

ADDIS ABABA UNIVERSITY

COLLEGE OF DEVELOPMENT STUDIES

CENTER FOR ENVIRONMENT AND DEVELOPMENT

DEPARTMENT OF ENVIRONMENT AND SUSTAINABLE DEVELOPMENT

RURAL-URBAN INTERFACE VEGETATION COVERS CHANGE IN AND AROUND BURAYU TOWN, OROMIA REGION

BY

TAREKEGN BULCHA

A RESEARCH THESIS SUBMITTED TO DEPARTMENT OF ENVIRONMENT AND SUSTAINBLE DEVELOPMENT IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER IN ENVIRONMENT AND SUSTAINBLE DEVELOPMENT

JUNE 2020

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Declaration

I, the researcher, declare that this MA research thesis is my original work, and it has not been presented partially or in full by any other person for an award of a degree in any other university. Also, all sources of material used for the thesis have been well acknowledged.

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Approval

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Acknowledgments

First, I would like to express my great respect and deep appreciation to my research advisor, Dr. Feyera Senbeta, for his immeasurable and priceless support, constructive criticism and devoting precious time in guiding, reading, as well as correcting of this research. I thank him not only for his professional guidance, but also for his hospitality, brotherly advice and encouragement, which enabled me to complete this thesis work without stress.

The researcher would like to express deep gratitude to the research methodology course instructors Dr. Tamirat Tefera and Dr. Dawit Diriba as well as the former environment and sustainable development department head Dr. Tasfaye Zeleke for their valuable efforts and commitments they share us in order to have basic knowledge and skill on this research. On top of this, their constructive comment, guidance, suggestions, brotherly and fatherly advice, encouragement from the date of title selection to the final date of this thesis submission are meaningful and appreciable.

I must express my deepest sense of gratitude and acknowledgement for all my instructors and staff members of department of environment and sustainable development, Addis Ababa University for sharing their experiences, materials and unreserved cooperation during this research Work.

It is also my great pleasure to thank and express deep appreciation to my close friends Mr. Shanbel Ketema and Mr. Samuel Hailu for sacrificing their valuable time in collecting and processing of the data for this research works in this inconvenient time of COVID-19.

My deepest gratefulness goes to my wife Lensa Wakgari, my family and all my friends for their support and encouragement to strongly work on research in the inconvenient time. It is also my pleasure to thank Burayu town municipality administration for providing me necessary information and relevant materials for the study.

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ACRONYMS

BTM **Burayu Town Municipality**

CRGE **Climate Resilient Green Economy**

CSA **Central Statistical Agency**

EEA **European Environmental Agency**

FDRE **Federal Democratic Republic of Ethiopia**

GIS **Geographical Information System**

GPS **Global Positioning System**

HHs **House Holds**

IBC **Institute of Biodiversity Conservation**

IDP **Integrated Development Plan**

MEAs **Multinational Environmental Agreements**

NDVI **Normalized Difference Vegetation Index**

NRM **Natural Resource Management**

OUPI **Oromia Urban Plan Institute**

SPSS **Statistical Package for Social Science**

UN **United Nation**

Abstract

At rural-urban interface areas the extent of vegetation cover changes has been increasing owing to lack of proper management, awareness of the local community and urban expansion. This study was conducted to analyze the governance, perception and extents of rural-urban interface vegetation cover changes in and around Burayu Town. This study employed both quantitative and qualitative (mixed research) type of research approach. Descriptive research which is cross-sectional survey type of research design was employed to survey 268 households. Information regarding to the governance of vegetation cover were collected and analysed qualitatively. Data regarding the spatial analysis of vegetation cover change was analysed using remote sensing satellite images of 2000-2020 period. This study finding reveals most of the vegetative landscapes including urban parks and green areas located at periphery and at interface areas of the town were mismanaged due to lack of strong governance and little integration between community and town administrative. This study also indicated that the issues of urbanization, formal and informal settlements, land use plan and horizontal expansion of the town are perceived as a problem and agreed by the majority of the people. The change in vegetation covers was perceived as a result of the effects of urbanization and settlement expansion. Particularly urbanization is seen as leading problem with mean value of 3.95 which further give rise to horizontal expansion and unintended settlements. The 2000-2020 period trends of spatial analysis revealed that over the last 20 years, as a result of anthropogenic effects the predominant vegetation covers in and around the town converted to other non-vegetation purposes which is mainly the urban settlements. About 43.37% of the vegetation cover was changed to other land use cover types during the study period from 5166.27 ha in 2000 to 2925.81in 2020. Hence, urban-rural interface vegetation covers change problems in the study area needs more attention to synergies and integrate management responses among all the stakeholders.

Key words: *Community perception, governance, rural-urban interface, spatial analysis, vegetation covers change.*

CHAPTER ONE

1 INTRODUCTION

1.1 Background

Rural-urban interface is the place located between the of periphery urban areas adjacent to rural areas where the urban and rural vegetation resources intermix. For this research, the phrase 'Rural-urban interface' interchangeably used with the phrase 'peri-urban interface'. The peri-urban interface is still generally considered as a transitional area between city and countryside.

Understanding the trends and experience of peri-urban interface vegetation cover change at all global, regional, national and local context is very important. In this research global context means the world wide, regional context is to indicate the African experience, the national context is to show the overall Ethiopian and its regional governments, and the local context is to mean the study area. At all levels the problem and the trends of urban-rural interface vegetation cover changes are more or less similar.

The global context of vegetation cover change at the rural-urban interfaces shows that, the governance arrangements, policies, and plans in most urban areas fails to integrate the issues of natural resources and lack attention for the rural-urban interface vegetation covers. A study conducted in south Asia cities indicated that, rural-urban interface resource management is governed separately by different responsible bodies (ESPA, 2017) that has responsibilities in governing the rural urban interface areas operate their activities separately. According to this study, it is clear that the interaction between rural and urban administrative bodies in in formulating policy, structural arrangements and developing plans regarding the conservation of the vegetation in the interface area is very weak.

The rural-urban vegetation cover change usually goes with high-density urban and rural development activities, in contrary to this there are conditions where the two are not always working. In rural communities where people are escaping cities to live closer to the natural environment there can be high levels of native vegetation coverage and high rural settlement density (Ross, 2014). Urban settlement is not the merely factors for rural-urban interface vegetation cover change. It is true that settlement and industrial expansion as a result of urban development alone is not a factor of vegetation cover change in peri-urban areas, but

there are also other factors like land competition for free grazing and traditional farming practices can play a vital role in degradation of the vegetation cover in the interface area.

When we see the regional context of rural-urban interface vegetation cover changes, the situation are more similar to that of the global and the extent of change is more severe than of the other developed nations. According to a study conducted in Barombi Mbo forest reserve in Cameroon by Beatrice, Pascal, Mor-Achankap & CheClovis (2019) the land competition in the peri-urban areas for agriculture and urban livelihoods result in the changes in the land-use patterns. Patterns of land-use change and current vegetation status in peri-urban forest reserves shows that, most of rural areas of Africa countries consist of small communities practicing subsistent agriculture and the poor urban areas depend on peri-urban natural resources and forests for their livelihoods (Beatrice, et al., 2019). Regarding the idea one can conclude that in developing countries like African nations, most of the land-use change in rural-urban interface areas is a direct result of the interaction of people on natural resources for livelihoods and economic opportunities of the residents at the periphery areas.

The local and national perspective of the rural-urban interface vegetation cover change is more similar to that of the regional context. In developing countries like Ethiopia, rapid population growth has also been regarded as the major cause of deforestation and vegetation cover change as high population demands more land and fuel, which are both directly or indirectly obtained at the expense of forest and vegetated landscape destruction and unsustainable utilization (Abiyot, 2017). In Ethiopia especially in the urban areas like Burayu town, the urban population is increasing from time to time due to natural growth rate and migration from rural to urban, urban to urban areas and from nearby small villages to the urban areas. Horizontal scattered patterns of settlements from central to periphery areas as a result of population pressure in urban areas expanding gradually. In the most rural-urban interface areas of the country in general and in Burayu town specifically rural-urban interface areas, land use planning is very passive and not implemented properly.

At all levels of global, regional, national and local areas, rural-urban interface needs interconnected comprehensive land use planning, decision making and implementation of the plan to protect the natural resource and vegetation situated in the area. This research work entitled rural-urban interface vegetation cover changes analysis in and around Burayu town, therefore, aimed to assess the local community perceptions towards the changes of vegetation cover in peri-urban areas, and the governance of rural-urban interface vegetation and the extent of vegetation cover changes in the area.

1.2 Statement of the problem

Vegetation provides valuable goods and services to human beings freely without payment. But those goods and services are not visible and understandable to the people and because of this, people tend to ignore the impact of their day to day interaction on the natural environment and as a result of this, gradual deterioration and degradation of the vegetation cover is occurring especially in urban areas. Stephen (2011) elaborate that unless we correct the balance between nature and human as well as being properly managing the natural environment to be sustain in quality continue and sustainable provision of those services for human well-being. It is no doubt that, the management of natural resources, especially the vegetation covers in rural-urban interface areas is a critical issue. The management of the vegetation of the rural-urban interface has significant implications, not only for the livelihoods and quality of life of those who live in these areas but also for the sustainability of urban and rural development. This is because the ecological, economic and social functions performed by and in the rural-urban interface affect both the urban and the rural. Protecting the natural resources located at rural-urban interface areas is very complex task, because of the traditional and artificial division between urban and rural areas that not indicating the integrated institutional arrangements and joint deployment planning approaches to manage and use the resources at the interface areas (Beatrice, et al., 2019).

Generally, the vegetation covers found at rural-urban interface areas of the town have protection, provision, supporting and regulating and amenity function of the ecosystem services for the town. Hence, the vegetative landscape surrounding the town needs to be conserved and managed in sustainable ways. But when we see the actual practices, the vegetation covers around the Burayu town have been gradually converted over time to settlements, open grazing lands and small holder traditional farming of the rural poor at interfaces for livelihoods purpose (OUPI, 2014). These trends of conflicts and land competition between urban and rural areas for settlements and agricultural practices, nowadays causing majority of vegetation covers in the area to be at risks. One of the most driving factors of this increase in human made encroachment into peri-urban vegetation cover are increased urban populations and the corresponding demand for housing and settlements (BTM, 2014). In the town for the last ten to fifteen years, previously vegetated land scape coverage was changed and degraded due to the gradual scattered settlement expanding horizontally to the periphery areas of the rural-urban interface areas and the majority of the expansion is informal or not settled according to the land use plan of the town. Competition for land for formal and informal house construction, along with booming

informal land markets in the town, drives the loss of vegetated landscape and increases the vulnerability of natural environment in the interface areas.

According to the Ethiopian Institute of Biodiversity Conservation, IBC (2005) strategy, the governance of those resources is under question due to lack of urban and rural integrated natural resource management plan among the two administrative bodies as well as yet there is the problem of integration of sectorial and cross-sectorial issues to harmonize for joint management. Urban area administrative body strives only for the existence of urban greenery and the rural area administrative body focuses on forest reserve areas. But the governance including institutional arrangement and organizational structure responsible for administration of the vegetated land scape at interface areas are silently ignored. In addition to this, the awareness and attention given for the vegetation at the rural urban interface areas by the local community living around the areas is less. Because the only thing that given more attention is earning money due to increasing land use conversion and demand for houses. Due to this, resource poor peri-urban farmers in order to get more and better income, they transfer their land use and protection right and the power that help them to influence the management of natural resources to the informal brokers for converting to other land use , and finally the vegetated landscape shifted to the informal settlements. In general, the perceptions of the local community about the rural-urban interface vegetation covers and the organizational and institutional frameworks to govern those resources are the most contributing factors for the gradual changes of vegetation cover in the study area.

Generally, due to lack of proper management of resources and awareness of the local community, the extents of vegetation cover changes increasing overtime. According to Berhanu, Nengcheng, Xiang, and Dev (2014) the green area (vegetation and grass) was the predominant land-use type in towns of Burayu, Sululta, and Lege-Tafo and between 1987 and 2019 the coverage of vegetation in those towns were reduced by 49.5%, 51.8%, and 53.64%, respectively due to gradually stretched built-up areas and significantly increased urbanization. Beside this, the study conducted by Oromia Urban Planning Institute, OUPI (2014) on the environmental planning in Burayu town shows the vegetation covers around the town have been gradually converted over time to settlements, open spaces, open grazing lands and small non farming for livelihoods purpose. But both studies have investigated the effects of existing and the anticipated urban expansion on land use cover changes by focusing the current and future socio-economic condition of the town. In contrast, the influences of the governance and community perception regarding the peri-urban vegetation cover changes have been overlooked by these studies. Moreover, as far as I concerned, the issues of vegetation cover changes were not well addressed by other research work

conducted so far. Hence, in the study area the problem of urban-rural interface vegetation cover changes need to be addressed by further research work.

Therefore, this study was conducted to analyze the governance, people perception and the extent of changes of the rural-urban interface vegetation cover change in and around Burayu town in order to measure the extents of vegetation cover changes, assess local government vegetation management practices and evaluate the perception of the community regarding vegetative landscape changes.

1.3 Objective of the research

1.3.1 General objective

The general objective of the research is to analyze the governance, community perception and patterns of rural-urban interface vegetation cover changes in the study area.

1.3.2 Specific objectives

The specific objectives of the research are;

1. To evaluate the perception of local community towards the rural-urban interface vegetation cover changes in the study area.
2. To assess the governance of rural-urban interface vegetative landscapes in the study area.
3. To analyze the extents of the rural-urban interface vegetation cover changes in the study area.

1.4 Research questions

In order to address the problems defined and objectives of the research, this study is conducted to answers the following research questions.

1. How are the legal and institutional arrangements functioning for governance of rural-urban interface vegetative landscapes?
2. What is the extent of rural-urban interface vegetation cover changes and how the local community perceives it?

1.5 Significance of the study

The challenge of peri-urban natural resources including the vegetation covers nowadays a critical problem in most urban areas of the country in general and in Burayu town in particular. This study is significant for development, political, further research work and academic purposes. It also helps the urban administrative to consider and revise their

development and land use plan for proper implementation when undertaking different development activities without affecting the natural resources and vegetation covers located at periphery areas of the town. The rural-urban interface resources are the sources of conflict and political boundary for both administrative bodies. Therefore, the study is significant for the formulating the legal and institutional frameworks for urban and rural administrators to manage jointly the natural resources and vegetation covers at the interface areas and to easily solve the political conflict rising between them. Beside this, it also helps to initiates further research to be conducted to fill the gaps identified and help to use as a reference for other researchers. The final output of this study is published and used as reading and reference materials for academic institution and for individuals who have an interest on the subject matter. Thus, this study strives to give a new perspective and recommended options to the study of rural-urban interface vegetation cover change in Burayu town for governmental and political decision makers, researchers, and for academicians.

1.6 Scope of the study

The thematic scope of this study was limited to rural-urban interface vegetation cover changes in Burayu town. It is not including urban greenery area as well as forest reserves which are under Participatory Forest management. Because of time and financial constraints, the special scope of the study was restricted to the Northern part of Burayu town, Gefersa Burayu and Gefersa Gujee kebeles, which are adjacent to rural kebeles of Mulo woreda. The target group of the study was limited to Households or local community living in the interface area, Burayu town municipal service sector, housing development units, and land use planning sector as well urban agriculture and environmental protection offices.

CHAPTER TWO

2 LITERATURE REVIEW

2.1 Definition of concepts

Rural-urban interface vegetation cover is the vegetated landscape located between the periphery urban areas and the adjacent rural areas. Different authors used the phrase 'Rural-urban interface' interchangeably with the word phrase 'peri-urban'. The meaning is the same and it is the area where humans especially the urban people and their development needs intermix with vegetation resources. 'The perceived link between the city and the countryside is evolving rapidly, shifting away from the assumptions of mainstream paradigms to new conceptual landscapes where rural-urban links are being redefined and with the increasing urbanization, concerns for peri-urban interface have emerged widely' (Mrinalini, 2018). In this conceptual field, the peri-urban interface is still generally considered as a transitional area between city and countryside. As the result of population increasing in the urban areas the demand for housing and other developments increases overtime. This can further result, the gradual increments of the land competition and urban expansion to the periphery areas of the previously vegetated landscapes located at the interface of the rural and urban areas. Mrinalini (2018) described the rural-urban interface areas that characterized by higher residential, dominance of non-agriculture and services activities, and industrial expansion than the average for rural and urban areas, as well as higher rates of population density and more dynamic processes of land conversion. As mentioned here, these areas known by the high commercial areas, high population density and high land competition due to scarcity of land resource and costly life at central part of the city especially for the poor. Rural-urban interface is the boundaries of the urban and rural area in which both urban and rural people share the common resources.

> *The peri-urban areas are the center of almost all new developments and of a great deal of the transformations in economic activities. Economic expansion in all its forms gives rise in these areas to lively competition for land, which is also in demand to meet the housing requirements since the population continues to increase in these areas* (Nkwae 2006).

The Nkwae explanation of the peri-urban areas is to indicate the interaction occurred due to the increasing of the development needs or the economic expansion and the growing population. These two interactions create high competition and demands on peri-urban land. Beside the active land use change pattern, the population of rural-urban areas is also highly dynamic as they offer better residential alternatives for the poor and government workers at a

low cost and accessibility to new urban livelihoods. In growing towns like Burayu, the pressure of urbanization leads to the vegetation cover change, especially in remote and poor accessible areas through the means of informal settlements.

According to Douglas (2012) definition, the rural-urban interface is the area where the most active area susceptible to urban expansion and easily affected by the urbanization due to the interaction between urban and rural. He also defining the peri-urban area as the area refers to a transition or interaction place, where urban and rural activities are place alongside, and landscape patterns are dynamic, subject to rapid modifications, brought by anthropogenic activities like built-up areas due to housing demand, social and physical infrastructural developments, and industrialization. Therefore, rural-urban interface vegetation cover change for this study is defended as the vegetation cover changes that found at the periphery areas of urban and rural marginal areas and nowadays which are under pressure and very progressively converted into urban areas through the horizontal urban expansion.

2.2 Challenges of rural-urban interface vegetation covers

Rural-urban interface landscapes are challenged spaces. The composition of rural-urban landscapes is a product of the multiple competing government priorities driving development of these areas In addition, new residential developments demand open space for recreation and increased infrastructure such as road networks. In rural-urban interface areas economic and social priorities are sources of conflict which undermines environmental priorities. Much of the time economic and social priorities come before environmental priorities (Buxton and Choy, 2007). In some cases it is possible to meet social, economic and environmental priorities in the landscape, but it is extremely challenging to balance social, economic and environment in peri-urban landscapes. Government priorities are in part driving the diversity of owners of the land in peri-urban landscapes. In turn, this makes it difficult to engage the mix of land property-owners who have been driven to move or stay in peri-urban areas for economic and social reasons.

These changes in land use are resulting in changes to landholder demographics across the area shift away from traditional farmers to lifestyle landholders. In turn, this is creating a more diverse mix of landholders with differing values, property aspirations and economic circumstances (Mendham and Curtis, 2010). Compared to rural areas, land in peri-urban areas has a larger number and greater variety of land uses, with diversity increasing closer to urban centers. The scenario of changing from agricultural farming activities to non-agricultural activities in areas near to urban areas is much working for Ethiopian urban areas

especially in Burayu town, the change has been observed most notably in the northern part of the town where vegetation covers is densely populated probably over the last 10 years, and it is continuing at an ever increasing rate. With increases in smaller residential lots comes the need for infrastructure and amenities to service the increasing population moving into these areas. This further increases the diversity of land uses and commonly includes a mix of industry, manufacturing, conservation areas, green and open space for recreation.

Administratively both urban and rural administrations often ignore the ecological changes associated with socioeconomic development in peri-urban areas. Peri-urban areas are always rich in vegetation resources, including all cultivated and spontaneous vegetated-cover types, such as woodland, cropland, grassland, and forest. Peri-urban vegetation delivers a diversity of ecological and social services, varying from climate regulation, soil erosion control, and biodiversity maintenance to water quality improvement, air pollutants absorption, and recreational opportunity supply (Pert, 2012). Being sensitive to human activities, peri-urban vegetation has been under the most challenging and dynamic changing condition, it needs the attention of government and requires intensive conservation and management of the vegetation resources in peri-urban areas.

2.3 Urban-rural interfaces trends of vegetation cover changes

Vegetation cover is the habitat for all plant animal life on earth surfaces. The diversity of plant and animal species provides a key input or resource for the supporting livelihoods of the people. The greatest threat to biodiversity is not destruction of plants and animals, but rather the destruction of their habitat. Rapid socio-economic development in the interface areas of urban and rural can result the settlement to be expanded by occupying a large areas of vegetated landscape in periphery areas. Land-use trends such as urban sprawl are potentially jeopardizing the future of sustainable land use, especially in peri-urban regions (Luca and Carlotta, 2013). This expanded settlement is fragmented and irregular, and dispersed among vegetated landscape patches in a disorder manner. According to this idea, the land use patterns resulted in the declined connectivity and increased fragmentation and irregularity of vegetated landscapes in peri-urban areas.

The rapid urbanization and economic dynamics in urban areas have transformed the size of cities and the population living in the cities. The study conducted in 21 European countries by the European Environmental Agency (EEA) shows in Europe, the expansion of residential areas and construction sites are the main cause of the increase in urban land cover at the continental level (EEA, 2011). European Environment Agency study point out the trends of

change by indicating that the annual land conversion in 21 European countries in two recent periods (1990–2000 and 2000–2006), increased by 9 per cent in the latter period and the composition of the areas converted changed significantly. Between 2000 and 2006 arable land, pasture, permanent cropland and mosaic farmland, forest, grassland and open spaces experienced development at a greater rate than between 1990 and 2000 (EEA, 2011). This process reflects the progressive increasing of population growth and urban expansion in the largest urban centers to the periphery vegetated landscapes.

In Ethiopia natural resource conservation areas such as forest and vegetated landscapes priority areas particularly in growing urban areas of the periphery areas are facing challenges and expected to undergo various changes because of anthropogenic effects such as the disturbance exerted upon them. Rapid urbanization has also been regarded as the major cause of deforestation and vegetation cover change as high population demands more resources which are both directly or indirectly obtained at the expense of forest and vegetated landscape destruction and unsustainable utilization (Abiyot, 2017).

Study conducted in central part of Ethiopia on land use and forest dynamics by Kiros and Desalegn to show land cover changes in the study area by taking three periods from 1957-1975, from 1975-1995, and from 1995-2017. The rapid change of urbanization which leads to increasing settlement especially built-up areas which showed a net positive increase from 0.4% during 1975–1995 to a 4.4% during 1995–2017, which was slightly above the national urbanization rate of 4% (Kiros and Desalegn, 2019). As a result of urbanization increasing the demand for land for housing is an issue in urban and peri-urban areas that might increase the expansion of built-up areas. According to the study in the recent period due to change in urbanization, the urban settlements is gradually increasing, especially Addis Ababa city and the nearby and adjacent towns of Oromia special zone Surrounding Finfine.

2.4 Urban people perception towards vegetation cover changes

The general understanding of the perception of the urban people towards rural-urban interface vegetated landscape including forests with alteration on lifestyles and modernization is difficult and need intensive research works. Rural-urban interface vegetation covers often can be places which bring people with different social and cultural background to socialize together, still many of the residents are seeing peri-urban forests as a peaceful and quite place for their relaxation (Pearce, 2011). For more people, their direct or indirect contact with nature play very important role for the quality of their life. Pearce (2011) also explained that peri-urban and urban vegetative cover can have a positive impact on physical and mental health, for example, by providing settings for physical exercise,

reducing ultraviolet radiation and air pollution, and reducing stress. Because people tend to prefer outdoor recreational areas close to their homes, urban and peri-urban green areas are the most popular outdoor recreational areas. But in many urban areas the awareness of the most local community on environmental and ecological importance of the rural-urban interface vegetative covers is unclear.

Education and knowledge are the most important determinant factors for vegetation resource management. Study conducted in Bangladesh shows most people of Bangladesh are poor and illiterate. There is serious lacking of public awareness about the necessity and environmental, social and economic benefits of trees. Therefore, they don't hesitate cut the trees and their poverty encourage them to do it (Mohammad, 2008). Human perception about natural environment and the urge to contribute towards its sustainability are influenced by societal norms and the awareness pertinent to the benefits of environment. These benefits are referred to as ecosystem services. This significant link demands a more intensive and extensive assessment of the ecosystem services (Blazevska, Miceva, Stojanova and Stojanovska, 2012). According to this idea, ecosystem services are gained naturally from the vegetation resources but vegetation or environmental value is determined by human perception.

The other aspects like the socio-economic differences such as gender, age, education, residential status and income of respondents living in both urban and rural-urban interface centers may be the other important factors in shaping the perception of people on the importance of vegetative covers located in urban and rural-urban interface areas. This may be due to the fact that these socio-cultural factors also affect the normative knowledge base of respondents about environment and people with reasonable economic resources prefer to live in environment friendly planned surroundings of urban and peri-urban areas (Qureshi, Kazmi and Breuste, 2010).

Some people living in urban areas perceived that the forest serve no purpose in urban and peri-urban areas and that there are better need for the use of land for non-vegetation and forestry purposes. That is why in most urban areas of Ethiopia, people living in interface areas of rural-urban sell their farming land and vegetated land which is more endowed with natural biodiversity to the informal settlers through illegal land marketers. Vegetative covers in and around urban areas have an ecosystem services for urban and maintain the sustainable development of the city. Unless its importance is known to the community, the community might overlooked and ignore the resource. Therefore, perception of local community about the environmental, economic, cultural and social benefits of the vegetated landscape found at rural-urban interface areas is one of the critical issues to be addressed in this research.

2.5 Urban-rural interface vegetative landscapes management

2.5.1 Legal and institutional frameworks of urban-rural interface vegetation management

A strong legal and institutional system is important for the conservation and management of the scarce natural resources. Ethiopian Institute of Biodiversity Conservation, IBC (2005) stated the underestimation of environmental resources due to limited knowledge and awareness about the importance of ecosystems and the degree of its deterioration or lost leads to less attention to give the protection and management result in the marginalization of biological natural resources. The idea to elaborate that the governance of natural resource should not be undermined and their utilization should not be seen only in the context of limiting access and exploitation, but should be viewed from the perspective of opportunities for sustainable environmental, social and economic opportunities. In urban and rural-urban areas the issue of natural resource conservation and management is more critical than that of rural areas. The governance of urban and peri-urban natural resources like vegetation covers in most of the case unclear. The problem of the urban and peri-urban forest including vegetation cover is the problem of governance and urban and peri-urban forest governance therefore refers to the structures, rules, partnerships and processes that shape decisions about urban and peri-urban trees and woodlands (Mark, 2015). According to this idea, in most cases, because of the lack of strong governance the decisions about use of urban and peri-urban natural resource like the natural vegetative covers are made without consideration of their environmental and ecosystem values.

The government of the Federal Democratic Republic of Ethiopia (FDRE) has formulated Environmental Policy, Land Use Policy, Climate Resilient Green Economy (CRGE), different Conservation Strategies of Ethiopia, Legislations, and Laws regarding environment and natural resource management as a key prerequisite for lasting success of development and reach middle income economy country. The FDRE Environmental Protection Authority (2011) in its global environmental facility portfolio identification document point out that the government of Ethiopia has ratified a number of international and regional Multilateral Environmental Agreements (MEAs) and they have been made part of the laws of the country.

According to the Ethiopian Institute of Biodiversity Conservation, IBC (2005) strategy document even though Ethiopia have established and ratified the global and national environmental protection and natural resource conservation legal frameworks, is yet a problem of integration of cross-sectorial and sectorial issues into a policy framework on natural resources and the environment to harmonize these broad directions and guide the

sustainable development, use and management of the natural resources and the environment. All the policies and strategies are set for their respective sectors and locality. On one hand, the issue of natural resource management is under different sectors (agricultural sector, environmental sector, forestry enterprise, and biodiversity institute). On the other hand, land uses policy for urban does not work for rural use they applied within their jurisdictions. Past approaches have been piecemeal and top-down in addressing the issue of soil degradation, livestock feed and shortage of pasture land, fuel wood crisis, lack of rainwater harvesting and management, lack of community-based organization and limited opportunity for an alternative livelihood outside agriculture (IBC, 2005). Due to these, governance of the rural-urban interface natural resources including vegetation covers are under challenging.

2.5.2 Functioning organizations of urban-rural interface vegetation management

Under the proclamations of the environment, duties and responsibilities of regional states include planning, directing and developing social and economic programs, as well as the administration, development and protection of environment in their respective regions. These regional agencies have basic administrative units in lower administrative units at woredas and Kebele levels. The natural resources, vegetative areas, management effort needs integration and interaction of different sectors at all levels to bring a more effective implementations. Different government, communities, private sectors and civil societies at all levels have significant roles in natural resource management to reduce degradation and loss of biodiversity. The participation of all partners and stakeholders in conservation and management of natural resources such as the peri-urban vegetated landscapes is important. Regarding this issue Spry, Annett, McGuinness and Thuan (2016) stated the engagement of landholders in Natural Resource Management (NRM) activities is critical to meet the desired environmental outcomes of relevant for federal, regional and local environment and NRM organizations, even though such organizations have many challenges that associated with engaging peri-urban landholders in NRM. Partially, these challenges are associated with different interacting factors, which are characteristic of peri-urban landscapes, including the unclear boundaries of peri-urban areas, their dynamic and transitional nature like conversion of rural land to other uses, rural and in-migration of new settlements, population pressure, and the large variety of often competing land uses and development pressure like limited land and high land demand (Spry et al., 2016).

In most countries of the world, especially in European countries, the role of central governments in natural resource management, including peri-urban natural resources is basically to formulate the basic policy, strategy, laws and different directives. But the

application of urban and peri-urban vegetative landscapes conservations, the practical management of the urban and peri-urban forest is essentially a local authority function (Rik, 2015). In Ethiopia the approach is similar and the central and regional government work jointly in formulating legal frameworks and standards on environment and natural resource issues, because the issues are trans-national and trans-regional issues. Federal and regional government role is to provide for the protection and conservation of the broad environment, through formulation of policies, strategies, laws and standards, which foster social and economic development in a manner that enhance the welfare of humans and the safety of the environment sustainable. According to Rik (2015) in all the countries on the world the debate is how to share the responsibilities of per-urban vegetative landscape governance between different central government departments and agencies to manage and conserve the resources effectively.

The other governance structures for vegetative cover management are local governments, community organizations and other partnership. Local government structures include zonal, wereda, and kebele. For urban areas the local governments are the town administration, municipality and their respective kebele admirations. Due to their close links to the local public, they are well-situated to enhance communication with the public, public participation and involvement of stakeholders and forest and natural resource users (Mark, 2015). Community involvement on rural-urban interface vegetation cover management is very important. According to Mark (2015) there are many benefits of community involvement and partnership working for the community and local government, namely enhancing the quality of decision-making, encouraging a sense of ownership and raising awareness of urban and peri-urban vegetation related issues. The author also further elaborate that community involvement also needs some formal organizational structure to support and sustain it and they can contribute much to the local authority's, even though relying on volunteers can have its limitations.

2.6 Theories of urbanization and rural-urban interface vegetation cover change

Nowadays the vegetated landscape located at the rural-urban interface areas are under pressure due to the increasing urban growth. According to Susana (2012) the interaction between urbanization, resource depletion, and environmental degradation has been a matter of debate for decades. For the most part, in urban areas the argument has been between those who view urbanization as problem for the environment and those who place more blame on other factor than the urban growth. Different scholars view the relationships between urbanization and natural resources differently. For the convenience and simplicity the

researched used the three most common theories dealing with the relationships between urbanization and resources by the most famous scholars. They are Von Thunian, Francois Perroux, and Willer, D. theories.

Von Thunian theory is called Thunian model and market rationality theory which is contemporary economic theories of regional development tend to view landscape or environmental change as a function of the growth of towns and cities in a regional settlement system and have spawned a genre of probabilistic models and deterministic theories of land use change based on principles of market rationality. According to the Von Thunen's classic "concentric zones" model, in urban areas landscape change is seen as a response to changes in economic land rents associated with increasing transportation costs from a central market place (Bryant, C.R., Russwurm, L.H. and McLellan, A.G., 1982). Von Thunen was well aware that certain conditions might distort a regular concentric ring pattern of land use around the city. Variations in physical resources, alternative transport routes, and the emergence of competing centers would likely instigate aberrations in the land use gradients (Browder, 2002). From the Thunian perspective, the rural area (the "hinterland") is assumed to be a smooth, socially undifferentiated space, two-dimensional surface. One might say that a priori the Thunian framework is of limited applicability to the question at hand of conceptualizing the relationship between urbanization and vegetation resources since the latter typically occurs beyond the outer limit of commercial agriculture in the vast undifferentiated zones. The Thunian model could be extended to accurately identify additional zones of rural land use beyond the periphery remains an open question (Browder, 2002).

The other one is the Francois Perroux theory of the growth pole models theory which focuses the studies of urban-rural linkages, or core-periphery dynamics. The theory although intended to provide a framework for understanding the process of structural economic change in an urban system, and not the effects of urban centers on rural land use, growth pole theory gave credence to the notion of economic space as a "field of forces" and hence to the possibility of urban-based economic networks as "drivers" of structural change (including rural landscape change) in the periphery (Hansen, 1975). The growth pole theory is based on the belief that governments of developing countries can induce economic growth and welfare by investing heavily in capital-intensive industries in large urban centers or regional capitals (Perroux, 1950). This growth is supposed to spread to the rural areas in a process of regional development (Unwin, 1989). The growth pole theory is underpinned by the belief that "free market forces" provide conditions for development through the existence of the so-called "trickle-down effect" that is meant to put together various economic forces, creating a

virtuous cycle that spreads economic growth from urban to rural areas (Douglass, 1998). According to Douglass one of the consequences of this rural-urban conceptual dichotomy is the very existence of a "curious divide in planning": on one side urban planners that keep considering urbanization the key to achieve regional integration.

The third theory is Network Exchange Theory (NET) which is the stream of ideas that may fruitfully contribute to the conceptualization of a model of urban influences on rural landscapes derives from the work of sociologists interested in network exchange theory or NET (Willer, 1999). The exchange networks emphasize that due to increasing urbanization and land market interaction between individuals, the natural resources found at urban-rural interface areas are facing challenges. Conceptually, the urban-rural interface (URI) is the g+eographic interstice and interaction between the urban built environment and the rural landscape or resources (Bradley, 1984). In exchange networks, agents interact with each other seeking favorable resource outcomes and their success is conditioned by the type of connections between their own and others' positions within a network. Willer (1999) stated that NET began as a discourse on the construction of power relationships in organizations, several concepts from NET may be usefully applied to the analysis of urban influences on the resources within periphery or hinterlands. NET provides a structural framework (i.e., networks) to help explain human agent behavior. The assumption here is that interactions among agents in a network influence vegetation resource and land use decisions.

2.7 Conceptual framework of the study

Based on the on conceptual, empirical, and theoretical literature reviewed following the study specific objectives, the researcher developed the following conceptual framework. This conceptual model shows how urban growth influences the gradual changes of the rural-urban interface vegetative covers. In addition to this, the framework shows how local community perception and governance of the resource can contribute to the vegetative landscape changes. Even though this research is not focus on the outcome of vegetation covers change, the changes in the vegetation cover can leads to unsustainable development.

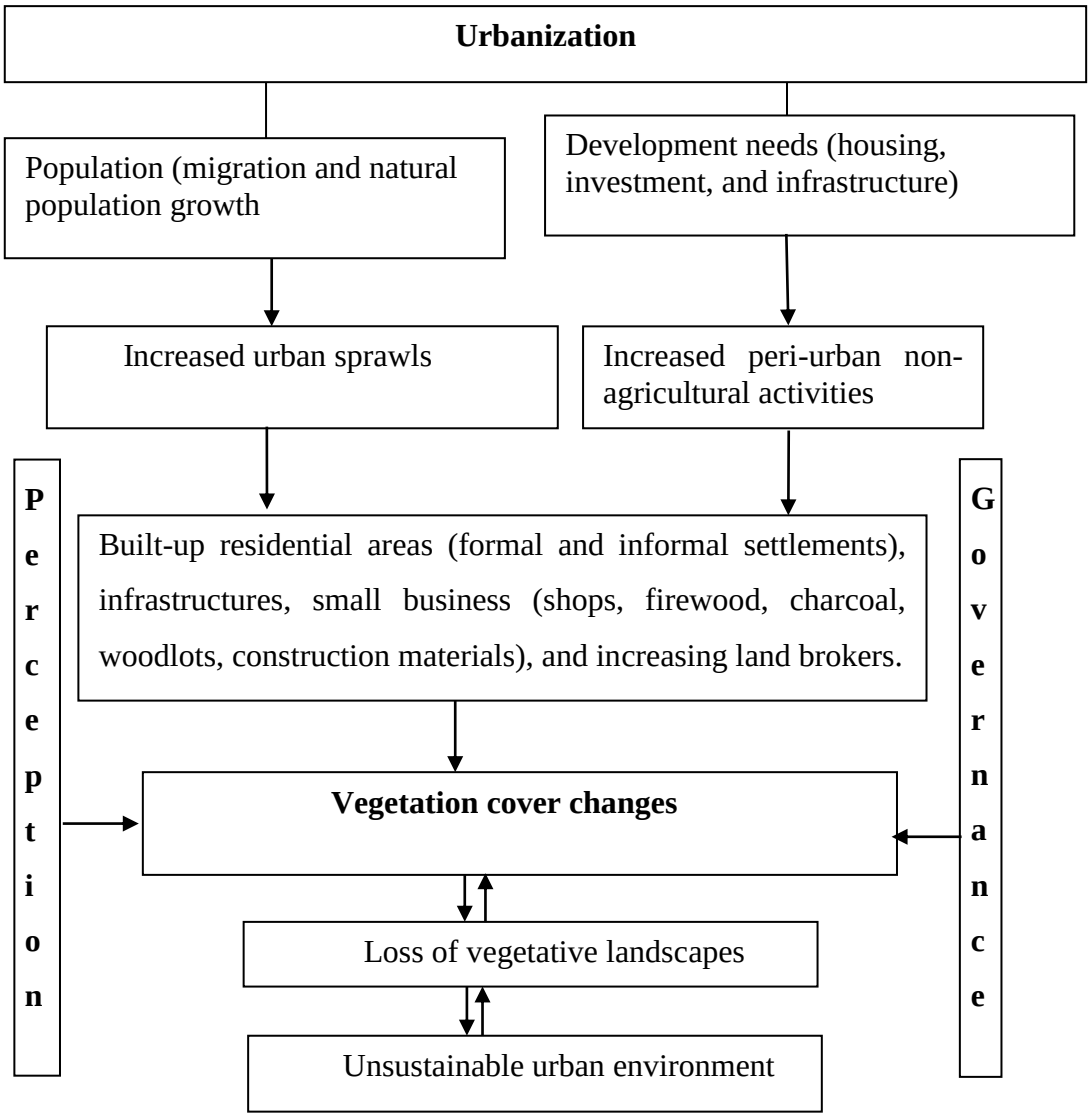


Figure.2.1. Conceptual framework of rural-urban interface vegetation covers changes
Source: Own interpretation

CHAPTER THREE

3 MATERIALS AND METHODS

3.1 Description of the study area

3.1.1 Physical characteristics

Location

Burayu town is one of the nine municipal town administrations in Oromia special zone surrounding Finfine. It is located towards the North West on the way to Ambo, from Addis Ababa metropolis, the capital of Ethiopia. According to the rank given by Oromia national regional state to all urban centres of the region, the town is the first grade town in the region OUPI, 2014). According to OUPI(2014) in the year 1996 the municipality of Burayu town was established over the area between Katta and Gefersa and the geographical location of Burayu town is extended over 9^0 02'' 47 N to 9^0 06'' 56 N latitude and 36^0 28'' 53E to 36^0 36'' 40 E longitudes. Burayu town is administratively divided into six sub units namely: Leku Keta, Burayu Keta, Gafarsa Burayu, Gafarsa Gujee, Gafarsa Nono and Melka Gafersa. It is bounded by Addis Ababa city in the east and south east, forest owned by Addis Baha in the north, Menagesha Suba community forest and Sululta town in the south west, Menagesha Kolobo town in the west, Sebeta Hawas district in the south (BTM, 2014).

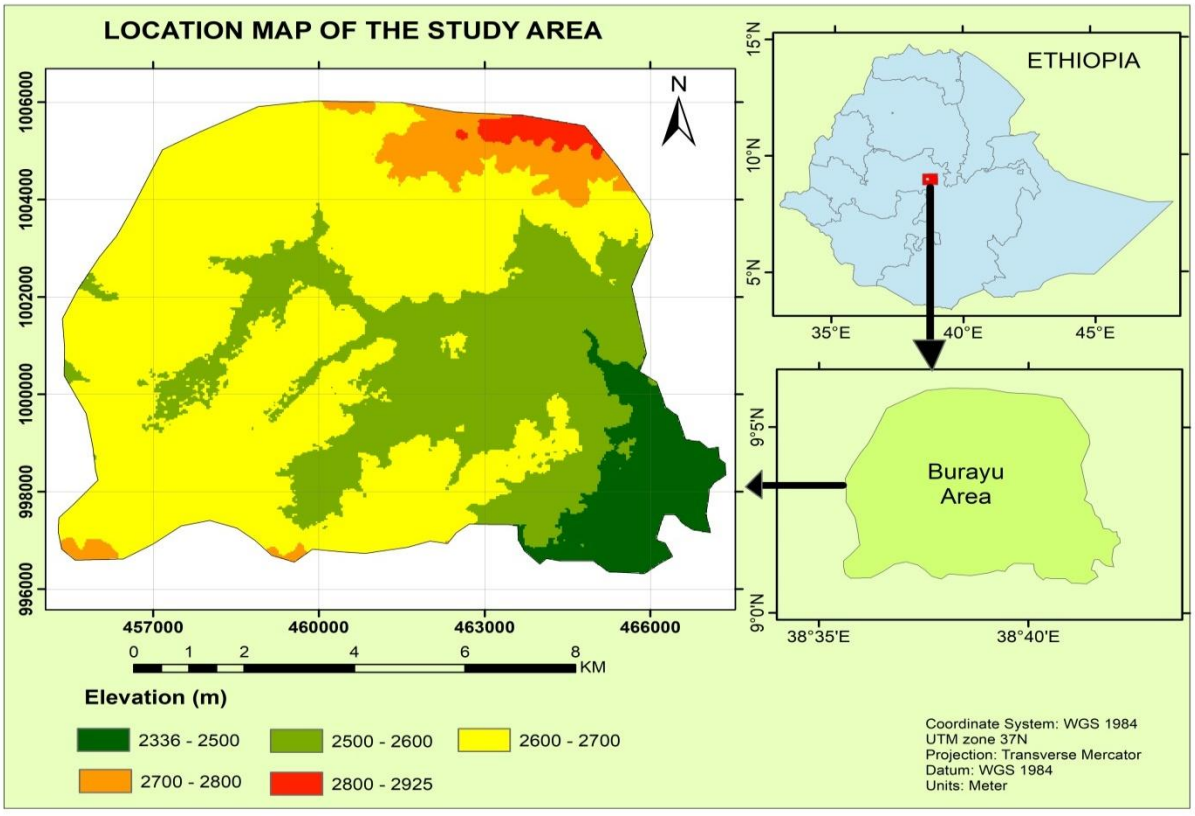


Figure. 3.1. Location map of the study area

The existing built up area (the developed part of the city) incorporate 6650 hectare of land and recently 2407 hectare is added to the existing. Therefore, the total area included as administration boundary of the town is reckoned to be 9057 hectare (BTM,2014). The vastness area of the city boundary has forced to propose one main center around Burayu town administration office and three sub centers around Keta, Guje (kella) and Nono (Ashewa meda) localities. The selection of center and sub center considers emerging businesses and services and physical radius. Urban center refers to portion of urban center that serves the surrounding area in offering essential urban services. They are focal point of administration, services, commercial activities, transport and communications where people gather to get services (OUPI, 2014).

Topography

According to Oromia urban planning institute study conducted on structural pan of the town in 2014, in the city boundary, there are a number of hills including Egdu, Aria, "Baxaroo" and others where stream generate and flow towards the city. These hills considered as source of potential physical hazard and generate as a source of flooding as well. In fact, the hills have its own contribution; to harvest additional volume of surface runoff during rainy seasons. According to OUPI (2014) the expansion areas of the city are described by gentle slopes and undulated plain (in the north western, western and southern directions). As obtained from the base map of Burayu town, the highest altitude of the city is situated around the northern tip of Burayu Keta along with the reservoir, "*Baxaroo*" locality (2875m) and the lowest elevation lies in the Anfo locality (2311m) with altitudinal variation of **564m** and average elevation of **2593m** (OUPI, 2014). These areas are presently underutilized and yet are suitable for housing and other uses. Accordingly, it serves the city administration to respond for land demand. According to BTM (2014) the future physical expansion direction of the city, therefore, is towards Sebeta Hawas district, Menegesha town and in the ways to Mulo. These areas are identified as areas where the land is presently underutilized and yet is suitable for housing and other uses and to ensure that land is made available to meet demand.

Climate

As Burayu town Integrated Development Plan (IDP) of 2006 indicated, the town is grouped under semi-humid climatic zones. The meteorological data has shown that, the mean annual temperature, the mean annual maximum and the mean annual minimum temperatures of the town is reckoned to be about 14^{o}c, 22^{o}c and 6^{o}c, respectively. The Burayu town IDP (2006) shows that the amount of rainfall recorded in the town varies from one month to

another. Generally, June, July, August and September are months, which receive high rainfall in a year.

Vegetation

According to OUPI (2014) study shows, a vast area of Burayu town is occupied by vegetation of different species which provide aesthetic value for the city. Among the type of vegetation variety eucalyptus (*Baar-gamoo*), juniper (gaattiraa), "*Ejersa*", "*Heexoo*", and other indigenous trees and green plants are few to be mentioning. The large part of the town is occupied by large eucalyptus plantations and other indigenous trees and plantations found in the north, west and southwest part (OUPI, 2014). The study also revealed that the areas surrounding Gefersa dam are occupied by indigenous tree combined with eucalyptus. It is important to note that areas occupied by vegetation and especially areas along Gefersa dam need to substitute for indigenous tree to sustain the resource for long term use.

3.1.2 Socio-Economic Characteristics

Population Size

The population count made by Central Statistical Authority (CSA) on population and housing census conducted in 2007 has been considered here to see the trend of the population size of the town. The 2007 population census put the population size of the town at 63,889. Based on the 2007 census, projected population of the town in year 2013 is 81,740.Whereas population counted in year 2011 by Burayu town municipality, the population size of the town is around 114,426 (BTM, 2014). Based the population projection of 2013, the population of the town is estimated to be 97,035 in 2019 by using natural population growth rate of 2.9% each year. Migration is one of the components of population dynamics which can affect population size of an area when its volume is significant. According to data on study area of previous residence of the migrants in 2007, the number of migrants from urban and rural areas was almost similar and out of the total population of the town migrants constituted close to 61% (BTM, 2014).

Housing and Industrial development

According to the 2007 population and housing census report by CSA projected there were 18789 housing units for 19546 households in Burayu Town. The ratio of the total number of households per 100 housing units was to be 1.0403. In other words, for every increment of 100 households there were, on the average, about 188 housing units (BTM, 2014). The town is characterized by fast growth of industrial investment and currently there are about 212

manufacturing industries, 116 medium and 96 small scale industries more than 5756 permanent and non-permanent workers are employed in the medium scale industries which have capital more than birr 1.18 billion (BTM, 2014).

Agriculture and Natural Resources

Beside services and industry, the economic base of the town is agriculture and natural resources (OUPI, 2014). Both crop production and livestock rearing activities are taking place in the town and periphery parts of the towns. Vegetables are the dominant type of crop produced while livestock production includes dairy farm, cattle, sheep, and poultry production are common (BTM, 2014). Regarding the natural resources, there is misuse and abuse of the resources in the town. For instance, practices such as stone mining without considering the environmental and social impacts emanate from the quarrying activities due to increasing urbanization is one of the challenges (OUPI, 2014). The study further shows that the topography of Burayu town is vulnerable for environmental degradation which requires intensive integrated watershed management. This means the existing situation in the town is prone to erosion, water pollution, degradation of tributaries and water ways by construction and solid waste disposal (OUPI, 2014). Moreover, vegetation cover and water recharge areas are highly affected due to urban sprawl and construction activities.

3.2 Methodology of the Study

In order to answer the research question stated in this research as well as to address the objectives of the research, this study employed both quantitative and qualitative (mixed research) type of research approach based on the data required for the study. In this research appropriate research design, data sources and target population, methods of data collection and analysis, sample size and sampling techniques were implemented to come up with the best and comprehensive research output.

3.2.1 Study design

The main objective of the study is analyzing the governance, people perception and trends of rural-urban interface vegetation cover changes. In order to meet the objective, descriptive research which is cross-sectional survey type of research design was employed. This type of survey is to ensure the valid representation and accuracy of factors or variables that are relevant to the research questions. It provided quick, cheap and effective means of evaluating the desired information about the study population. For the information regarding to the governance of vegetation cover was collected and analyzed qualitatively. The period (2000-2020) remote sensing satellite image analysis was used to observe the trends and extents of

vegetation cover change in the study area. Similarly, information about the perception of the local community to the interface vegetation cover change was collected and analyzed quantitatively taking numerical scores of respondents using Likert Scale technique. Moreover, both qualitative and quantitative methods were used to generate comprehensive information and a clear picture of the study.

3.2.2 Sampling design

A sample design is a definite plan for obtaining a sample from a given population. It refers to the technique or the procedure the researcher adopt in selecting items for the sample. For the purpose of this, the study defined population, sample frame and sample unit to get the best representative sample size.

Population: Burayu town administrative is where the study focused and targeted to conduct the study. This is the theoretical or target population of the study for which the output of the study was generalized for the whole area. The total population of Burayu town administrative was estimated to 132,008 by 2019 based on the count made by the town in 2014 by taking 2.9% projection each year. The household was estimated to be 26,401hhs.

Study Population: Burayu town has six kebeles and out of which Gefersa Burayu and Gefersa Guje Kebeles are where urbanization severely expanding. Thus, these two kebeles used as sample population and were selected purposively from the six kebeles. Based on the estimation taken in 2014 and the population projection rate, the population size of both was estimated to be 29,041 and the total households in the both kebeles were estimated to be 7,260 hhs in 2019.

Sample Frame: Gefersa Burayu and Gefersa Guje have twenty four (24) sub-divisions (the so called Gots). Out of the 24 sub division, the study focused on five (5) sub divisions that are very proximate to the periphery of the kebeles and considered to be vegetation cover change prone areas. The study sample-frame was all the twenty four (24) sub-divisions or gots from where the sample was drawn.

Sample Unit: The sample unit was purposively taken those five sub-divisions due to the fact that it is highly prone areas of the rural-urban interface vegetation cover changes. The sample unit is therefore, the sub-division or unit from which the true representatives of sample respondents were identified. Therefore, 268 sample households were taken from the estimated total 820 households in the five sub-divisions of the kebeles by using stratified random sampling techniques.

Sample size determination

According to Burayu town municipality 2018 annual report indicated, the total number of the households (HHs) in the Burayu Gefersa kebele and Gefersa Guje are 5810 HHs. The number of the household from the five sub-divisions is estimated to be 820 households. From total HHs in the Kebele, the study draw 268 samples from Gefarsa Burayu and Gefersa Guje Kebeles of the periphery five sub-divisions. The actual sample size for the study was determined using the statistical formula that is designed by Yamane in 1967 which was designed for sample size determination formula in order to reach at the required sample size for data collection. When the population is finite and the total population is known but the proportion is unknown, sample size was determined using the formula as follows;

$\mathbf{n = N/ (1+N (e)^2)} = 820/ (1+820(.05)^2) = 268$

Where: **n** is required sample size

N is the total number of hhs in five sub-divisions in Gfersa Burayu and Gefersa Guje kebeles.

e is precision level which is expressed as decimal of 0.05 for 5% significant level.

1 is constant number

Therefore, the sample size for this study was 268 respondents.

Sampling techniques

To select the sample respondents from sample, the sampling techniques that researcher used was Stratified Random Sampling technique. The sample unit (the five sub-division or gots) formed in different strata (Got 1, Got2, Got3, Got4 and Got5). The total HHs in the five gots was estimated to 820 HHs. The proportion of HHs in each got was estimated as follows; Got1 18 % (148), Got2 22% (180), Got3 16% (132), Got4 20% (164)) and Got5 24% (196). The required sample sizes were 268 HHs respondents. Therefore, Got1 (148/820*268= 48), Got2 (180/820*268= 59), Got3 (132/820*268= 43), Got4 (164/820*268= 54), Got5 (196/820*268= 64). The first respondent was selected randomly from each strata and the rest were selected following the ratio specified for each strata using systematic random sampling techniques. Totally, 268 households were selected by such stratified random sampling technique.

3.2.3 Data Sources

The sources of data for this research were primary and secondary types of data. The primary data was those which are collected a new and for the first time and thus happen to be original in character and it's to be originally collected. The secondary data, on the other hand, was those which have already been collected by someone else and which have already been passed through the statistical process and the nature of data collection work is merely that of compiling. The primary data is the data which was obtained using questionnaires, interviews, and direct field observations. On the other hand, various documents of the organizations under the study (Burayu town administration and certain relevant documents from the sample kebeles were used as secondary sources of data. Moreover, various documents, reports of Oromia national regional urban planning institute, the materials from different research works, internet websites, and some related materials to the issue were used as additional sources of secondary data.

3.2.4 Data collection methods

Participants of the study were purposely selected experts and officers from the Burayu town administration of different departments (urban land use plan, urban housing unit, urban environment and urban agriculture offices of the town, both kebeles administrators, and land use management committees of the study area) and HH residents of the local people at the periphery area who have direct interaction with interface vegetation covers, and implementers of the legal frameworks regarding natural resources in the area. Household survey, Key Informant Interview (KII), field observations and remote sensing satellite image were used in this research.

Household survey: For the study 268 close-ended questionnaires were designed to collect data that answers the research objectives and research questions stated in this study. The questioners were conducted to collect data regarding people perceptions about vegetation cover change in the study area. In order to obtain firsthand information on the issue, the researcher distributed and collected the questionnaires after five to seven days. The researcher visited the study area regularly to answer any questions or challenges that the respondents might face. This survey was comprised of the demographic variables, respondents' characteristics, and perceptions about the vegetation cover change in the interface area.

Key Informant Interview (KII): For this study personal interview by structured and semi-structured guiding interview checklist were employed. This was an extensive and qualitative interview conducted mainly with the total of sixteen (16) respective individuals from Burayu town municipality, land use and management office, urban environment office, agriculture offices of the town and from both kebele administrative those who are more knowledgeable on the issues of the vegetation cover changes at periphery of the study area were interviewed. This type of data collection tool was conducted, based on qualitative techniques, to obtain information about the land use plan of the town, patterns of urban expansion, trends of informal settlements practices, availability of legal frameworks to manage the vegetation of the interface, and awareness they have about the purposes of the vegetation cover in the interface for the sustainability of the town.

Field Observation: The researcher was made regular personal field observations with participant and non-participant observations techniques to all the vegetation sites in Gefersa Burayu and Gefersa Guje Kebeles periphery area to compare some of the responses view with that of the actual situation on the ground. The researcher also observed the contribution of vegetation cover changes and the actual sustainable land use management practices on the ground. The observation was focused only vegetation cover change related issues in the study area.

3.2.5 Data analysis

The collected raw data was converted into suitable form for analysis and interpretation. This was achieved through sequences of activities including editing, coding, entry, and tabulation. The objective was to check the completeness, internal consistency and appropriateness of the answers to each of the questions. Finally, the data was analyzed and presented using computer software program such as Statistical Package for Social Science (SPSS) software. Finally, a variety of statistical tests, which include means, frequencies, and mode, were used to analyze data. The nature of investigation involved both quantitative and qualitative data, methodologically combination of both techniques was chosen both for the collection and analysis of data.

Descriptive statistical tools such as frequency, mean, mode and percentages were used to describe the socio-economic characteristics of the respondents. By the help of these computer software programs, the primary data collected through questionnaires was analyzed and presented using descriptive statistics such as mean, percentage, frequency, chart and graph quantitatively. In order to analyze the perception of vegetation cover changes by the local

community five point Likert scale was used. This means, perceptional statements against a 5-point Likert scale ranging from strongly agree (5), agree (4), unsure (3), disagree (2) and strongly disagree (1) responses were administered. The class boundaries of mean of responses were used to draw the interpretations following Del (2010) Class boundaries which are with the ranges of: < 1.0 < 1.5 = strongly disagree; ≥ 1.5 < 2.5 = disagree; ≥2.5 < 3.5= undecided; ≥ 3.5 < 4.5= agree; and ≥4.5 ≤ 5.0 = strongly agree. Based on the mean class boundaries, the perception ranges between agree and strongly agree was considered to be agreed on the issue. Similarly the perception ranges between strongly disagree and disagree was perceived as the perception that disagreed on the issue, and the rest don't know perception was taken as the neutral idea on the issue. The qualitative data including raw data gathered through interviews, extensive field notes and field reports were discussed and described qualitatively. Besides this, analytical review of various documents, relevant policy and strategy document was employed.

3.2.6 Land use land cover change analyse

Landsat satellite image were employed for the study. Landsat data is one of the most important and accurate datasets for understanding the global land cover status which is freely provided by the United States Geological Survey (USGS). Two Landsat images which downloaded from www.earth explorer.usgs.gov are February 5, 2000 (Image ID-0501702123441_07625) and January 19, 2020 (Image ID-0702001272792_00051) of same path and row (168/54) used for the change detection of vegetation cover of the study area. The image of 2000 is Landsat 7 ETM+ (Enhanced Thematic Mapper) and 2020 is Landsat 8 OLI (Operational Land Imager). As the requirements for change detection analysis, it is necessary to standardize the effect of atmosphere. The dark object subtraction (DOS) method for atmospheric correction was applied and data were processed using ERDAS imagines software. All pre-processing operations were performed with Landsat 7 band 3 (Red) and band 4 (Near Infra-Red) as well as Landsat 8 band 4 (Red) and band 5 (Near Infra-Red). The 2000-2020 image data obtained from remote sensing Landsat satellite image in the study area was used to detect the trends of land use change for special analysis. To make spatial analysis of the extent and trends of rural-urban interface vegetation cover changes, ArcGIS crack software was used to interpret the images and to indicate the levels of the conversion from vegetation to the settlements. From the NDVI map of 2000 and 2020, five different object classifications (water body, open spaces, built-up areas, sparse vegetation and dense vegetation covers). The area coverage of each feature on the 2000 and 2020 images were calculated by manual method using Arc GIS 10.3 software.

CHAPTER FOUR

4 RESULTS AND DISCUSION

4.1 Demographic and socio-economic characteristics of the respondents

As indicated in the table 4.1. Demographic and socio-economic characteristics of the respondents including sex, age, marriage, education, occupation, family size, income and duration of stay related information were surveyed and assessed for the study. During the survey a wide range of information regarding demographic and socioeconomic characteristics for inclusion and representativeness of the all categories of respondents.

Based on this the gender of respondents that took part in survey results showed that involvement of both genders is male population with 73.1 % and female population is 26.9 %. The result of male to female proportion shows most of the respondents living in the interface areas are male headed households. When it comes to age structure of respondents that were participated in the survey the age structure of respondents was divided into five categories. The first category include the age between eighteen and twenty five, the second category is age of twenty six to thirty three, the third one is between thirty four to forty one, the forth category of age structure is between forty one to forty nine and the last category is the respondents with the age of 50 and above. As it can be seen from the table 4.1, the highest frequency and the mode is the age category of thirty four to forty one which contains 36.6% and the respondents over forty two and below 50 age has the share of 20. 5%. This indicates that more than half of the respondents (57.1 %) of them are adults and recently resides in the area.

Regarding marital status, family size and duration of the respondents out of total respondent involved in the study the majority (80.4 %) of them were married. In respect to the family size the highest frequency and mode is the family size range of four to six families with the share of 50.7% (table 4.1). From the people livelihood experiences and trends, married individuals supposed to be reside permanently or less mobile than single individuals. As the individual resides permanently or less mobile, the need for having land formally or informally for house contraction can increase. In similar manner the number of family members can increase a conflict of interests on vegetation or land resources. Respondents of dwelling duration between five to fifteen years have a highest share which is 62.3%. This is also shows that as people stayed in the same place for long duration, the tendency to depend

on the land resource is high. That is why most people buy the land from private land owners through brokers and build their houses as observed from figure 4.1 and 4.2 of this research.

In terms of education level, occupation and income of the respondents that participated in this research showed that the largest percentage (29.9%) from respondents are with university first degree and 149 (55.6%) out of 268 are government employees. The highest income range of the respondent is fall between the income levels of 2000-6000 Ethiopian birr per month which is nearly half (47%) of the respondents. From this we can conclude that even though more than half (51.2%) of respondents are with educational level of first and second degree, most of the them relied on government for job security and their income level is low as compared to the current gradual increasing rate of market inflation. At this income level people do not afford the housing price for renting which is estimate a minimum price of 4000 to 5000 Ethiopian birr for a medium quality houses. The only solution for such level people is in any means to have the low price periphery land, which is part of vegetative landscape, from private holders or land brokers.

In general, the demographic and socio-economic differences such as gender, age, education, occupation and income of respondents in urban rural interface areas are the most important issues to be considered in understanding and shaping the responses of the respondents. Study conducted in Bangladesh shows education and knowledge are the most important determinant factors for vegetation resource management and human perception about natural environment and the urge to contribute towards its sustainability are influenced by societal norms and the awareness pertinent to the benefits of environment (Mohammad, 2008).This may be due to the fact that these issues can affect the normative knowledge base and concern of respondents about the vegetation cover and environment as a whole. This is because of the fact that, people with reasonable economic resources; better educated; more mature age, more responsible personality especially females and sound job security individuals may prefer more to live in environment friendly and planned settlements of urban and peri-urban areas.

Table 4. 1 Distribution of respondents by demographic and socioeconomic characteristics

variables		Frequency	Percentage	Mode
Gender	0=male	196	73.1	Male
	1=female	72	26.9	
	total	268	100	
Age	1=18-25	22	8.2	34-41
	2=26-33	77	28.7	
	3=34-41	98	36.6	
	4=42-49	55	20.5	
	5=50+	16	6.0	
	Total	268	100	
Marital status	1=single	52	19.6	Married
	2=married	216	80.4	
	total	268	100	
Education	1= 0-8	50	18.7	1st degree
	2= 9-12	37	13.8	
	3= certificate/diploma	39	14.6	
	4= 1st degree	80	29.9	
	5= 2nd degree	57	21.3	
	6= 3rd degree	5	1.9	
	total	268	100	
Occupation	1=government	149	55.6	Government
	2= private/own business	90	33.6	
	3= unemployed	29	10.8	
	total	268	100	
Family size	1= 1-3	120	44.8	4-6 family
	2=4-6	136	50.7	
	3= 7-9	7	2.6	
	4= 10+	5	1.9	
	Total	268	100	
Monthly income	1= <2000 birr	74	27.6	2000-6000 birr
	2= 2000-6000 birr	126	47.0	
	3= 6000-10000 birr	41	15.3	
	4= 10000+ birr	27	10.1	
	Total	268	100	
How long you lived in the area	1= <5 years	74	27.6	5-10 years
	2= 5-10 years	126	47.0	
	3= 10-15 years	41	15.3	
	4= 15+ years	27	10.1	
	Total	268	100	

Source: Survey by the researcher, 2020.

4.2 Perception of respondents on urban-rural interface vegetation covers change

In order to examine and evaluate perception on the local community in the interface area of town towards vegetation cover change, the information gathered through household survey were computed and analyzed through SPSS software program and the following results has been obtained. The perception responses derived from the respondents regarding urban rural interface vegetation covers change are summarized in table 4.2.

To assess the perception about the issue of urbanization and vegetation cover change, the respondents were asked whether urbanization has playing a great role on the changes of vegetation cover in the area. The perception of the respondents with mean boundary of 3.95 and standard deviation of 0.955 shows that they agreed or satisfied with the idea that urbanization has playing a great role on the changes of vegetation covers in the study area. In the same manner the majority of the respondents with the mean of 3.73 were agreed with the ideas of urban-rural interface vegetation cover change in the study area is due to expansion of settlement than expansion of agricultural. The perception of the respondents on urban expansion also examined and regarding the idea of highly increasing urban expansion in the area is a result of informal settlements on vegetative landscapes is being perceived positively by the majority with the mean of 3.91. The majority of people involved in the study believed that if informal settlement in the area is controlled through strong land use planning, the rate of vegetation cover change will decrease. In respect to this issue, the mean class boundary of 3.76 with the standard deviation of 0.976 as indicated in the table 4.2 shows the respondents satisfied with the concepts of the improper implementation of land use plan is the main causes of informal settlements in the study area. The change in vegetation cover in the study area due to urbanization, expansion of formal and informal settlements, and improper implementation of land use plan are being positively perceived by the majority of the respondents.

According to Kiros and Desalegn (2019) as a result of increasing urbanization, the demand for land for housing is an issue in urban and peri-urban areas that might increase the expansion of built-up areas. From these assessments and perceptions, the result shows that, the influences of urbanization, settlements and land use plan of the town on the urban rural interface vegetation cover change are the most dominant factors and these factors are practiced through land use conversion from peri-urban to urban and introduction of new settlements at the cost of the land with vegetative cover. Though there are abundant natural vegetation resources endowed, there is also an increasing land demand for settlements at the

costs of these resources is common in the study town. The approaches and the trends of land use planning and urban design in the study area are not encouraging the better management of vegetation cover by protecting vegetative landscape, creating new green spaces and large parks within urban and its borders areas. For these reasons, it is better to have strong regulation and implementing formal structures in order to protect vegetative landscape and to design for new urban expansion without affecting these resources.

On one hand, as perceptional statements indicated in table 4.2, people participated in the survey have some confusion and neutral idea with the mean of 2.83 concerning the statement which says 'it is not possible to create balance between urbanization and vegetation cover change in the area because to be expanding the town the only option is using vegetative lands in and around the town'. On the other hand the large proportion of respondents with mean average of 3.81 agreed that encouraging vertical expansion of the town than the current horizontal expansion can save the destruction of vegetation covers in the area and the rest of them still have a neutral idea about the encouragement of the vertical expansion. Urban sprawl are potentially endangering the future of sustainable land use, especially in peri-urban regions through fragmented, irregular, and dispersed expansions to vegetated landscape patches in a disorder manner (Luca and Carlotta, 2013). The Current urban development policy and building regulation of Ethiopia are encouraging the vertical expansion of the town due to resource scarcity and sustainable infrastructure development of the towns. According to this regulation and urban policy of the country, towns are expected to implement vertical development of their town (OUPI, 2014). But the trends of urban expansion in the study town seems linear expansion to periphery areas. As the trends of urban expansion in the study area shows the linear expansion of the town along the road side is aggravating the depletion of vegetation cover. The current development trend and horizontal expansion of the town directly and indirectly contributed to the local environmental sustainability of the town. This indicates that due attention was not given for vertical expansion of the town by the municipal and kebele administrators. Similarly, as observed from the perceptional statements of the respondents, most people did not get deep awareness about the vertical expansion of the town and its benefit for the community as a whole.

The other perceptional assessment identified by this survey is the purpose and importance of vegetative landscape in and around the study town. The rapid growth of settlements leads to a huge decrease of vegetative land to non-vegetative purposes. Regarding this issue the respondents asked to express their perception on the increasing needs for use of vegetated landscape for non-vegetation purpose such as housing and other constructions. About 64.9% of the responses reported that they agreed that there is a radical shift from vegetative purpose

to non-vegetative purposes of the land in the town. Because in and around urban areas the value of land is increasing due to the increasing needs of settlements. The opinions of people regarding the benefit get from vegetative cover than non-vegetative propose shows that the level of satisfaction on non-vegetative purpose is high and agreed with the mean value of 3.87. As shown in the table 4.2 there is a miss perceiving about the importance of vegetation in around the urban areas. Because a large proportion of the perception identified during survey fall in the neutral opinion (with mean values of 2.59 and standard deviation of 1.261) against the statement which states vegetation covers has no purpose in and near urban areas. This shows that people more interacted with economic and social benefits of the vegetation resource within short period than the environmental benefit. Because the effect of environmental benefit is not observed within the short term and it's not easily understood literally like that of social and economic benefits. According to the study conducted by Buxton and Choy (2007) shows in rural-urban interface areas economic and social priorities conflict with environmental priorities and much of the time economic and social priorities come before environmental priorities. However, some of the respondents disagreed that the vegetation covers has no purpose in and near urban areas and that there are better need for the use of land for vegetative purpose than for non - vegetative purposes.

The idea of gradual vegetation cover changes in the area has no any impact on the local community is perceived as a neutral opinion or no ideas by the majority of respondents with the average value of 2.72 mean and 1.245 standard deviation and a few of respondents disagreed with the idea of vegetation cover changes in the area has no any impact on the community. This shows that people perceive that the vegetation cover change has no negative impacts on the local community. In the same manner, respondents were asked to offer their opinion on whether agree or disagree about vegetation covers in the interface area have no purpose for the sustainability of the town. According to the perception of the respondents indicated in the table 4.2 the opinion of vegetation cover change in the interface area have no purpose for the sustainability of the town is disagreed by the large proportion of respondents with mean value of 2.31 and on contrary the idea is being agreed by some of the respondents. This result is to indicate that vegetation cover in and around the town is important for the sustainability of the town, since the loss of vegetation cover impacts negatively on urban sustainability. Sustainability in this case is the environmental sustainability which related to the sustainable urban development. The loss in environmental sustainability can lead to a loss the capacity for supply of local ecosystem services including provision, protection, regulatory and cultural function of the environment for the town. Supporting this issues Pert (2012) described that peri-urban vegetation delivers a diversity of

ecological and social services, varying from climate regulation, soil erosion control, and biodiversity maintenance to water quality improvement, air pollutants absorption, and recreational opportunity supply. Sustainable environment and urban development of the town are greatly affected by weak urban land use planning and ineffective governance structure especially in peri-urban areas of the town. In most cases, for the reason that lack of strong governance, the decisions about use of urban and peri-urban vegetative covers are made without consideration of their environmental and ecosystem values (Mark, 2015).

Table 4.2 Perception of respondents on urban-rural interface vegetation cover change

Variables	Mean range	St. Dev	Interpretations based on mean range
Urbanization has playing a great role on the changes of vegetation cover in the area.	3.95	0.955	Agreed
Highly increasing urban expansion in the area is a result of informal settlements on vegetative landscapes	3.91	1.106	Agreed
If informal settlement in the area is controlled through strong land use planning, the rate of vegetation cover change will be decreased	3.76	0.976	Agreed
The Urban-rural interface vegetation cover change in the study area is due to expansion of settlement than expansion of agricultural.	3.73	1.068	Agreed
Encouraging Vertical expansion of the town than Horizontal expansion can save the destruction of vegetation covers in the area.	3.81	0.97	Agreed
The gradual Vegetation Cover Changes in the area has no any impact on the local community	2.72	1.245	Neutral
There are high needs for use of vegetated landscape for non-vegetation purpose such as housing and other constructions.	4.55	0.699	Agreed
People get more benefit from vegetative landscape for non- vegetation purpose than for vegetative purpose.	3.87	1.094	Agreed
It is not possible to create balance between urbanization and vegetation cover	2.83	1.298	Neutral
Vegetation covers has no purpose in and near urban areas	2.59	1.261	Neutral
The gradual Vegetation Cover Changes in the area has no any impact on the local community	2.72	1.245	Neutral
The vegetation covers in the interface area have no purpose for the sustainability of the town	2.31	1.1	Disagreed

Source: Own survey, 2020

4.3 The Governances of rural-urban interface vegetative landscape

Regarding the governances of rural-urban interface vegetation cover in the study area, key informant individuals from both Burayu town municipality and respective kebeles who are directly working and on land use planning and urban environment and agriculture sectors, and those more knowledgeable on the subject matter were interviewed on the issues of the presence of master plan of the town and its implementation, how this plan aligned and communicated from top to dawn, the status of informal settlement practices in you're the town, and the integration of the master plan with other sectoral plans to integrally managing vegetation resources of the interface areas.

Regarding the presence of Master Plan, all of the interviewees reacted that, the town has got its first master plan in 2006 and it was expected to be revised in 2016, but till now it was not. The researcher also observed the 2006 master plan document of the town. Land use planning to secure vegetation covers through zoning and regulating urban expansion and green structure planning were incorporated in the master plan of the town (OUPI, 2014). The protection and attention given for green spaces or vegetation covers in the implementation of land use plan was appears to be rather weak, when compared with new emerging settlement spaces in the town.

According to OUPI (2014), during the preparation of master plan the town administration has about fifty four (54) identified and demarked green areas and parks. Most of the forests and vegetation covers at periphery of the town were considered as government owned parks of the town. The responses observed from the key informant respondents reveal that, currently the community and kebele level administrates considered those resources as open access resources and most of the green areas and open spaces are used for other purposes like built up community organization office (Afosha), local leader office (Gote office), shades for micro and small enterprises, and other activities which are not be the intended purpose for the green area and parks. This shows, that the master plan document was not implementing properly and its implementation follow up is very weak. In other word, the communication on the master plan and its implementation among top level town administrative and dawn level kebele administrative structures is seems to be poor.

Based on the key informant interview made with individuals on the issues of land use plan indicates that, more land is needed in and around urban areas for settlements (most of them are informal) than for greenery purposes which encourages the gradual expansion of urban areas with a negative effect on forests and other green areas in and around the town. From this idea we can conclude that still there is a traditional land use planning and zoning has been practicing in the area in contrast with the

master plan of the town. According to the view obtained from the discussion, the other challenge in the governance of urban rural interface vegetation cover is that the urban-rural interface often lacks comprehensive and integrated planning of the rural and urban areas. The conventional method of land use planning is considering urban and rural land use planning as a separate activities and mandates. This indicate that there is lack of comprehensive and integrated land use planning between urban and rural areas, where the two boundaries meet and where important parts of the vegetation covers are situated.

The respondents were interviewed to answer and asked to discuss the issues regarding to the management practices and legal frameworks for urban rural interface vegetative landscape governance across the responsible sectors and administrative bodies in the study area. According to information gathered from interview shows urban rural interface vegetative landscape governance often fall in to continuous challenges of the two bodies. There are no joint planning, management practices, and legal frameworks for urban rural vegetation covers, but rather segmented legal frameworks, conflicts of interests over resources and competition between different administrative bodies of rural and urban areas. From this information we can generalize that there is no or little integration between sectors like municipal, environmental and agricultural sectors as well as between both rural and urban administrative bodies. In addition to this the information is clearly indicating that there was no platform for setting a common goal and acting accordingly among the sectors and administrative bodies. Rik (2015) analysis indicates that having a common goal across all the respective sectors and administrative bodies can pave the way for integration of joint governance and consolidation of the knowledge and experience which is necessary to provide a stronger basis for better management of the urban-rural interface vegetative cover.

Urban expansion will no doubt result in over-exploitation of limited vegetation resources through intensive increment of built up areas. This gradual exploitation of vegetation resources through urbanization would consequently result in reducing the level of vegetation cover (Browder, 2002). This is much more practical in and around Burayu town, where the condition was being aggravated by the highly increasing settlements. From the point of view of environmental Protection and climate change officers of Burayu town, settlement is the major cause for vegetation cover change in the town. This view may be explained by the fact that many vegetative lands located at periphery of the town have been cleared for settlements.

Due to urbanization, the town has been expanded horizontally towards north and western direction and covered rapidly with built up areas. With this spatial development of the town, settlement areas

replace the vegetation resources and forest land. As the magnitude of the rate of urbanization and settlement growth, the demand for vegetation land is also shows an increase and the vegetation cover experiences a net loss over time (Kiros and Desalegn, 2019). Open areas and vegetated areas were filled up for housing development works not in any planned manner. The respondents who have their own house and construct by their own were asked how they get the land. The responses in Figure 4.2 showed that more than half or 63.55% of respondents answered that they bought the land from land owners or farmers and 13.79% of them responded that they get the land from their families. Only 22.66% of respondents get the land legally by the government allocation. This result shows that almost 77. 34% of respondents land was not formally allocated by the responsible government body according to land use planning of the town. In the study area urban settlement is increasing rapidly at an alarming rate through gradual conversion of vegetation resources at the interface areas into build up areas because of the fact that most of the land resources are formally or informally at the hands of private land owners. When looking at vegetation covers in general, including e.g. green space, gardens and trees, private ownership seems to dominate. Private land owners basically focus on the vegetative land conversion through land brokers informally to get more money rather than proper implementation of land use plan of the town. In the study area, land has been sold through informal land broker. As indicated in figure 2, house hold survey conducted on 115 HHs who constructed their own houses by buying the land from private land owners. The study show that 77.42 % of the respondents said that they bought the land not directly from the private land owners, they bought the land through informal brokers.

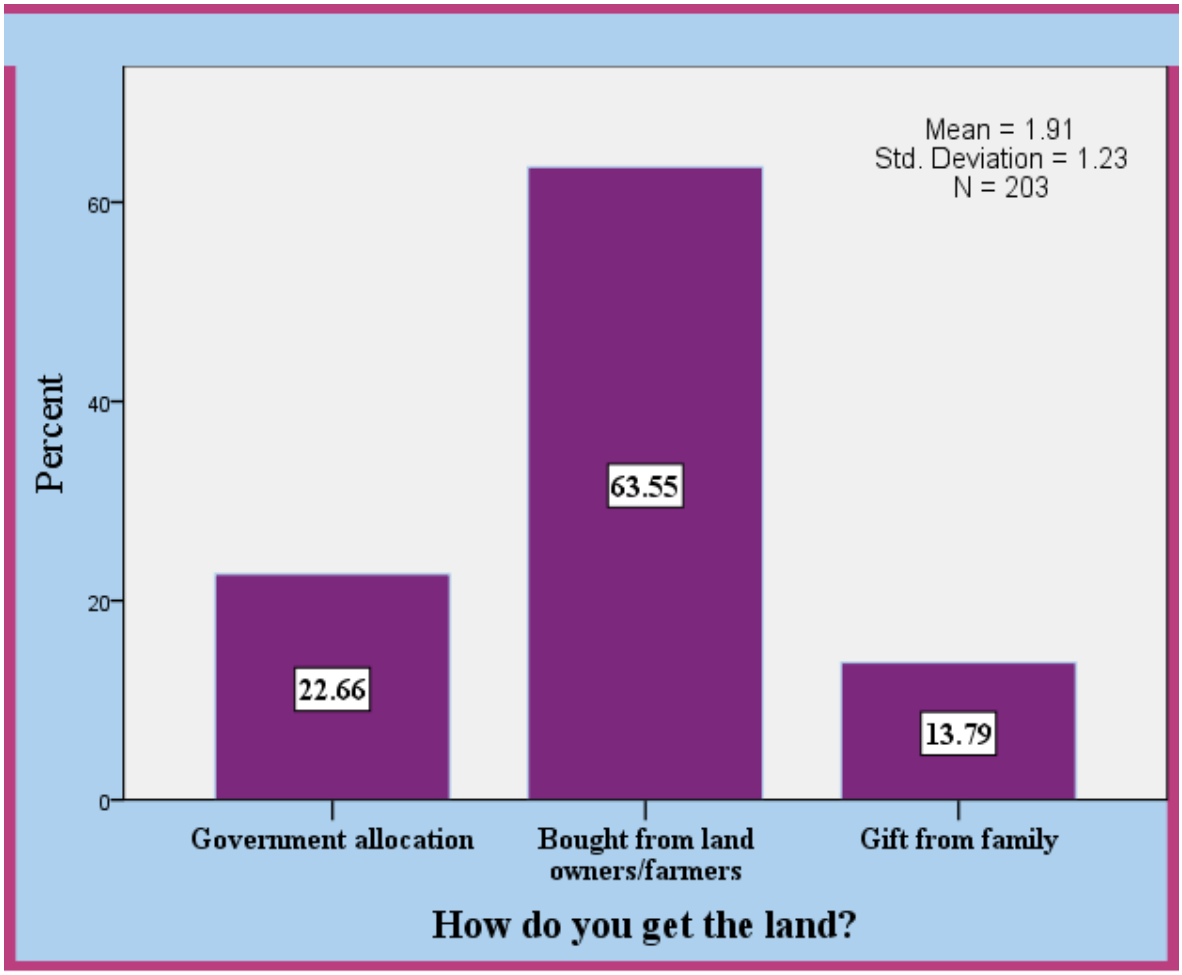


Figure 4.1. Graph shows the responses of how the owners of the house get the land.

Source: Own survey, 2020.

As observed from the respondents, the value of the land at periphery of the town is highly increasing due to the gradual increasing value of lands. From this we can understand that informal land marketing at periphery area of the town is due to the continuous process of horizontal expansion of the town which complemented with land speculation, shifting of economic activities from farming to small businesses, and the emergence of informal and illegal construction activities.

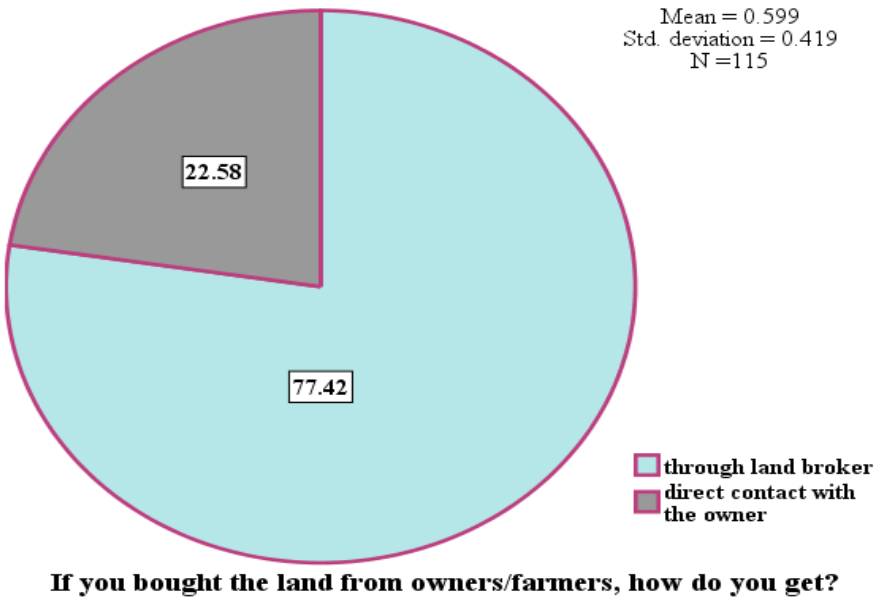


Figure 4.2. Graph shows the role of brokers in land marketing in the study area.

Source: Own survey, 2020

Urban-rural interface vegetation governance is primarily the role of local authorities (municipal and kebele administrates). Because, they are mandated to successfully implementing land use planning as per determined in the master plan of the town. But most of the vegetative landscapes including urban parks and green areas located at periphery and interface areas of the town are owned and managed by private owners or community due to their close links to the resources and their tenure rights before. Community participation and involvement in the implementation of master plan is a missing part. The study in the other research shows the problem of the urban and peri-urban vegetation cover is the problem of governance and failure in structures, rules, partnerships and processes that shape decisions and management about urban and peri-urban vegetation (Mark, 2015). Due attention were not given for the benefits of community involvement working for decision-making, encouraging a sense of ownership and raising awareness of implementing land use planning related issues by the local government. According to the Federal Democratic Republic of Ethiopian (FDRE) constitution 1995, the ownership right of land is both government and individuals. Individuals have the right to access and use the land according to land use planning of the town. Therefore, effective communication between local government and private land owners can avoid conflicts on resources and promotes the effective implementation of the master plan to govern urban and peri-urban vegetation resources.

4.4 The extents of the rural-urban interface vegetation cover changes

Considering the land use coverage and the density of vegetative landscape as well as the image resolution, five categories of landscape types (water body, built-up area, open space, sparse vegetation and dense vegetation) were visually interpreted from remotely sensed images which taken from landsite satellite images of the 2000 and 2020. The two years (2000 and 2020) image data was processed to correct the atmospheric effects on the images. Due to the lack of coexisting reference data about these images, the relative radiometric correction method was applied to overcome this difficulty. Radiometric correction of remotely sensed data is normally carried out to reduce the influence of inconsistencies that may affect the ability to quantitatively analyse as well as interpret images. This method involved two steps: firstly, converting digital numbers (DNs) to top of atmosphere (TOA) reflectance by using standard calibration values to remove temporal differences in sensor calibration and in environmental factors between image acquisitions. The images were taken from different dates, thus, the atmospheric conditions were different. As the requirements for change detection analysis, it is necessary to standardize the effect of atmosphere. The Dark Object Subtraction (DOS) method for atmospheric correction was applied and data were processed using ERDAS Imagine software. All pre-processing operations were performed with Landsat 7 band 3 (Red) and band 4 (Near Infra-Red) as well as Landsat 8 band 4 (Red) and band 5 (Near Infra-Red). The result of this process was a set of grey scale NDVI images of 2000 and 2020 representing the amount of vegetation present at each year.

There are many quantitative methods to analyse change between images. For the study the researcher used the Simplest method to differentiating changes between the two images is by subtracting the categorized initial year image (NDVI 2000) from the categorized final year image (NDVI 2020) which further applied to identify areas that have undergone significant change between 2000 and 2020. The two images in figure 4.3, indicates that areas with vegetation cover are white, while areas that are grey are no or little vegetation, and areas where water body exists are black. The white area which represents vegetated areas has stronger near-infrared reflectance. The range of NDVI values in 2000 image is from -1.92 to 0.96 and in 2020 image from -0.92 to 0.89. High NDVI value indicates the high vegetation density while lower NDVI value shows the low density of vegetation. NDVI value of 2000 and 2020 indicated in figure 4.3 shows that the density of vegetation cover in 2000 was higher when compared to the density of vegetation cover in 2020.

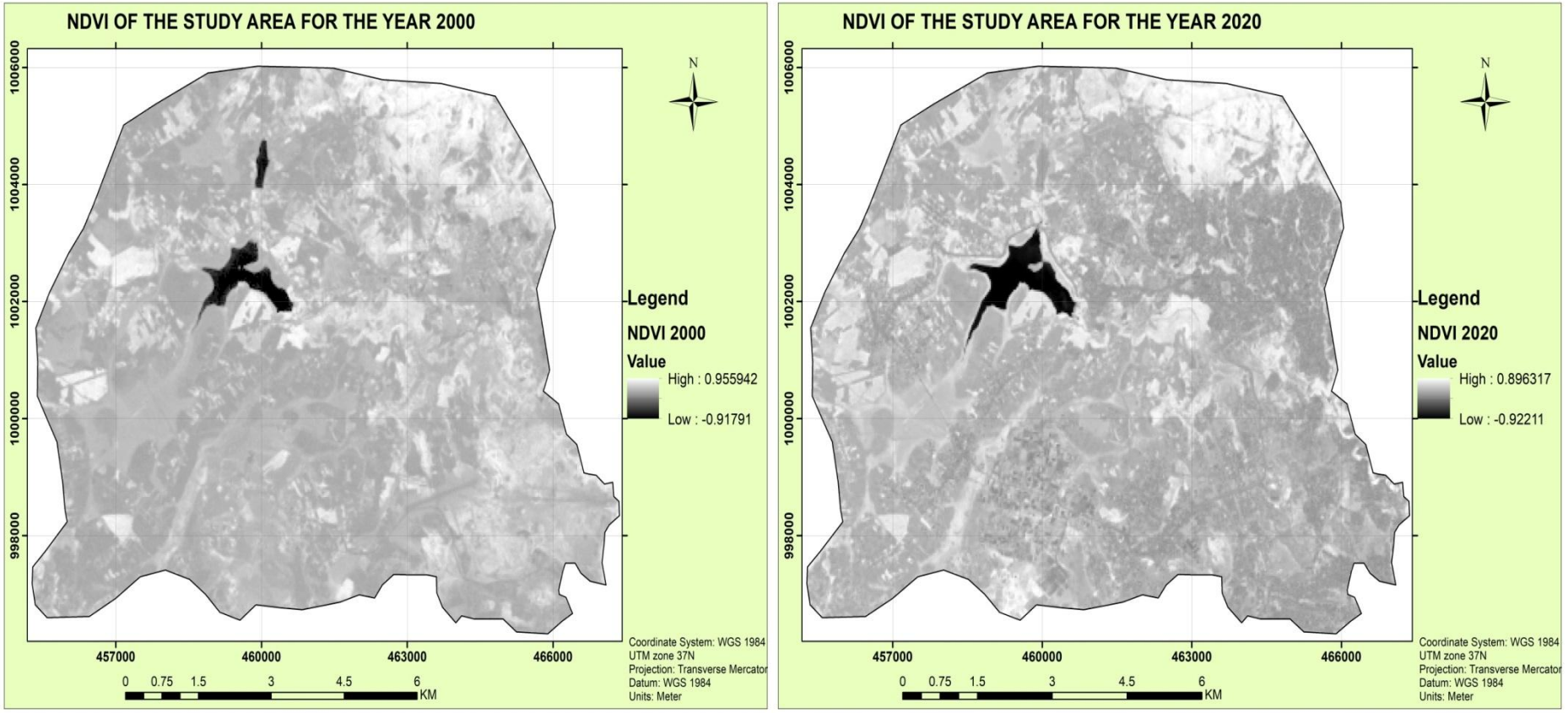


Figure 4.3. NDVI of the study area for the year 2000 and 2020.

In the study area the area covered by sparse vegetation was 5166.27 ha and it has a total share of 57.17% in 2000, but it was gradually changed to 2925.81 ha and 32.50 % share in 2020 which indicates removal of 2240.46 ha vegetation cover within duration of 20 years (Table 4.3 and figure 4.4). Between 2000-2020 years period the sparse vegetation cover was rapidly decreased about twice of the present coverage area of 2020 at the rate of 112.023 ha per year. Hence there is 43.37% negative changes of vegetation cover from the previous coverage of 2000. In contrary to this, the area covered with built-up areas or settlement was 1279.53 ha with the total share of 14.22% in 2000 and increased to 3131.62 ha with the share of 34.79% in 2020. Thus, Settlements (Urban expansion) are gradually increasing at the rate of 144.75% positive change at the rate of 7.24 ha per year (Table 4.3). Urban expansion was more extensive in the 2020s compared to the last twenty years as indicated in Table 4.3. On the other hand, the expansion of the urban areas usually known by the expansion of urban settlement doesn't follow a regular spatial pattern of development, but it was expanded in all directions horizontally to areas where vegetation cover endowed. Besides to this, the area covered with dense forest areas located at the interface areas of the town, there is a slight positive changes (15.81%) from 1069.29 ha in 2000 to 1238.36 ha in 2020 due to annual tree plantation programs movements in areas where covered by forest (table 4.3). As it can be observed from the figure 4.4, the area is at the North-East of Burayu town adjacent to the eucalyptus forest of Entoto mount. This area is mainly characterized and dominated by the Eucalyptus tree species of the forest.

The results of this research finding shows, the rate of vegetation cover in the study area gradually dropped between 2000 to 2020 years due to the change in land cover change from vegetation to the built up areas. On the other hand, the area covered by open spaces which indicated in the figure 4.4 and table 4.3 were increased over the last 20 years at the rate of 16.93% and increased at 11.6 ha per year. This study is supported by the other the study conducted in 21 European countries by European Environmental Agency, EEA (2011) which shows in ten years from 1999 to 2000 period arable land, pasture, permanent cropland and mosaic farmland, forest, grassland and open spaces experienced a gradual changes at the rate of 9% which reflects the progressive increasing of urbanization and settlement expansion in the largest urban centers to the periphery vegetated landscapes. The surface area of the open space has increased from 1365.48 Ha to 1596.66 ha, a total change of 231.18 Ha. This open area is purposively converted from vegetation covers to open areas by the town

administrators because of the fact that the gradual increasing demands of the land for house construction. Due to the individuals demand for land for house construction, the 2009 land use regulation and legislation of the region which is primarily the lease based land allocation was revised and reformed in 2016 in the way to give the chances for the individuals to get the land through house cooperatives. Based on this revised regulation, the decision was made by the regional and town council in 2017 to give 140m^2 of the land to each individual in the cooperatives. As the data obtained from the Burayu municipal 2019 annual report shows and the personal observation made in the study area, in the last two years about 12537 individuals from Oromia regional bureaus and from Burayu town were organized in house cooperatives to get the land for house construction. Since the study town is very proximate to the capital city Addis Ababa related to other towns, the land demand is high. When we take the rough estimation of the area ready for allocation, it was estimated to be 176 ha (140m^2*12537). As a result of this, in the last one or two years the land which was previously coved with vegetation were cleared and get ready for allocation. Most part of the cleared areas was already transferred to these house cooperatives starting from the end of last year and the allocation of the land will continuous until all the individuals in house cooperatives reached.

Table 4.3. Land use cover change in the study area

Name of the Objects	Year 2000		Year 2020		Change	
	ha	%	ha	%	ha	%
Water Body	120.69	1.34	108.81	1.21	11.88	9.84
Built-Up / Settlements	1279.53	14.22	3131.62	34.79	1752.09	144.75
Open Space	1365.48	15.17	1596.66	17.74	231.18	16.93
Sparse Forest / Vegetation	5166.27	57.39	2925.81	32.50	-2240.46	-43.37
Dense Forest / Vegetation	1069.29	11.88	1238.36	13.76	169.07	15.81
Total	9001.26	100	9001.26	100	_	_

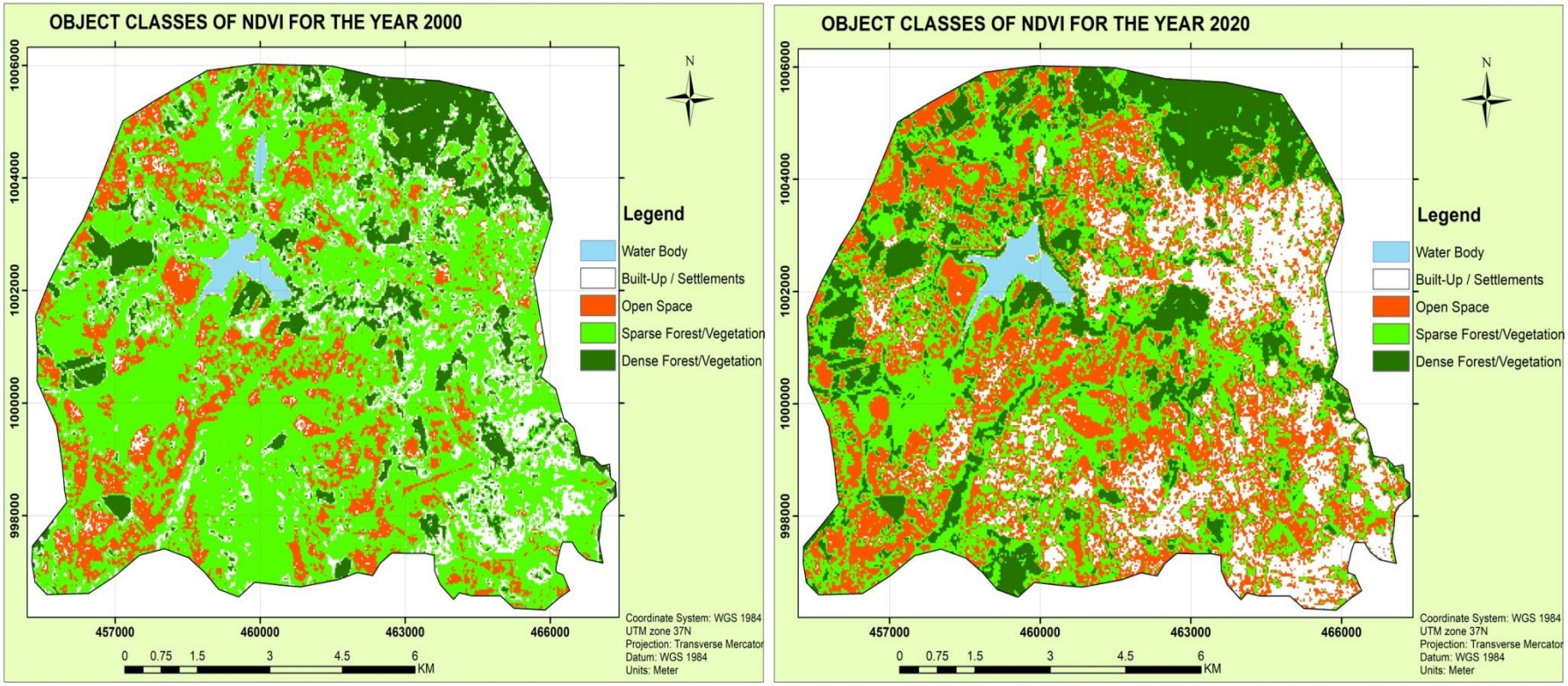


Figure 4.4. Object classification of NDVI on the year 2000 and 2020.

From the above analysis it is clear that the vegetation covers in the study areas are affected by the gradual increasing urbanization through expansion of urban settlements. In the study area, the loss of vegetation was mainly caused by the conversion of vegetation covers to non-vegetation covers of the urban settlements. As indicated in this study lack of strong governance and regulations regarding vegetation covers and lack of proper implementation of land use plan of the town has a great contribution for the gradual reduction of the areas formerly covered by vegetation. From this finding we can conclude that, unless and otherwise proper land use plan implemented and stronger vegetation resource governance applied, the gradual expansion of the urbanization leads to the dropping of the vegetation cover in the study town. In addition to this the research finding shows that the predominant sparse vegetation have been cleared and ready for new land uses of settlements. From this one can understand that the effects of anthropogenic activities have rigorously changed this vegetation cover to other non-vegetation purposes. In Ethiopia natural resource conservation areas such as vegetated landscapes at the priority of growing urban areas are facing challenges and expected to undergo various changes because of anthropogenic effects of increasing land demands as a result of rapid urbanization at the expense of vegetation cover (Abiyot, 2017). With the gradual expansion of the town and lack of strong governance of vegetation resources, the present trends of land-use change in vegetation cover will continue, and vegetative landscapes in and around the study area face existential threats to their status and functions.

4.5 Rural-urban interface vegetation change: community perception and satellite image analysis

The relationship between community perception and satellite image regarding rural-urban interface vegetation change was analyzed by this study using the information obtained from community perception and satellite images of 2000 and 2020. According the summarized perceptional statement of the community and the image analysis shows that urbanization and settlement expansion are the major challenges for the interface vegetation.

The perception of the respondents with frequency of 93 (34.7%) shows that the community agreed with the idea that urbanization has playing a great role on the changes of vegetation covers in and around Burayu town. Similarly the majority of the respondents with the frequency of 85 (31.7%) were agreed with the ideas of urban-rural interface vegetation cover

change in the study area is due to expansion of settlement than expansion of agricultural. The trends of urban expansion in Burayu town seems linear expansion to periphery areas. The study done in other research describes in most developing urban areas the expansion of settlements is fragmented, irregular, and dispersed among vegetated landscape covers in a disorder manner (Luca and Carlotta, 2013). In rural-urban areas of Burayu town most of the vegetation cover change is caused by human's activities due to its closeness to urban centers. As the trends of urban expansion in the study area shows the linear expansion of the town towards north, north east and north west of the town is aggravating the depletion of vegetation cover.

The trends of urbanization and the gradual changes in vegetation cover experienced in the study area over the last 20 years have been increasing and some of these trends are expected to continue. As table 4.3 shows, between 2000-2020 years period the vegetation cover was rapidly reduced nearly twice of the present coverage area of 2020 at the rate of 112.023 ha per year. Hence, there is 43.37% negative changes of vegetation cover from the previous coverage of 2000. On the other way, the area covered with settlement in 2000 was 1279.53 ha with the total share of 14.22% and increased to 3131.62 ha with the share of 34.79% in 2020. Thus, urban expansion is gradually increasing at the rate of 144.75% positive change at the rate of 7.24 ha per year.

The information from perception and image analysis are alike and support each other regarding rural-urban interface vegetation cover change in the study area. The information gathered from the perception and image reflects that anthropogenic effects, such as expansion of settlements negatively influence the existence of the vegetation cover in and around Burayu town. Other study focus on the trend analysis of rural-urban interface vegetation change reveal that in most rural-urban interface areas the net vegetation cover is decreasing negatively and the rate of urbanization and expansion of settlements is increasing positively (Kiros and Desalegn, 2019). The great conversion of vegetation land to settlements and barren lands in and around urban areas may have far reaching impact on future sustainability of the interface vegetation cover. As the finding indicated in table 4.3 and figure 4.4 shows the rural-urban interface vegetation cover change in and around Burayu town is due to urbanization, the town has been expanded horizontally towards north and western direction and covered rapidly with built up areas.

CHAPTER FIVE

5 CONCLUSION AND RECOMMONDATIONS

5.1 CONCLUSION

This study presented on urban-rural interface vegetation covers change in and around Burayu town using community perception and satellite image analysis.

The information gathered from key informant interview in the study revealed that urban rural interface vegetative landscape governance often fall into continuous challenges of the two bodies of urban and rural governing bodies. The two bodies have no joint planning, management practices, and legal frameworks for governance of urban-rural vegetation covers, but rather segmented legal frameworks, conflicts of interests over resources and competition between different administrative bodies of rural and urban areas. There is little integration between sectors like municipal, environmental and agricultural sectors as well as between both rural and urban administrative bodies. The study conducted by Ethiopian Institute of Biodiversity Conservation, IBC (2005) shows Strategic management and the governance of urban-rural interface resources are under challenge due to lack of urban and rural integrated natural resource management plan among the two administrative bodies and still there is a problem of integration of sectorial and cross-sectorial issues to harmonize for joint management.

Thus, the governance of peri-urban vegetation cover change in Burayu town was under complex situation and the vegetation cover was fall under the conflicts of interests between short term social and economic benefits and long term environmental benefits. From the idea we can conclude that among the different respective sectors and administrative bodies there was no platform for setting a common goal and acting accordingly. Because having a common goal across all the respective sectors and administrative bodies can pave the way for integration of joint governance and consolidation of the knowledge and experience which is necessary to provide a stronger basis for better management of the urban-rural interface vegetative covers. The problems of urban-rural interface vegetation covers change in the study area needs more attention to synergize integrated management responses among all the stakeholders.

By this study the perceptions of respondents were often described how much the increased urbanization, settlements and linear expansion of the town have such an impact on the urban-rural interface vegetation covers change in the study area. The analysis shows that the influences of urbanization, horizontal expansion of settlements, and land use plan of the town on the urban rural interface vegetation cover change are significant. All opinions point out the effects of urbanization, horizontal expansion of settlements and improper land use plan as the most dominant factors for land use conversion from peri-urban to urban and introduction of new settlements at the cost of the land with vegetative cover. Similarly, this study finding reveals that due to increasing land demand for increasing expansion of urban settlements, there is a radical shift from vegetative purpose to non-vegetative purposes of the land in the town. Similar to this study finding, the other study finding by Luca and Carlotta (2013) shows that rapid socio-economic development in the interface areas of urban and rural areas can result the settlement to be expanded by occupying a large areas of vegetated landscape in periphery areas with fragmented and dispersed among vegetated landscape in a disorder manner and endangering the future sustainable use of vegetative land.

Therefore, urbanization was more significantly affecting vegetation cover change and unless proper measures will not take, the effect of urbanization will continue and affect the future existences of peri-urban vegetation covers in Burayu town. This is because of the fact that the current development trend and horizontal expansion of the town is with no doubt affecting the sustainability of the urban-rural interface resources. The approaches and the trends of land use planning and urban expansion in the study area so far are not in the way to encourage the better management of vegetation cover through protecting vegetative landscape, creating new green spaces and large parks within urban and its borders areas. Thus, it is better to have strong regulation and implementing formal structures in order to protect vegetative landscape and to design for new ways of urban expansion without affecting these resources.

The perception statements in this study finding about idea of gradual vegetation cover changes in the area has no any impact on the local community is perceived as no ideas with some confusions by the majority of respondents with the average mean value of 2.72. Similarly people accepted that vegetation cover in and around the town have purpose for sustainability of the town. But the respondents still see the purpose of vegetation cover in terms of economic and social gain. According to Pearce (2011) the peri-urban and urban vegetative cover can have a positive impact on physical and mental health, for example, by

providing settings for physical exercise, reducing ultraviolet radiation and air pollution, and reducing stress. Because people tend to prefer outdoor recreational areas close to their homes, urban and peri-urban green areas are the most popular outdoor recreational areas.

From these we can conclude that the awareness of the most community in the study areas on environmental and ecological importance of the rural-urban interface vegetative covers is unclear. The impacts of the interface vegetation cover on sustainability of local community livelihoods and urban environmental needs to be addressed. People more interacted with economic and social benefits of the vegetation resource within short period than the environmental benefit and the effect of environmental benefit is not observed within the short period. The loss in urban environmental sustainability can lead loss of the capacity for supply of local ecosystem services of provision, protection, regulatory and cultural function of the environment for the town.

Vegetation cover or the NDVI in and around the town is an indicator of how urban vegetation changes over time as a consequence of urbanization. Rapid population growth and the related need for housing and other facilities have resulted in an increasing urbanized land cover, mostly along the major roads and peri-urban areas, which is typically scattered and inefficient in resource utilization (Berhanu, et al., 2014). The study also revealed that the scattered urban growth and disaggregated landscape structures as a result of anthropogenic activities also influence the function and structure of the vegetation landscapes. Over the last 20 years, the predominant vegetation covers in the study area have been converted to other new land use type which is urban settlements. If the present human activities and trends of land-use change in vegetation cover continued, the extent and the ecosystem function of the vegetation cover in and around the town will gradually devastated unless proper measures employed.

The information gathered both from community perception and satellite image analysis reflects that anthropogenic effects, such as expansion of settlements negatively influence the existence of the vegetation cover in and around Burayu town. The study findings from community perception and image analysis are alike and support each other regarding rural-urban interface vegetation cover change in the study area. The trends of urbanization and the gradual changes in vegetation cover experienced in the study area over the last 20 years have been increasing and some of these trends are expected to continue.

5.2 RECOMMONDATIONS

Urbanization and expansion of the town is increasingly undermining the vegetation cover at rural-urban interface of Burayu town. The problems of vegetation covers change will continue until priority and appropriate solutions are given for the situation to curve it. Based on the findings of this study, the study therefore, proposed the following recommendations to create stability and sustainability between urbanization and vegetation covers management in the study area in the future.

- As the study found out the influence of urbanization, horizontal expansion of settlements and land use plan are the most dominant factors and gradually increasing at the cost of vegetative land cover due to improper implementation of the new master plan of the town. Hence, Burayu town municipality and the kebele administrators together with the local community should revise and implement proper land use plan of the town in accordance with the master plan to create balance between urbanization and vegetation resources.
- The current development trend and horizontal settlement expansion of the town is directly or indirectly affecting the interface vegetation resources. Due to increasing land marketing, there is a radical shift from vegetative purpose to non-vegetative purposes of the land. Thus, land marketing should be controlled and other housing alternatives like vertical building low cost houses (condominiums) should be introduced by the town administrative to reduce the current trends of horizontal expansions.
- Mostly people are more interacted with the short term economic and social benefits of the vegetation resource rather than the long term environmental impacts. To save the vegetation resources and to solve the land scarcity of the town, the municipality should give special attention for vertical expansion and create awareness for local people to have deep knowledge about the vertical expansion and its benefit for the community as a whole are very important.
- The loss of vegetation cover have a negative impact on the sustainable environmental development of the town through a loss the environmental capacity for supply of local ecosystem services including provision, protection, regulatory and cultural function of the environment for the town. So, environmental management and land use

administration sectors of the town should prepare joint planning and effective governance structure to maintain the environmental sustainability of the town.

- Due to lack of integration between sectors like municipal, environmental and agricultural sectors as well as between both rural and urban administrative bodies, there are high conflicts of interests and competition over the interface vegetation resources between the two administrative bodies and between the sectors of the same administrative. In this situation it is essentials to have strong regulation and formal structures in order to protect vegetative landscape and to design for new urban expansion without affecting these resources. Therefore, Burayu town and the adjacent rural district administrative bodies as well as the municipal, environmental and agricultural sectors of the Burayu town need to have joint planning, management practices, and legal frameworks for sustainable governance of the urban rural interface vegetation covers.
- Over the last 20 years, as a result of anthropogenic effects the predominant vegetation covers in and around of the town have been converted to other non-vegetation purposes which is urban settlements. Therefore, the town municipal especially the urban planning and design department jointly with environmental protection department should contribute to increasing or preserving vegetation cover by creating urban green spaces, large urban parks within urban areas and in its borders, conserving the existing vegetation covers in and around the town, and regulating the new urban expansion not to be at costs of the vegetation resources.

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7 Annexes

Introduction: The researcher is one of the Participants in a graduate program at Addis Ababa University in Environment and Sustainable Development as a partial requirement for the completion of the Master's Degree program. He is undertaking a research on the Urban-Rural Interface Vegetation Cover Changes in and around the Burayu Town. The purpose of this questionnaire and interview are to collect primary information on the extents of the rural-urban interface vegetative landscapes changes, the governance of rural-urban interface vegetation cover changes and the perception of local community towards the rural-urban interface vegetation cover changes. All the information asked will be purely used for academic purpose. Your individual responses will be kept strictly confidential. The responses from all respondents will be anonymously combined in research analysis and no reference will be made to you in particular. Therefore, please feel free to respond the questions to the best of your knowledge so as to realize the objectives of this study which will be a difficult task without your whole hearted cooperation. You are, therefore, kindly requested to cooperate in providing accurate and reliable information as much as you can, since your individuals' response is decisive.

Thank you in advance for your cooperation.

7.1 Annex 1: Survey questionnaires for households

General Instruction

a. Tick your appropriate answer in the box in front of the options provided to you.

b. Circle the number corresponding to your appropriate answer for those questions require doing so.

1. General information about the respondent

1.1. Sex (male ☐ female ☐)

1.2. Age (18-25 ☐ 26-33 ☐ 34-41 ☐ 42-49 ☐ 50 and above ☐)

1.3. Marital status (married ☐ single ☐)

1.4. Education (0-8 grade ☐ 9-10/12 complete ☐ certificate/Diploma ☐ 1st ☐ degree

Master's degree ☐ PHD and above ☐)

1.5. Occupation (Government employee ☐ Private employee /Own business ☐ Unemployed ☐)

1.6. Family size (1-3 ☐ 4-6 ☐ 7-9 ☐ 10 and above ☐

1.7. Monthly income (>2,000 birr ☐ 2,000-6,000 birr ☐ 6,000-10,000 ☐ more than 10,000 ☐)

1.8. For how long you lived in the area? (Less than 5 years ☐ 5-10 years ☐ 10-15 years ☐ more than 15 years ☐)

1.9. If you born in the area (if your original place is here), fifteen years before this the area was (Part of the rural area ☐ part of the town ☐)

1.10. The house you lived in (Constructed by your own ☐ Rental ☐ Bought ☐)

1.11. If you are the owner of the house, how do you get the land? (Government allocation [ ] Bought from land owners/farmers [ ] Gift from family [ ])

1.12. If you bought the land from owners/farmers, how do you get? (through land broker [ ] direct contact with the owner [ ])

2. Information about the perception of community on the Vegetation Cover Change

2.1. Urbanization has playing a great role on the changes of vegetation cover in the area.

Strongly agree [5] Agree [4] Don't know [3] Disagree [2] Strongly disagre [1]

2.2. Highly increasing urban expansion in the area is a result of informal settlements on vegetative landscapes.

Strongly agree [5] Agree [4] Don't know [3] Disagree [2] Strongly disagree [1]

2.3. If informal settlement in the area is controlled through strong land use planning, the rate of vegetation cover change will be decreased.

Strongly agree [5] Agree [4] Don't know [3] Disagree [2] Strongly disagree [1]

2.4. The Urban-rural interface vegetation cover change in the study area is due to expansion of settlement than expansion of agricultural.

Strongly agree [5] Agree [4] Don't know [3] Disagree [2] Strongly disagree [1]

2.5. The more the urban population increasing, the more the pressures on the vegetation resources.

Strongly agree [5] Agree [4] Don't know [3] Disagree [2] Strongly disagree [1]

2.6. Encouraging Vertical expansion of the town than Horizontal expansion can save the destruction of vegetation covers in the area.

Strongly agree [5] Agree [4] Don't know [3] Disagree [2] Strongly disagree [1]

2.7. There are high needs for use of vegetated landscape for non-vegetation purpose such as housing and other constructions.

Strongly agree [5] Agree [4] Don't know [3] Disagree [2] Strongly disagree [1]

2.8. People get more benefit from vegetative landscape for non- vegetation purpose than for vegetative purpose.

Strongly agree [5] Agree [4] Don't know [3] Disagree [2] Strongly disagree [1]

2.9. It is not possible to create balance between urbanization and vegetation cover change in the area because to be expanding the town the only option is using vegetative lands in and around the town.

Strongly agree [5] Agree [4] Don't know [3] Disagree [2] Strongly disagree [1]

2.10. Vegetation covers has no purpose in and near urban areas.

Strongly agree [5] Agree [4] Don't know [3] Disagree [2] Strongly disagree [1]

2.11. The gradual Vegetation Cover Changes in the area has no any impact on the local community.

Strongly agree [5] Agree [4] Don't know [3] Disagree [2] Strongly disagree [1]

2.12. The vegetation covers in the interface area have no purpose for sustainability of the town.

Strongly agree [5] Agree [4] Don't know [3] Disagree [2] Strongly disagree [1]

7.2 Annex 2: Check list for Key Informant Interview (KII)

I. For Burayu Town administratives

1. Do you have the Master Plan of the town? If yes, is it implemented as stated in the document? If no why?
2. How do you balance the gradual expansion of the town and the gradual decreasing of the vegetation covers in and around the town?
3. How can you communicate with kebeles leaders on the issues of Master plan implementation?
4. Is land use plan of the town is properly implemented? If not, what are the reasons?
5. How is the pattern of urban expansion in the town, increasing or decreasing? If increasing, what are the reasons for expansion?
6. How can you integrate sectorial plan of each sector to integrally managing vegetation resources in the interface areas of the town?
7. What is the status of informal settlement practices in your town, increasing or not? If increasing what is the reason?
8. How can you communicate and interact with nearby woreda administrates to manage the natural resources located in and around your town?
9. Are there any legal frameworks to manage the vegetation of the interface areas?
10. Can you create awareness to the community about the purposes of the vegetation cover in and around the town? How?

II. For Gefersa Burayu and Gefersa Guje Kebeles Administrative Bodies

1. Do you have Master Plan of town? If yes, do you have knowledge about known how of the Plan?
2. Is master plan of the town is properly implemented? If not, what are the reasons?
3. Is there any land use and management related responsible body or functioning structure at your kebele level?
4. Is the pattern of urban expansion in your, increasing gradually or decreasing? If the expansion is increasing, what are the reasons for expansion
5. How is a trend of informal settlements in the interface areas, increasing or decreasing? If increasing what are the reason?
6. How can you manage the land and natural resource management at interface areas of the town?
7. Are there any legal frameworks (rules, regulations, directives, etc.) to manage the vegetation of the interface areas?
8. Is your kebeles land use and management plan aligned with the master plan of town?
9. What is your awareness about the purposes of the vegetation cover in the interface for the sustainability of the town and its impacts?

7.3 Annex 4: Field observation checklist

1. Observing the present status of vegetation covers in the interface areas of the Gefersa Burayu and Gefersa Guje.
2. Observing the level of urbanization and urban expansion in the study areas.
3. Observing the status of informal settlement in the study area.
4. Observing the extents of vegetation cover changes in the study area.