm.v5i1.4>
- Hanham, R., & Spiker, J. S. (2005). Urban sprawl detection using satellite imagery and geographically weighted regression. In *Geo-Spatial Technologies in Urban*

Environments. https://doi.org/10.1007/3-540-26676-3_12

- Hardee, K., & Mutunga, C. (2010). Strengthening the link between climate change adaptation and national development plans: Lessons from the case of population in National Adaptation Programmes of Action (NAPAs). In *Insectes Sociaux* (Vol. 57, Issue 2). <https://doi.org/10.1007/s11027-009-9208-3>
- Hardi, T., Repaská, G., Veselovský, J., & Viliňová, K. (2020). Environmental Consequences of the Urban Sprawl in the Suburban Zone of Nitra. An Analysis Based on Landcover Data. *Geographica Pannonica*, 24(3). <https://doi.org/10.5937/gp24-25543>
- Haregeweyn, N., Fikadu, G., Tsunekawa, A., Tsubo, M., & Meshesha, D. T. (2012). The dynamics of urban expansion and its impacts on land use/land cover change and small-sca. *Landscape and Urban Planning*, 106(2), 149–157. <https://doi.org/10.1016/j.landurbplan.2012.02.016>
- Havel, M. B. (2014). Delineation of property rights as institutional foundations for urban land markets in transition. *Land Use Policy*, 38. <https://doi.org/10.1016/j.landusepol.2014.01.004>
- Hazemba, M., & Halog, A. (2021). Systematic review of how Environmental Management policies are incorporated into National Development Plans in order to achieve Sustainable Development. In *Environmental Challenges* (Vol. 3). <https://doi.org/10.1016/j.envc.2021.100041>
- Healey, P. (1998). Collaborative planning in a stakeholder society. In *Town Planning Review* (Vol. 69, Issue 1). <https://doi.org/10.3828/tpr.69.1.h651u2327m86326p>

- Healey, P., & Barrett, S. M. (1990). Structure and Agency in Land and Property Development Processes: Some Ideas for Research. *Urban Studies*, 27(1). <https://doi.org/10.1080/00420989020080051>
- Heaton, H. (2021). Industrial revolution. In *Routledge Library Editions: Industrial Revolution*. <https://doi.org/10.4324/9781315172163-2>
- Herrmann, J., Krafft, F., Phillipson, D. W., Sanders, W. T., Sivin, N., & Zurcher, E. (1996). *CONCEPTS OF NATURE, PHILOSOPHY AND SCIENCE. History of Humanity: From the seventh century BC to the seventh century AD*. 3(11).
- Herzog, L. A. (2018). Suburbanization in Latin America. *The Routledge Companion to the Suburbs*, July, 62–71. <https://doi.org/10.4324/9781315266442>
- Hestad, D. (2021). The Evolution of Private Sector Action in Sustainable Development: STILL ONLY ONE EARTH: Lessons from 50 years of UN sustainable development policy. *International Institute for Sustainable Development, September 2020*, 1–9.
- Heymans, A., Breadsell, J., Morrison, G. M., Byrne, J. J., & Eon, C. (2019). *Ecological Urban Planning and Design : A Systematic Literature Review*.
- Hillier, B., & Raford, N. (2014). Description and Discovery in Socio-Spatial Analysis: The Case of Space Syntax. In *The SAGE Handbook of Measurement*. <https://doi.org/10.4135/9781446268230.n14>
- Hirschhorn, J. S. (2001). Environment, Quality of Life, and Urban Growth in the New Economy. *Environmental Quality Management*, 10(3). <https://doi.org/10.1002/tqem.1000>

- Horst, A. (2006). Rehabilitation of urban forests in Addis Ababa. *Journal of Drylands*, 1(2), 108–117.
- Hosseiniabadi, M., Poortaheri, M., & Sekeravani, A. M. (2012). A Survey on Role of Small Towns in Rural Economic-Social Development (Case Study: Ghir-karzin region). *Regional and Urban Studies and Research*, 4(13).
- HU, Z., DU, P., & GUO, D. (2007). Analysis of Urban Expansion and Driving Forces in Xuzhou City Based on Remote Sensing. *Journal of China University of Mining and Technology*, 17(2), 267–271. [https://doi.org/http://dx.doi.org/10.1016/S1006-1266\(07\)60086-8](https://doi.org/http://dx.doi.org/10.1016/S1006-1266(07)60086-8)
- Humstone, B. (2011). Building Invisible Walls: Urban Growth Boundaries. *Planning Commissioners*, 53(81), 1–3.
- Huntsinger, L., & Sayre, N. F. (2007). Introduction: The working landscapes special issue. *Rangelands*, 29(3), 3–4. [https://doi.org/10.2111/1551-501X\(2007\)29\[3:ITWLSI\]2.0.CO;2](https://doi.org/10.2111/1551-501X(2007)29[3:ITWLSI]2.0.CO;2)
- Imam, A. U. K., & Banerjee, U. K. (2016). Urbanisation and greening of Indian cities: Problems, practices, and policies. In *Ambio* (Vol. 45, Issue 4). <https://doi.org/10.1007/s13280-015-0763-4>
- Intergovernmental Panel on Climate Change. (2012). Sustainable Development and mitigation. *Climate Change* 2007, 691–744. <https://doi.org/10.1017/cbo9780511546013.016>
- Isard, W. (1951). Interregional and Regional Input-Output Analysis: A Model of a Space-Economy. *The Review of Economics and Statistics*, 33(4). <https://doi.org/>

Isard, W. (1956). *Location and space-economy* (M. M. P. Cambridge (ed.)).

Islam, M. S., Rana, M. M. P., & Ahmed, R. (2014). Environmental perception during rapid population growth and urbanization: A case study of Dhaka city. *Environment, Development and Sustainability*, 16(2), 443–453. <https://doi.org/10.1007/s10668-013-9486-5>

Ismail, M. B. (1996). A review of the models of land development process: The equilibrium and event-sequence model. *Buletin Ukur*, 7(1), 11–28.

J Rodrigue. (2013). *Urban transportation and land use*. The SAGE handbook of transport studies.

Jabareen, Y. R. (2006). Sustainable urban forms: Their typologies, models, and concepts. *Journal of Planning Education and Research*, 26(1), 38–52. <https://doi.org/10.1177/0739456X05285119>

James A. Lagro. (2006). Site Analysis : A Contextual Approach to Sustainable Land Planning and Site Design. In *John Wiley & Sons, Inc.* (Vol. 1999, Issue December).

Japan International Cooperation Agency (JICA). (2018). *Basic Physical and Social Infrastructure Development Plan*. https://openjicareport.jica.go.jp/pdf/11850286_03.pdf

Jean-Paul Rodrigue. (2011). *Urban Land Use Models: Urban Land Use and Transportation*.

Jean-Paul Rodrigue. (2020). Types of Urban Expansion. In *The Geography of Transport Systems* (Fifth Edit, p. 456). Routledge. <https://doi.org/doi.org/>

10.4324/9780429346323

- Jehling, M., Hecht, R., & Herold, H. (2018). Assessing urban containment policies within a suburban context—An approach to enable a regional perspective. *Land Use Policy*, 77. <https://doi.org/10.1016/j.landusepol.2016.10.031>
- Jenberu, A. A., & Admasu, T. G. (2020). Urbanization and land use pattern in Arba Minch town, Ethiopia: driving forces and challenges. *GeoJournal*, 85(3). <https://doi.org/10.1007/s10708-019-09998-w>
- Johnson, D. A. (2001). History of Regional Planning. *International Encyclopedia of the Social & Behavioral Sciences*, 1901.
- Johnson, D. L., Ambrose, S. H., Bassett, T. J., Bowen, M. L., Crummey, D. E., Isaacson, J. S., Johnson, D. N., Lamb, P., Saul, M., & Winter-Nelson, A. E. (1997). Meanings of environmental terms. *Journal of Environmental Quality*, 26(3), 581–589. <https://doi.org/10.2134/jeq1997.00472425002600030002x>
- Jong, L. De, Bruin, S. De, Knoop, J., & Vliet, J. Van. (2021). Understanding land-use change conflict : a systematic review of case studies. *Journal of Land Use Science*, 16(3), 223–239. <https://doi.org/10.1080/1747423X.2021.1933226>
- Jordan, H. (1994). Public Parks, 1885-1914. *Garden History*, 22(1). <https://doi.org/10.2307/1587004>
- Kahn, M. E. (2000). The environmental impact of suburbanization. *Journal of Policy Analysis and Management*, 19(4). [https://doi.org/10.1002/1520-6688\(200023\)19:4<569::AID-PAM3>3.0.CO;2-P](https://doi.org/10.1002/1520-6688(200023)19:4<569::AID-PAM3>3.0.CO;2-P)
- Kampa, M., & Castanas, E. (2008). Human health effects of air pollution. In

- Environmental Pollution* (Vol. 151, Issue 2). <https://doi.org/10.1016/j.envpol.2007.06.012>
- Kareiva, P., Watts, S., McDonald, R., & Boucher, T. (2007). Domesticated nature: Shaping landscapes and ecosystems for human welfare. In *Science* (Vol. 316, Issue 5833, pp. 1866–1869). <https://doi.org/10.1126/science.1140170>
- Karen Roof and Ngozi Oleru. (2008). Public Health: Seattle and King County’s Push for the Built Environment. *Environmental Health*, 71(1), 24–27.
- Kasa, L., Zeleke, G., Alemu, D., & Hagos, F. G. (2011). *Impact of Urbanization of Addis Abeba City on Peri-Urban. January 2015.*
- Kasim, O. F., Wahab, B., & Oweniwe, M. F. (2021). Urban expansion and enhanced flood risk in Africa: The example of Lagos. *Environmental Hazards*. <https://doi.org/10.1080/17477891.2021.1932404>
- Kassahun, S., & Tiwari, A. (2012). *Urban Development in Ethiopia : Challenges and Policy Responses. August 2014.*
- Kaufmann, T. (2014). *Parameterizing land use planning : deploying quantitative analysis methods in the practice of city planning.*
- Keniger, L. E., Gaston, K. J., Irvine, K. N., & Fuller, R. A. (2013). What are the benefits of interacting with nature? In *International Journal of Environmental Research and Public Health* (Vol. 10, Issue 3, pp. 913–935). <https://doi.org/10.3390/ijerph10030913>
- Kenworthy, J. R., & Laube, F. B. (1999). Patterns of automobile dependence in cities: An international overview of key physical and economic dimensions with some

- implications for urban policy. *Transportation Research Part A: Policy and Practice*, 33(7–8). [https://doi.org/10.1016/S0965-8564\(99\)00006-3](https://doi.org/10.1016/S0965-8564(99)00006-3)
- Kindu, M., Schneider, T., Döllerer, M., Teketay, D., & Knoke, T. (2018). Scenario modelling of land use/land cover changes in Munessa-Shashemene landscape of the Ethiopian highlands. *Science of the Total Environment*. <https://doi.org/10.1016/j.scitotenv.2017.11.338>
- Kitie, B. F. (2012). *Challenges of Urban Plan Implementation in Oromia Region: The case of Sebeta town Three Kebeles in Focus*. Addis Ababa University.
- Kleemann, J., Inkoom, J. N., Thiel, M., Shankar, S., Lautenbach, S., & Fürst, C. (2017). Peri-urban land use pattern and its relation to land use planning in Ghana, West Africa. *Landscape and Urban Planning*, 165. <https://doi.org/10.1016/j.landurbplan.2017.02.004>
- Kolbadi, N., Mohammadi, M., & Namvar, F. (2015). Smart Growth Theory as One of the Main Paradigms of Sustainable City. *Int. J. Rev. Life. Sci*, 5(9).
- Koroso, N. H., Lengoiboni, M., & Zevenbergen, J. A. (2021). Urbanization and urban land use efficiency: Evidence from regional and Addis Ababa satellite cities, Ethiopia. *Habitat International*, 117. <https://doi.org/10.1016/j.habitatint.2021.102437>
- Kovács, Z., Farkas, Z. J., Egedy, T., Kondor, A. C., Szabó, B., Lennert, J., Baka, D., & Kohán, B. (2019). Urban sprawl and land conversion in post-socialist cities: The case of metropolitan Budapest. *Cities*, 92. <https://doi.org/10.1016/j.cities.2019.03.018>

- Kroll, F., Müller, F., Haase, D., & Fohrer, N. (2012). Rural-urban gradient analysis of ecosystem services supply and demand dynamics. *Land Use Policy*, 29(3). <https://doi.org/10.1016/j.landusepol.2011.07.008>
- Krueger, R. a., & Casey, M. a. (2009). Participants in a Focus Group. *Focus Groups: A Practical Guide for Applied Research*, 63–84. https://www.sagepub.com/sites/default/files/upm-binaries/24056_Chapter4.pdf
- Kuddus, M. A., Tynan, E., & McBryde, E. (2020). Urbanization: A problem for the rich and the poor? *Public Health Reviews*, 41(1). <https://doi.org/10.1186/s40985-019-0116-0>
- Lacitignola, D., Petrosillo, I., Cataldi, M., & Zurlini, G. (2007). Modelling socio-ecological tourism-based systems for sustainability. *Ecological Modelling*. <https://doi.org/10.1016/j.ecolmodel.2007.03.034>
- Landforce. (2021). *What is Green Infrastructure?* <https://www.landforcepgh.org/hire-landforce/work-we-do/stormwater-green-infrastructure-management/>
- Lang, J. (2003). C.A.Doxiadis and the Science of Human Settlements. In *TIME-SAVER STANDARDS for URBAN DESIGN*.
- Larsen, Yeshitela, Mulatu, Seifu, & Desta. (2019). The Impact of Rapid Urbanization and Public Housing Development on Urban Form and Density in Addis Ababa, Ethiopia. *Land*, 8(4), 66. <https://doi.org/10.3390/land8040066>
- Lauer, T. R. (1988). The morphology of multiple-nucleus brightest cluster galaxies. *The Astrophysical Journal*, 325. <https://doi.org/10.1086/165982>
- lawinsider.com. (2022). *Urban region definition*. <https://www.lawinsider.com/dictionary/>

urban-region

- Lee, M. F. R. (2011). *Making Redevelopment Viable - Reduction of Risks to Developers by Urban Renewal Authority in Hong Kong*.
- Lee, P. S. (2015). *Resource Efficiency for Green and Resilient Urban Development in the Asia-Pacific Region – The case of water –*. December.
- Lee, S. Y., Dunn, R. J. K., Young, R. A., Connolly, R. M., Dale, P. E. R., Dehayr, R., Lemckert, C. J., McKinnon, S., Powell, B., Teasdale, P. R., & Welsh, D. T. (2006). Impact of urbanization on coastal wetland structure and function. *Austral Ecology*, 31(2). <https://doi.org/10.1111/j.1442-9993.2006.01581.x>
- Li, B., Chen, D., Wu, S., Zhou, S., Wang, T., & Chen, H. (2016). Spatio-temporal assessment of urbanization impacts on ecosystem services: Case study of Nanjing City, China. *Ecological Indicators*, 71, 416–427. <https://doi.org/10.1016/j.ecolind.2016.07.017>
- Lian, K. K., Gunawansa, A., & Bhulla, L. (2010). “Eco-cities” and “Sustainable Cities”: Whiter? *Rural and Urban Innovation*, 84–92.
- Lincoln, J. E., Birdsey, J., Sieber, W. K., Chen, G. X., Hitchcock, E. M., Nakata, A., & Robinson, C. F. (2018). A Pilot Study of Healthy Living Options at 16 Truck Stops Across the United States. *American Journal of Health Promotion*, 32(3). <https://doi.org/10.1177/0890117116670289>
- Lindahl, J. F., Grace, D., & Strand, T. (2015). The consequences of human actions on risks for infectious diseases: a review. In *Infection Ecology and Epidemiology* (Vol. 5, Issue 1). <https://doi.org/10.3402/IEE.V5.30048>

- Lindholm, G. (2019). *Land and Landscape ; Linking Use , Experience and Property Development in Urban Areas*. <https://doi.org/10.3390/land8090137>
- Lirebo, D. (2006). *UDP-705 HOUSING IN URBAN CONTEXT*. February, 1–45.
- Liu, J., Zhang, G., Zhuang, Z., Cheng, Q., Gao, Y., Chen, T., Huang, Q., Xu, L., & Chen, D. (2017). A new perspective for urban development boundary delineation based on SLEUTH-InVEST model. *Habitat International*, 70(December), 13–23. <https://doi.org/10.1016/j.habitatint.2017.09.009>
- Liu, Z., Ding, M., He, C., Li, J., & Wu, J. (2019). The impairment of environmental sustainability due to rapid urbanization in the dryland region of northern China. *Landscape and Urban Planning*, 187. <https://doi.org/10.1016/j.landurbplan.2018.10.020>
- Loots, J. (2020). *Infrastructure for development: the use of human rights impact assessments in public-private partnerships*. Lld. <https://repository.up.ac.za/handle/2263/78572>
- López-García, J. M., Moreira, D., Benzerara, K., Grunewald, O., & López-García, P. (2020). Origin and Evolution of the Halo-Volcanic Complex of Dallol: Proto-Volcanism in Northern Afar (Ethiopia). *Frontiers in Earth Science*, 7. <https://doi.org/10.3389/feart.2019.00351>
- Lovell, S. T. (2010). Multifunctional urban agriculture for sustainable land use planning in the United States. In *Sustainability*. <https://doi.org/10.3390/su2082499>
- Lu Dadao. (1982). Regional planning in West Germany. *Dili Zhishi/Geographical Knowledge*, 11.

- Mabahwi, N. A. B., Leh, O. L. H., & Omar, D. (2014). Human Health and Wellbeing: Human Health Effect of Air Pollution. *Procedia - Social and Behavioral Sciences*, 153. <https://doi.org/10.1016/j.sbspro.2014.10.056>
- MacDonald, M. (1994). The Outlook Tower: Patrick Geddes in Context: Glossing Lewis Mumford in the Light of John Hewitt. *The Irish Review (1986-)*, 16. <https://doi.org/10.2307/29735756>
- Madaleno, I. (2000). Urban agriculture in Belem, Brazil. *Cities*. [https://doi.org/10.1016/S0264-2751\(99\)00053-0](https://doi.org/10.1016/S0264-2751(99)00053-0)
- Madhuri Malhotra. (2017). Foreign Direct Investment Opportunities in Infrastructure Development: A Study on India. In *Handbook of Research on Economic, Financial, and Industrial Impacts on Infrastructure Development* (p. 11). Loyola Institute of Business Administration. <https://www.igi-global.com/chapter/foreign-direct-investment-opportunities-in-infrastructure-development/181145>
- Magsi, H., Torre, A., Liu, Y., & Sheikh, M. J. (2017). Land Use Conflicts in the Developing Countries : Proximate Driving Forces and Preventive Measures. *The Pakistan Development Review*, 56(1), 19–30. <https://doi.org/10.30541/v56i1pp.19-30>
- Mahiteme, Y. (2007). 'Carrying the Burden of Long-term Ineffective Urban Planning ' *An Overview of Addis Ababa's Successive Master Plans and their Implications on the Growth of the City* (Issue 16).
- Mahsud, A. Z. K. (2010). Rethinking Doxiadis' Ekistical Urbanism. *Positions*, 1.
- Maitima, J. M., Mugatha, S. M., Reid, R. S., Gachimbi, L. N., Majule, A., Lyaruu, H.,

- Pomery, D., Mathai, S., & Mugisha, S. (2009). The linkages between land use change , land degradation and biodiversity across East Africa. *African Journal of Environmental Science and Technology*, 3(10). <https://doi.org/10.5897/AJEST08.173>
- Malalgoda, C., & Amaratunga, D. (2015). A disaster resilient built environment in urban cities: The need to empower local governments. *International Journal of Disaster Resilience in the Built Environment*, 6(1). <https://doi.org/10.1108/IJDRBE-10-2014-0071>
- Malamis, S., Katsou, E., Inglezakis, V. J., Kershaw, S., Venetis, D., & Folini, S. (2016). Urban Environment. In *Environment and Development: Basic Principles, Human Activities, and Environmental Implications*. <https://doi.org/10.1016/B978-0-444-62733-9.00005-8>
- Mann & Jeanneaux. (2009). Two Approaches for Understanding Land-Use Conflict to Improve Rural Planning and Management. *Journal of Rural and Community Development*, 4(1), 118–141. <https://doi.org/ISSN:1712-8277>
- Manzoor Hussain and Iram Imitiyaz. (2018). Urbanization Concepts, Dimensions and Factors. *International Journal of Recent Scientific Research*, 9(Issue, 1(I)), 23513–23523. <https://doi.org/DOI:http://dx.doi.org/10.24327/ijrsr.2018.0901.1483>
- Maru, M., & Worku, H. (2022). Unpacking principles of resilience mainstreamed in Ethiopia’s local urban spatial planning documents: practices from Kombolcha, an urbanizing secondary city. *Heliyon*, 8(3). <https://doi.org/10.1016/j.heliyon.2022.e09137>

- Marutlulle, N. (2017). *Causes of informal settlements in Ekurhuleni Metropolitan Municipality : An exploration*. 1–11.
- Matt Burdett. (2018a). *Characteristics of urban places – GeographyCaseStudy*.
<https://geographycasestudysite.wordpress.com/characteristics-of-urban-places/>
- Matt Burdett. (2018b). *Urban land use patterns and models*. GeographyCaseStudy.Com.
<https://www.geographycasestudy.com/urban-land-use-patterns-and-models/>
- Matz, C. J., Egyed, M., Hocking, R., Seenundun, S., Charman, N., & Edmonds, N. (2019). Human health effects of traffic-related air pollution (TRAP): A scoping review protocol. In *Systematic Reviews* (Vol. 8, Issue 1). <https://doi.org/10.1186/s13643-019-1106-5>
- Mbifung Lambi, C., Ndzifon Kimengsi, J., Givencheh Kometa, C., & Sunjo Tata, E. (2012). The Management and Challenges of Protected Areas and the Sustenance of Local Livelihoods in Cameroon. *Environment and Natural Resources Research*, 2(3). <https://doi.org/10.5539/enrr.v2n3p10>
- McDonnell, M. J., & Pickett, S. T. A. (1990). Ecosystem structure and function along urban-rural gradients: an unexploited opportunity for ecology. In *Ecology* (Vol. 71, Issue 4, pp. 1232–1237). <https://doi.org/10.2307/1938259>
- McHale, M. R., Pickett, S. T. A., Barbosa, O., Bunn, D. N., Cadenasso, M. L., Childers, D. L., Gartin, M., Hess, G. R., Iwaniec, D. M., McPhearson, T., Nils Peterson, M., Poole, A. K., Rivers, L., Shutters, S. T., & Zhou, W. (2015). The new global urban realm: Complex, connected, diffuse, and diverse social-ecological systems. *Sustainability (Switzerland)*, 7(5). <https://doi.org/10.3390/su7055211>

- McLees, L. (2011). Access to land for urban farming in Dar es Salaam, Tanzania: Histories, benefits and insecure tenure. *Journal of Modern African Studies*.
<https://doi.org/10.1017/S0022278X11000498>
- Mekonnen, Y., & Ghosh, S. K. (2017). Monitoring Urban Growth and Land Use/ Cover Changes using Remote Sensing and Geospatial Techniques in Adama, Ethiopia. *Engineering Science and Technology: An International Journal (ESTIJ)*, 7(2).
<https://doi.org/10.1190/iceg2017-044>
- Mersal, A. (2016a). Sustainable Urban Futures: Environmental Planning for Sustainable Urban Development. *Procedia Environmental Sciences*, 34, 49–61.
<https://doi.org/10.1016/j.proenv.2016.04.005>
- Mersal, A. (2016b). Sustainable Urban Futures: Environmental Planning for Sustainable Urban Development. *Procedia Environmental Sciences*, 34, 49–61.
<https://doi.org/10.1016/j.proenv.2016.04.005>
- Meskerem et.al. (2017). Temporal Dynamics of the Driving Factors of Urban Landscape Change of Addis Ababa During the Past Three Decades. *Environmental Management*, 56(1), 1–15. <https://doi.org/10.1007/s00267-017-0953-x>
- Michalska-Zyła, A., & Marks-Krzyszkowska, M. (2018). Quality of life and quality of living in rural communes in Poland. In *European Countryside* (Vol. 10, Issue 2).
<https://doi.org/10.2478/euco-2018-0017>
- Mills, E. S. (2003). Urban sprawl causes, consequences and policy responses. *Regional Science and Urban Economics*, 33(2). [https://doi.org/10.1016/s0166-0462\(02\)00061-3](https://doi.org/10.1016/s0166-0462(02)00061-3)

- Ministry of Urban Development and Construction (MUDCo). (2012). *Structure Plan Manual (Revised Version)*.
- Ministry of Works and Urban Development (MWUD). (2007). *Participation Manual for Urban Planning*.
- Moffatt, S., Kohler, N., Moffatt, S., & Kohler, N. (2008). *social – ecological system Conceptualizing the built environment as a social ^ ecological system*. 3218(November 2013), 37–41.
- Mohamed, A., & Worku, H. (2019a). Quantification of the land use/land cover dynamics and the degree of urban growth goodness for sustainable urban land use planning in Addis Ababa and the surrounding Oromia special zone. *Journal of Urban Management*, 8(1), 145–158. <https://doi.org/10.1016/j.jum.2018.11.002>
- Mohamed, A., & Worku, H. (2019b). Quantification of the land use / land cover dynamics and the degree of urban growth goodness for sustainable urban land use planning in Addis Ababa and the surrounding Oromia special zone. *Journal of Urban Management*, 8(1), 145–158. <https://doi.org/10.1016/j.jum.2018.11.002>
- Mohamed, A., & Worku, H. (2021). Urban land cover and morphometric analysis for flash flood vulnerability mapping and riparian landscape conservation in Kebena River watershed, Addis Ababa. *Applied Geomatics*, 13(1), 15–28. <https://doi.org/10.1007/s12518-020-00318-3>
- Mohamed, A., Worku, H., & Kindu, M. (2019). Quantification and mapping of the spatial landscape pattern and its planning and management implications a case study in Addis Ababa and the surrounding area, Ethiopia. *Geology, Ecology, and*

- Landscapes*, 00(00), 1–12. <https://doi.org/10.1080/24749508.2019.1701309>
- Mohammed Haji and Muhammad Salim. (2006). *The Causes and Consequences of the Informal Settlements in Zanzibar*. 1–15.
- Mohammed, I., Alshuwaikh, H. M., & Adenle, Y. A. (2016). An approach to assess the effectiveness of smart growth in achieving sustainable development. *Sustainability (Switzerland)*, 8(4). <https://doi.org/10.3390/su8040397>
- Mohammed Kiula Milewa. (2012). *Effects of Population Increase On Sanitation Conditions of Maganzo Town, Kishapu District Shinyanga, Tanzania*.
- Mol, A. P. J. (2000). The environmental movement in an era of ecological modernisation. *Geoforum*, 31(1). [https://doi.org/10.1016/S0016-7185\(99\)00043-3](https://doi.org/10.1016/S0016-7185(99)00043-3)
- Monstadt, J., & Coutard, O. (2019). Cities in an era of interfacing infrastructures: Politics and spatialities of the urban nexus. *Urban Studies*, 56(11). <https://doi.org/10.1177/0042098019833907>
- Mougeot, L. J. A. (1999). Urban Agriculture: Definition, Presence, Potentials and Risks, and Policy Challenges. *International Workshop on Growing Cities Growing Food: Urban Agriculture on the Policy Agenda*, 31(2), 58.
- Mouratidis, K. (2021). Urban planning and quality of life: A review of pathways linking the built environment to subjective well-being. *Cities*, 115. <https://doi.org/10.1016/j.cities.2021.103229>
- Moustafa Saad, M., AbdelAll Ibrahim, M., & El Sayad, Z. M. (2017). Eco-City as Approach for Sustainable Development. *American Scientific Research Journal for Engineering*, volume 28(Un 2012), 57–74. <http://asrjetsjournal.org/>

- Mubea, K., Goetzke, R., & Menz, G. (2014). Applying Cellular Automata for Simulating and Assessing Urban Growth Scenario Based in Nairobi, Kenya. *International Journal of Advanced Computer Science and Applications*, 5(2). <https://doi.org/10.14569/ijacsa.2014.050201>
- MUDCo. (2005). *Urban Land Development And Managment*.
- MUDCo. (2010). *Manual for the Preparation and Implementation of Basic Plans (Structure Plans) of Small Towns of Ethiopia*.
- MUDCo, M. of U. D. and C. (2012a). *Construction Industry Policy*.
- MUDCo, M. of U. D. and C. (2012b). *Urban Planning , Sanitation and Beautification Bureau Urban Planning , Sanitation and Beautification Bureau*.
- MUDHo. (2016a). *Public Right-of-Way Management and Establishment Manual No.12/2016* (Issue 1).
- MUDHo. (2016b). *Recreational Parks Development and Management Manual*. 13.
- MUDHo & GIZ. (2015). *Ethiopia national urban green infrastructure standard*.
- Muranaka, H., Yamashita, R., Arai, T., & Morimoto, H. (2015). Evaluation of political cost and effect on surrounding areas of a compact city policy. *Studies in Regional Science*, 44(2). <https://doi.org/10.2457/srs.44.241>
- MWACHARO, R. E. (2012). *Factors Influencing Growth Of Informal Settlements : A Case Of Bangladesh Slum , Changamwe Constituency , Mombasa County ,Kenya*.
- MWUD. (2009). *Rural- Urban Linkage Manual*.
- National Planning Commission. (2016). *Growth and Transformation Plan II (GTP II)*.

- Nigro, A., Bertolini, L., & Moccia, F. D. (2019). Land use and public transport integration in small cities and towns: Assessment methodology and application. *Journal of Transport Geography*, 74. <https://doi.org/10.1016/j.jtrangeo.2018.11.004>
- Ning, X., Wang, H., Lin, X., Cao, Y., & Du, J. (2018). Spatio-temporal Urban Sprawl Monitoring and Analysis over Beijing-Tianjin-Hebei Urban Agglomeration during 1990-2015. *Cehui Xuebao/Acta Geodaetica et Cartographica Sinica*. <https://doi.org/10.11947/j.AGCS.2018.20170414>
- Niu, Q., Yu, L., Jie, Q., & Li, X. (2018). An urban eco-environmental sensitive areas assessment method based on variable weights combination. *Environment, Development and Sustainability*, 0123456789. <https://doi.org/10.1007/s10668-018-0277-x>
- OECD. (2002). Multi-Year Perspective in Budgeting and Public Investment Planning. *OECD Global Forum on Sustainable Development: Conference On Financing Environmental Dimension of Sustainable Development, April, 24–26*.
- OECD. (2012). Ross C. BrownsonChristine M. Hoehner[...]James F. Sallis. *Oecd, CONSULTATI*(June), 145.
- OECD. (2016). African Economic Outlook 2016. *Sustainable Cities and Structural Transformation*, 397. <https://doi.org/http://dx.doi.org/10.1787/aeo-2016-en>
- Office for the Revision of Addis Ababa Master Plan (ORAAMP). (2002). *Development Plan of the City of Addis Ababa*.
- Ohly, H., White, M. P., Wheeler, B. W., Bethel, A., Ukoumunne, C., Nikolaou, V., Garside, R., Ohly, H., White, M. P., Wheeler, B. W., Bethel, A., Ukoumunne, O. C.,

- Nikolaou, V., Garside, R., Restoration, A., Wheeler, B. W., Bethel, A., Ukoumunne, O. C., & Nikolaou, V. (2016). Attention Restoration Theory : A systematic review of the attention restoration potential of exposure to natural environments. *Journal of Toxicology and Environmental Health, Part B*, 19(7), 305–343. <https://doi.org/10.1080/10937404.2016.1196155>
- Okitasari, M., & Katramiz, T. (2022). The national development plans after the SDGs: Steering implications of the global goals towards national development planning. *Earth System Governance*, 12. <https://doi.org/10.1016/j.esg.2022.100136>
- Opoku, A. (2016). SDG2030: A sustainable built environment’s role in achieving the post-2015 United Nations sustainable development goals. *Proceedings of the 32nd Annual ARCOM Conference, ARCOM 2016*.
- Oromia Urban Planning Institute (OUPI). (2010). *Norms and Standards for Preparation, Monitoring and Evaluation of Implementation of Structure Plan*.
- Oromia Water Works Design and Supervision Enterprise (OWWDSE). (2011). *Final Report Section III : Regional Planning Volume I: Vol. I* (Issue March).
- OUPI. (2008). *Structural Plan document of Sebeta town* (Issue 03).
- OUPI. (2018). *Structural Plan document of Sebeta town*.
- Ozcan, Z. (2002). Cultural heritage and urban sustainability: A case study from Central Anatolia. *Advances in Architecture Series*, 14.
- Panagopoulos, T. (2019). Special issue: Landscape urbanism and green infrastructure. In *Land* (Vol. 8, Issue 7). <https://doi.org/10.3390/LAND8070112>
- Parr, J. (2005). *Perspectives on the city-region. Regional Studies*. 39(5), 555–556.

- Perloff, H. S. (1968). Key Features of Regional Planning. *Journal of the American Planning Association*, 34(3), 153–159. <https://doi.org/10.1080/01944366808977798>
- Perloff, H. S., & Wingo, L. (2013). Issues in urban economics. In *Issues in Urban Economics* (Vol. 4). <https://doi.org/10.4324/9781315064611>
- Perrin, A. J., Caren, N., Skinner, A. C., Odulana, A., & Perrin, E. M. (2016). The unbuilt environment: Culture moderates the built environment for physical activity. *BMC Public Health*, 16(1). <https://doi.org/10.1186/s12889-016-3866-3>
- Pickett, S. T. A., Cadenasso, M. L., & McGrath, B. (2013). *Resilience in Ecology and Urban Design: Linking theory and practice for sustainable cities*. <https://books.google.it/books?id=8W1HAAAAQBAJ>
- Power, A. L., Tennant, R. K., Jones, R. T., Tang, Y., Du, J., Worsley, A. T., & Love, J. (2018). Monitoring Impacts of Urbanisation and Industrialisation on Air Quality in the Anthropocene Using Urban Pond Sediments. *Frontiers in Earth Science*, 6. <https://doi.org/10.3389/feart.2018.00131>
- Priyakant Sinha, Verma, N. K., & Ayele, E. (2016). Urban Built-up Area Extraction and Change Detection of Adama Municipal Area using Time-Series Landsat Images. *International Journal of Advanced Remote Sensing and GIS*, 5(1), 1886–1895. <https://doi.org/10.23953/cloud.ijarsg.67>
- Pu, X. (2020). A Research Review on the Development of Urban-Rural Integration. *OALib*, 07(05), 1–6. <https://doi.org/10.4236/oalib.1106328>
- R.C., B., C.M., H., K., D., A., F., & J.F., S. (2009). Measuring the Built Environment for Physical Activity. State of the Science. In *American Journal of Preventive Medicine*

(Vol. 36, Issue 4 SUPPL.).

- Rajvanshi, A. (2005). Strengthening biodiversity conservation through community-oriented development projects: Environmental review of the India Ecodevelopment Project. *Journal of Environmental Assessment Policy and Management*. <https://doi.org/10.1142/S1464333205002031>
- Ramaano, A. I. (2022). Musina Municipality tourism management and strategies: a sustainable-eco-tourism inclusive business insights for the town, abutting peri-urban and countryside existences. *Management of Environmental Quality: An International Journal*, 33(3). <https://doi.org/10.1108/MEQ-11-2021-0257>
- Randolph. (2004). Collaborative Environmental Management and Public Participation. In *Environmental Land Use Planning and Management*. (pp. 1–4). Island Press.
- Ratter, B. (2012). *Human Nature Interactions in the Anthropocene : Potentials of Social Ecological Systems Analysis Population dynamics and adaptive capacity of supply systems*.
- Raymond, C. M., Frantzeskaki, N., Kabisch, N., Berry, P., Breil, M., Nita, M. R., Geneletti, D., & Calfapietra, C. (2017). A framework for assessing and implementing the co-benefits of nature-based solutions in urban areas. *Environmental Science and Policy*, 77. <https://doi.org/10.1016/j.envsci.2017.07.008>
- Raymond, C. M., Gottwald, S., Kuoppa, J., & Kyttä, M. (2016). Integrating multiple elements of environmental justice into urban blue space planning using public participation geographic information systems. *Landscape and Urban Planning*, 153(November), 198–208. <https://doi.org/10.1016/j.landurbplan.2016.05.005>

- Reale, A., & Handmer, J. (2011). Land tenure, disasters and vulnerability. *Disasters*.
<https://doi.org/10.1111/j.1467-7717.2010.01198.x>
- Richard Grove. (2003). Globalization and the history of Environmentalism, 1650-2000.
Institute of Advanced Studies, Australian National University, 15–21.
- richmondvale.org. (2022). *Effects of Urbanization That Will Make you Think!*
<https://richmondvale.org/blog/effects-urbanization/>
- Ritchie, A. (2008). Sustainable Urbanism: Urban Design With Nature. *Journal of the American Planning Association*, 75(1). <https://doi.org/10.1080/01944360802540422>
- Rodrigo Garcia Motta, Angélica Link, Viviane Aparecida Bussolaro, ... Alfieri, A. A. (2021). Analysis of Factors Influencing Private Real Estate Developments in The Peri-Urban Areas Of Bida, Niger State. *Pesquisa Veterinaria Brasileira*, 26(2), 173–180. <http://www.ufrgs.br/actavet/31-1/artigo552.pdf>
- Roggema, R. (2017). The future of sustainable urbanism: Society-based, complexity-led, and landscape-driven. *Sustainability (Switzerland)*, 9(8). <https://doi.org/10.3390/su9081442>
- Roggema, R., Design, C., Biggs, C., & Timmermans, W. (2011). Planning for Climate Change or: How Wicked Problems Shape the New Paradigm of Swarm Planning. *World*, 20(July), 4–8.
- Rondinelli, D. A. (1986). The Urban Transition and Agricultural Development: Implications for International Assistance Policy. *Development and Change*, 17(2).
<https://doi.org/10.1111/j.1467-7660.1986.tb00238.x>
- Ruben, R., & Van Den Berg, M. (2001). Nonfarm employment and poverty alleviation of

- rural farm households in Honduras. *World Development*, 29(3).
[https://doi.org/10.1016/S0305-750X\(00\)00107-8](https://doi.org/10.1016/S0305-750X(00)00107-8)
- Sahle, M., Saito, O., Fürst, C., Demissew, S., & Yeshitela, K. (2019). Future land use management effects on ecosystem services under different scenarios in the Wabe River catchment of Gurage Mountain chain landscape, Ethiopia. *Sustainability Science*, 14(1), 175–190. <https://doi.org/10.1007/s11625-018-0585-y>
- Sahle, M., Saito, O., & 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(June), e01671. <https://doi.org/10.1016/j.gecco.2021.e01671>
- Samsura, D. A. A., van der Krabben, E., van Deemen, A. M. A., & van der Heijden, R. E. C. M. (2015). Negotiation processes in land and property development: an experimental study. *Journal of Property Research*, 32(2). <https://doi.org/10.1080/09599916.2015.1009846>
- SANI GAMBO SANI; ESV OYELEKE, O., & OLUFEMI; ESV ADELEKE, M. A. E. (MAL) B. A. M. & E. A. M. A. (2022). The Competence of Estate Surveyors And Valuers In Management Of Building Construction In Bauchi. *International Journal of Environmental Research & Earth Science Published by Cambridge Research and Publications.*, 24(4), 297–312.
- Sara Wilkson and Richard Reed. (2008). *Property Development* (5th editio). Routledge.
<https://www.taylorfrancis.com/books/mono/10.4324/9780203933428/property-development-richard-reed-sara-wilkinson-david-cadman-richard-reed>

- Sarma, B., Sarma, A. K., & Singh, V. P. (2013). Optimal Ecological Management Practices (EMPs) for Minimizing the Impact of Climate Change and Watershed Degradation Due to Urbanization. *Water Resources Management*, 27(11). <https://doi.org/10.1007/s11269-013-0396-y>
- Sasakova, N., Gregova, G., Takacova, D., Mojzisova, J., Papajova, I., Venglovsky, J., Szaboova, T., & Kovacova, S. (2018). Pollution of Surface and Ground Water by Sources Related to Agricultural Activities. *Frontiers in Sustainable Food Systems*, 2. <https://doi.org/10.3389/fsufs.2018.00042>
- Satterthwaite, D., Haughton, G., & Budds, J. (2008). Environment and Urbanization emissions. *Environment & Urbanization-International Institute for Environment and Development (IIED)*, 20(2), 539–549.
- Schlüter, M., McAllister, R. R. J., Arlinghaus, R., Bunnefeld, N., Eisenack, K., Hölker, F., Milner-Gulland, E. J., Müller, B., Nicholson, E., Quaas, M., & Stöven, M. (2012). New horizons for managing the environment: A review of coupled social-ecological systems modeling. *Natural Resource Modeling*, 25(1), 219–272. <https://doi.org/10.1111/j.1939-7445.2011.00108.x>
- Schwirian, K. (2007). Ecological Models of Urban Form: Concentric Zone Model, the Sector Model, and the Multiple Nuclei Model. In *The Blackwell Encyclopedia of Sociology*. <https://doi.org/10.1002/9781405165518.wbeose004>
- Sebeta City. (2019). *Sebeta City Administration Profile*. <http://www.sebetacity.com/index.php>
- Secinaro, S., Brescia, V., Calandra, D., & Biancone, P. (2021). Towards a hybrid model

- for the management of smart city initiatives. *Cities*, 116. <https://doi.org/10.1016/j.cities.2021.103278>
- Sen, A. (1988). *The concept of development. Handbook of development economics. 1*, 9–26.
- Sharma, R., & Malaviya, P. (2021). Management of stormwater pollution using green infrastructure: The role of rain gardens. In *Wiley Interdisciplinary Reviews: Water* (Vol. 8, Issue 2). <https://doi.org/10.1002/wat2.1507>
- Sharma, S., Sharma, A., & Kumar, A. (2011). New city model to reduce demand for transportation. *Procedia Engineering*, 21. <https://doi.org/10.1016/j.proeng.2011.11.2114>
- Sietchiping, R., Kago, J., Zhang, X. Q., Augustinus, C., & Tuts, R. (2014). Role of Urban–Rural Linkages in Promoting Sustainable Urbanization. *Environment and Urbanization ASIA*, 5(2), 219–234. <https://doi.org/10.1177/0975425315577170>
- Sietchiping, R., Loose, S., Forster, T., Githiri, G., Egal, F., Getz Escudero, A., Alejandro Grande Fraile, R., Narang Suri, S., Robert Gatsinzi, J., & Wang, R. (2019). *Urban-Rural Linkages: Guiding Principles Framework for Action to Advance Integrated Territorial Development PROJECT TEAM Project Coordination Team: Design and Layout*. www.unhabitat.org
- Silva, C. (2018). Auckland’s Urban Sprawl, Policy Ambiguities and the Peri-Urbanisation to Pukekohe. *Urban Science*, 3(1). <https://doi.org/10.3390/urbansci3010001>
- Sinclair, R. (1967). Von thünen and urban sprawl. *Annals of the Association of American*

- Geographers*, 57(1). <https://doi.org/10.1111/j.1467-8306.1967.tb00591.x>
- Sliuzas, R. (2016). *National land use plan*. <https://www.cdema.org/virtuallibrary/index.php/charim-hbook/use-case-book/2-land-use-planning/2-1-national-land-use-plan>
- Smit, W. (2016). Urban governance and urban food systems in Africa: Examining the linkages. *Cities*, 58. <https://doi.org/10.1016/j.cities.2016.05.001>
- Solomon Benti and Hailu Worku. (2015). *Impacts of Urban Sprawl on Environment: The case of Sebeta, Ethiopia*. LAP LAMBERT Academic Publishing.
- Spórna, T., & Krzysztofik, R. (2020). ‘Inner’ suburbanisation – Background of the phenomenon in a polycentric, post-socialist and post-industrial region. Example from the Katowice conurbation, Poland. *Cities*, 104. <https://doi.org/10.1016/j.cities.2020.102789>
- Streule, M., Karaman, O., Sawyer, L., & Schmid, C. (2020). Popular Urbanization: Conceptualizing Urbanization Processes Beyond Informality. *International Journal of Urban and Regional Research*, 44(4). <https://doi.org/10.1111/1468-2427.12872>
- Su, S., Xiao, R., Jiang, Z., & Zhang, Y. (2011). Characterizing landscape pattern and ecosystem service value changes for urbanization impacts at an eco-regional scale. *Applied Geography*, 34(2), 295–305. <https://doi.org/10.1016/j.apgeog.2011.12.001>
- Sun, B., & Robinson, D. T. (2018). Comparison of statistical approaches for modelling land-use change. *Land*, 7(4). <https://doi.org/10.3390/land7040144>
- Suroso, D. S. A., & Kombaitan, B. (2018). Social-ecological resilience for the spatial planning process using a system dynamics model: Case study of Northern Bandung

- area, Indonesia. *International Journal of Sustainable Society*.
<https://doi.org/10.1504/IJSSOC.2018.092650>
- Suski, J. G., Swan, C. M., Salice, C. J., & Wahl, C. F. (2018). Effects of pond management on biodiversity patterns and community structure of zooplankton in urban environments. *Science of the Total Environment*, 619–620, 1441–1450.
<https://doi.org/10.1016/j.scitotenv.2017.11.153>
- Suykens, C., & van Rijswick, H. F. M. W. (2016). *Design principles for resilient, efficient and legitimate flood risk governance; Lessons from cross-country comparisons*.
- Taaffe E.J., G. H. L. and O. M. E. (1996). *The Hybrid Land Use Model: Transportation and the Formation of Urban Landscapes* (Second Edi). Geography of Transportation.
- Tacoli, C. (2003). The links between urban and rural development. *Environment & Urbanization*, 15(1), 3. <https://doi.org/10.1177/095624780301500111>
- Tadesse, E., & Imana, G. (2017). *Prospects and Challenges of Urbanization on the Livelihood of Farming Community Surrounding Finfinne*. 3(1), 1–15.
- Talashi and Bishehii. (2012). Residential and Industrial Compatibility by Mixed Land Use, Zoning and Urban Design Case Study Vardavard Near Tehran Metropolis. *International Journal of Sustainable Development*, 6, 4–10.
- Tayyebi, A., Pijanowski, B. C., & Tayyebi, A. H. (2011). An urban growth boundary model using neural networks, GIS and radial parameterization: An application to Tehran, Iran. *Landscape and Urban Planning*. <https://doi.org/10.1016/>

- Techniques, G. I. S. (2017). *Measuring and Mapping Urban Growth Patterns Using Remote Sensing and Measuring and Mapping Urban Growth Patterns Using Remote Sensing and GIS Techniques*. January.
- Tegenu, T. (2010). *Urbanization in Ethiopia : Study on Growth , Patterns , Functions and Alternative Policy Strategy*.
- Tehrany, M. S., & Pradhan, B. (2013). *Remote Sensing Data Reveals Eco-Environmental Changes in Urban Areas of Klang Valley , Malaysia : Contribution from Object Based Analysis*. <https://doi.org/10.1007/s12524-013-0289-9>
- Terfa, B. K., Chen, N., Liu, D., Zhang, X., & Niyogi, D. (2017). *Urban Expansion in Ethiopia from 1987 to 2017: Characteristics , Spatial Patterns , and Driving Forces*. 1–21.
- Terfa, B. K., Chen, N., & Zhang, X. (2020). Urbanization in Small Cities and Their Significant Implications on Landscape Structures: The Case in Ethiopia. *Sustainability*, 1–19.
- Teri Shore. (2020). *What are Urban Growth Boundaries and why do we need them?* Greenbelt Alliance. <https://www.greenbelt.org/blog/what-are-urban-growth-boundaries-need/>
- Tesfaye, G., & Wolff, M. (2014). The state of inland fisheries in Ethiopia: A synopsis with updated estimates of potential yield. In *Ecohydrology and Hydrobiology* (Vol. 14, Issue 3). <https://doi.org/10.1016/j.ecohyd.2014.05.001>
- Tesfaye Gutema. (1997). *Agricultural Land use in Almgena Woreda, BA senior Essay*.

Addis Ababa University.

- Teshome, E., & Demissie, E. (2018). Tourist services quality in the Simien Mountains National Park, World Heritage Site, Ethiopia. *African Journal of Hospitality, Tourism and Leisure*, 7(2).
- The Marine Environment and UN Sustainable Development Goal 14. (2018). In *The Marine Environment and United Nations Sustainable Development Goal 14*. https://doi.org/10.1163/9789004366619_002
- Theodosis, L. (2020). Systemic Methods and Large-Scale Models in Ekistics. *Nexus Network Journal*. <https://doi.org/10.1007/s00004-020-00531-y>
- Thompson, C. W. (2006). Patrick Geddes and the Edinburgh Zoological Garden: Expressing Universal Processes Through Local Place. *Landscape Journal*, 25(1). <https://doi.org/10.3368/lj.25.1.80>
- Tian, G., Jiang, J., Yang, Z., & Zhang, Y. (2011). The urban growth , size distribution and spatio-temporal dynamic pattern of the Yangtze River Delta megalopolitan region , China. *Ecological Modelling*, 222(3), 865–878. <https://doi.org/10.1016/j.ecolmodel.2010.09.036>
- Tian, G., Wu, J., & Yang, Z. (2010). Spatial pattern of urban functions in the Beijing metropolitan region. *Habitat International*, 34(2). <https://doi.org/10.1016/j.habitatint.2009.09.010>
- Tola, T.T., Khan, A.Z., Wegayehu, F. (2021). Urban Resilience and the Question of Food in Ethiopian Urbanisation: The Case of a Small Town in Ethiopia—Amdework. In *Urban Book Series* (pp. 173–190). Springer Nature. <https://doi.org/10.1007/978-3->

- Tola, T. T., Khan, A. Z., & Wegayehu, F. (2021). Urban Resilience and the Question of Food in Ethiopian Urbanisation: The Case of a Small Town in Ethiopia—Amdework. In *Urban Book Series*. https://doi.org/10.1007/978-3-030-84906-1_9
- Tom Daniels, & Katherine, A. (2003). *The Environmental Planning Handbook: for Sustainable Communities and Regions*. American Planning Association.
- Torrey, B. B. (2004). *Urbanization: An Environmental Force to Be Reckoned With*. <https://www.prb.org/resources/urbanization-an-environmental-force-to-be-reckoned-with/>
- Towers, G. (2005). *An Introduction to Urban Housing Design: AT HOME IN THE CITY*. Elsevier. <https://www.ptonline.com/articles/how-to-get-better-mfi-results>
- Tripathi, N., & Bhattarya, S. (2004). Integrating Indigenous Knowledge and GIS for Participatory Natural Resource Management: *State-of-the-Practice*. *The Electronic Journal of Information Systems in Developing Countries*, 17(1), 1–13. <https://doi.org/10.1002/j.1681-4835.2004.tb00112.x>
- Tsai, Y. H., Stow, D. A., López-Carr, D., Weeks, J. R., Clarke, K. C., & Mensah, F. (2019). Monitoring forest cover change within different reserve types in southern Ghana. *Environmental Monitoring and Assessment*, 191(5). <https://doi.org/10.1007/s10661-019-7450-z>
- UGent, L. B. Ug. and J. L. (2012). *Transnational networks of urban planning expertise in African cities from a comparative perspective*.
- Ukaogo, P. O., Ewuzie, U., & Onwuka, C. V. (2020). Environmental pollution: Causes,

- effects, and the remedies. In *Microorganisms for Sustainable Environment and Health*. <https://doi.org/10.1016/B978-0-12-819001-2.00021-8>
- Ullah, K. M., & Mansourian, A. (2016). Evaluation of Land Suitability for Urban Land-Use Planning: Case Study Dhaka City. *Transactions in GIS*, 20(1), 20–37. <https://doi.org/10.1111/tgis.12137>
- UN-Habitat. (2022). *Urban-Rural Linkages*. <https://unhabitat.org/topic/urban-rural-linkages>
- UN Department of Economic and Social Affairs (UN DESA). (2018). *The 2018 Revision of World Urbanization Prospects*. United Nations. <https://www.un.org/development/desa/en/news/population/2018-revision-of-world-urbanization-prospects.html>
- UNDESA. (2013). World Economic and Social Survey 2013: Sustainable Development Challenges. In *United Nations, Department for Economic and Social Affairs*. http://esa.un.org/wpp/documentation/pdf/WPP2012_KEY FINDINGS.pdf
- UNECE. (1996). Land Administration Guidelines. In *United Nations*. <http://www.unece.org/fileadmin/DAM/hlm/documents/Publications/land.administration.guidelines.e.pdf>
- UNESCO. (2016a). *Convention For The Safeguarding Of The Intangible Cultural Heritage Intergovernmental* (Issue December, pp. 33–34).
- UNESCO. (2016b). *Gada system, an indigenous democratic socio-political system of the Oromo*.
- United Nation. (2018). *World Urbanization Prospects : The 2018 Revision*.

- University of Delaware. (2006). *Urban Growth Boundary (UGB)/ Urban Services Boundary (USB).* 2–3.
- US EPA. (2001). Our Built and Natural Environments. *Our Built and Natural Environments: A Technical Review of the Interactions Among Land Use, Transportation, and Environmental Quality*, 148. <https://doi.org/EPA231K13001>
- US EPA. (2022). *What is Green Infrastructure?* <https://www.epa.gov/green-infrastructure/what-green-infrastructure>
- Uttara, S., Bhuvandas, N., & Aggarwal, V. (2012). Impacts of urbanization on environment. *International Journal of Research in Engineering & Applied Sciences*, 2(2), 1637–1645. [https://doi.org/10.1061/\(ASCE\)HE.1943-5584.0000852](https://doi.org/10.1061/(ASCE)HE.1943-5584.0000852).
- Valle, R. F., Varandas, S. G. P., Pacheco, F. A. L., Pereira, V. R., Santos, C. F., Cortes, R. M. V., & Sanches, L. F. (2015). Impacts of land use conflicts on riverine ecosystems. *Land Use Policy*, 43, 48–62. <https://doi.org/10.1016/j.landusepol.2014.10.015>
- Verbeek, T. (2017). *Living Cities: Reconnecting Environmental Health and Urban Planning*.
- Verma, M. C., & Tiwari, R. (2020). Analyzing expectation of landowners from Brownfield TOD project: A case study from MP Nagar, Bhopal. *Materials Today: Proceedings*, 46. <https://doi.org/10.1016/j.matpr.2020.08.482>
- Vijayanand, S., & Divyashree, M. (2015). Bioremediation of heavy metals using biosurfactants producing microorganisms. *International Journal of Pharma Sciences and Research*, 6(5).

- Waldheim, C. (2006). *The Landscape Urbanism Reader*. New York.
- Wang, J., Cao, S. J., & Yu, C. W. (2021). Development trend and challenges of sustainable urban design in the digital age. In *Indoor and Built Environment* (Vol. 30, Issue 1). <https://doi.org/10.1177/1420326X20976058>
- Wang, X., Shi, R., & Zhou, Y. (2020). Dynamics of urban sprawl and sustainable development in China. *Socio-Economic Planning Sciences*, 70. <https://doi.org/10.1016/j.seps.2019.100736>
- Ward, S. V. (1990). The garden city tradition re-examined. *Planning Perspectives*, 5(3). <https://doi.org/10.1080/02665439008725706>
- Wassie, S. B. (2020). Natural resource degradation tendencies in Ethiopia: a review. *Environmental Systems Research*, 9(1). <https://doi.org/10.1186/s40068-020-00194-1>
- web.uvic.ca. (1862). *The Park Movement*. <http://web.uvic.ca/vv/student/cricket/bhp/ParkMovement.html>
- Wehrmann, B., & Schmitz, S. (2011). *Land Use Planning: Concept, Tools and Applications*. www.giz.de.
- Westlund, H., & Haas, T. (2017). Introduction: In the post-urban world. In *In The Post-Urban World: Emergent Transformation of Cities and Regions in the Innovative Global Economy*. <https://doi.org/10.4324/9781315672168>
- Whitehouse, B. D. (2010). Half of humanity set to go urban. *Science*, May 2005.
- Whittemore, A. H. (2011). Regional Planning in America: Practice and Prospect, edited by Ethan Seltzer and Armando Carbonell. *Publius: The Journal of Federalism*, 41(4). <https://doi.org/10.1093/publius/pjr023>

- Wilkinson, C. (2012). *Social-ecological resilience and planning: an interdisciplinary exploration*. <http://su.diva-portal.org/smash/record.jsf?pid=diva2:546171>
- Wilkinson, S. J., & Sayce, S. L. (2015). Stakeholders through the development process. *Developing Property Sustainably*, 20–40. <https://doi.org/10.4324/9781315764825>
- Wilkinson, S., & Reed, R. (2008). Introduction to Property Development. *Property Development*, 1–31.
- William L. Allen III. (2012). Environmental Reviews and Case Studies: Advancing Green Infrastructure at All Scales: From Landscape to Site. *Environmental Practice*, 14.
- Wilson, W. H., & Johns, T. (1989). *From the Planners ' Bookshelf ... The City Beautiful Movement* . 1989.
- Wong, C. (2015). Regional Planning: China. In *International Encyclopedia of the Social & Behavioral Sciences: Second Edition*. <https://doi.org/10.1016/B978-0-08-097086-8.74037-2>
- Wong, C., Qian, H., & Zhou, K. (2008). In search of regional planning in China: The case of Jiangsu and the Yangtze Delta. *Town Planning Review*, 79(2–3). <https://doi.org/10.3828/tpr.79.2-3.8>
- World Bank. (2018). *Urban Institutional and Infrastructure Development Program In Ethiopia*.
- World Bank Group. (2015). *Ethiopia - Urbanization review : urban institutions for a middle-income Ethiopia* (No. 100238; Vol. 1). <https://doi.org/10.1017/CBO9781107415324.004>

- World Commission on Environment and Development (WCED). (1987). *Our Common Future* (ISBN 019282080X.).
- World Health Organisation. (2018). *Urban population growth*.
http://www.who.int/gho/urban_health/situation_trends/urban_population_growth_text/en/
- World Health Organization. (2017). World Health Statistics 2017 : Monitoring Health for The SDGs. In *World Health Organization*. <https://doi.org/10.1017/CBO9781107415324.004>
- Wu, J. (2014). Urban ecology and sustainability: The state-of-the-science and future directions. *Landscape and Urban Planning*, 125, 209–221. <https://doi.org/10.1016/j.landurbplan.2014.01.018>
- Wubneh, M. (2013). Addis Ababa, Ethiopia - Africa's diplomatic capital. *Cities*, 35, 255–269. <https://doi.org/10.1016/j.cities.2013.08.002>
- Yeowon Kim. (2018). *Safe-To-Fail Infrastructure for Resilient Cities under Non-Stationary Climate*. August.
- Yli-Pelkonen, V., & Kohl, J. (2005). The role of local ecological knowledge in sustainable urban planning: perspectives from Finland. *Sustainability: Science, Practice, & Policy*, 1(1), 3-14-. <https://doi.org/10.1080/15487733.2005.11907960>
- Yohannes, H., & Elias, E. (2017). Contamination of Rivers and Water Reservoirs in and Around Addis Ababa City and Actions to Combat It. *Environment Pollution and Climate Change*, 01(02), 1–12. <https://doi.org/10.4172/2753-458X.1000116>
- Young, R. (1999). Landscapes of settlement: Prehistory to the present. In *Journal of*

- Rural Studies* (Vol. 15, Issue 2). [https://doi.org/10.1016/S0743-0167\(98\)00027-8](https://doi.org/10.1016/S0743-0167(98)00027-8)
- Zárate, L. (2016). They are Not “Informal Settlements”—They are Habitats Made by People. *The Nature of Cities*.
- Zewdu, G. A., & Malek, M. (2010). Implications of Land Policies for Rural-urban Linkages and Rural Transformation in Ethiopia. *ESSP II Working Paper, 15*. <http://essp.ifpri.info/publications/>
- Zhang, D., Huang, Q., He, C., & Wu, J. (2017). Impacts of urban expansion on ecosystem services in the Beijing-Tianjin-Hebei urban agglomeration, China: A scenario analysis based on the Shared Socioeconomic Pathways. *Resources, Conservation and Recycling, 125*, 115–130. <https://doi.org/10.1016/j.resconrec.2017.06.003>
- Zhang, X., Song, W., Wang, J., Wen, B., Yang, D., Jiang, S., & Wu, Y. (2020). Analysis on decoupling between urbanization level and urbanization quality in China. *Sustainability (Switzerland), 12*(17). <https://doi.org/10.3390/SU12176835>
- Zhao, S., Da, L., Tang, Z., Fang, H., Song, K., & Fang, J. (2006). Ecological consequences of rapid urban expansion: Shanghai, China. *Frontiers in Ecology and the Environment, 4*(7), 341–346. [https://doi.org/10.1890/1540-9295\(2006\)004\[0341:ECORUE\]z2.0.CO;2](https://doi.org/10.1890/1540-9295(2006)004[0341:ECORUE]z2.0.CO;2)
- Zhu, J. (2002). Urban development under ambiguous property rights: A case of China’s transition economy. *International Journal of Urban and Regional Research, 26*(1). <https://doi.org/10.1111/1468-2427.00362>