MADDA WALABU UNIVERSITY

COLLEGE OF SOCIAL SCIENCES AND HUMANITIES DEPARTMENT OF GEOGRAPHY AND ENVIRONMENTAL STUDIES

EFFECT OF RESETTLEMNT PROGRAM ON FOREST RESOURCES: THE CASE OF NANSEBO WOREDA, WEST ARSI ZONE, OROMIA NATIONAL REGIONAL STATE, ETHIOPIA

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JANUARY, 2025

BALE ROBE, ETHIOPIA

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A THESIS SUBMITTED TO DEPARTMENT OF GEOGRAPHY AND ENVIRONMENTAL STUDIES, COLLEGE OF SOCIAL SCIENCES AND HUMANITIES OF MADDA WALABU UNIVERSITY IN PARTIAL FULFILLMENT OF THE REQUIREMENTS OF THE MASTER DEGREE INGEOGRAPHY AND ENVIRONMENTAL STUDIES.

JANUARY, 2025

BALE ROBE, ETHIOPIA

EXAMINERS' APPROVAL SHEET

MADDA WALABU UNIVERSITY

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Signature: ……. Place: Bale-Robe

ACKNOWLEDGMENTS

I am pleased to a large number of individuals and institutions for their encouragement and help while conducting this study. First of all, I would like to give my deepest thanks to the almighty God for helping me to be here and go through all this work.

I do not have adequate words to express my deepest appreciation to my thesis advisor Dr. Samuel Nigatu for his unreserved support, advice and guidance throughout the study period and also for sparing their valuable time in reading, arranging and correcting of my research from the early design proposal to final stage of thesis is unforgettable, so, GALATOMA! Is my response.

Many thanks and gratitude goes to Gezahegn Woldu for his assistance in remote sensing and GIS data analysis on LULCC of the study area. My heartfelt respect and thanks extended to Nensebo Woreda experts, sampled Kebeles, development agents' workers and kebele leaders for their kindness and devoted time in data collection process. My heartfelt thanks also go to my friends and colleagues Mr. Ifa Lencho, and others whose names not listed here for their moral supports to this research in one way or another.

Last but not the least, deepest and heart-felt gratitude goes to my beloved wife W/ro Akafete Asfaw my lovely son Segni Yewalashet for their determination, patience and love, care and tireless support to make my piece of work a success. My work is the result of your perseverance. I will always love you and remain grateful to you!

Above all, thanks to GOD who gave me the ability to finalize this study.

Yewalashet Bekele Kebede

January, 2025

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ACRONYMS AND ABBREVIATIONS

CSA: Central Statistics Agency

EMA: Ethiopian Mapping Authority

ERDAS: Earth Resources Data Analysis System

ETM+: Enhanced Thematic Mapper

FAO: Food and Agricultural Organization

FGD: Focus Group Discussion

GIS: Geographical Information System

GLCF: Global Land Cover Facilities

GPS: Global Positioning System

Ha: Hectares

LULC: Land Use/Land Cover

LULCC: Land Use /Land Cover Change

MoA: Ministry of Agriculture

MORD: Ministry of Rural Development

NWARDO: Nansebo Woreda Agricultural and Rural Development Office

SNNPRS: Southern Nations, Nationalities and Peoples Regional States

SPSS: Statistical Package for Social Science

TM: Thematic Mapper

USGS: United States Geological Survey

ABSTRACT

Ethiopia has a long history of practicing population resettlement either spontaneously or in a planned way to overcome the problem of chronic food insecurity in the country. The major aim of this study was to assess the effects of resettlement program on the forest resource in Nensebo Woreda, West Arsi Zone of Oromia Regional State, Ethiopia. For this study the exploratory case study design with a mixed research methods were employed. A total of 353 households which 212 from resettlers and 141 from the Natives people were selected from three kebeles using stratified sampling technique. In addition, socio-economic data were

collected via household survey, Key informant interviews (KII), Focus Group Discussion (FGD) and field observations. Four years' temporal satellite images (1986, 2003, 2013 and 2023) over the last 34 years, integrated with in situe field survey was used to assess the LULC change dynamics. A supervised classification with the maximum likelihood classifier was used to classify the images and classified into six major land use types (bare land, cropland, forest, grassland, settlement and shrub/woodland). The main finding of this study revealed that Nensebo Woreda has experienced a large forest cover change since population resettlement in the area. Because of this unplanned and unregulated forest cuttings and land cover changes within the study area have had an impact on land degradation. Results from the land use/cover changes analysis showed that the study area has undergone a dynamic increase and reduction in LULC extent during monitoring periods. Accordingly, during the 34-year period the proportion of area covered by forestland, shrub/woodland, grassland and bare land cover were declining continuously by 15.7%,9.7%, 3.4% and 0.2% respectively amid 1986-2023. In contrast, cropland and settlement areas have increased dramatically by 20.7% and 8.3% % respectively over the study period. The results of LULC conversion matrix discovered that the significant portion of forests (29.7%), shrub/woodland (16.1%) and grasslands (10%) of was converted to the cropland with an estimated total area of (55.7%) amid 1986 and 2023. Forest cover changes in the study area is an outcome of several proximate and underlying drivers. The major proximate driving forces of forest cover change in the study area are commercial agricultural expansion, infrastructural development, fuel wood extractions and population growth., poverty, land scarcity and weak law enforcement factors constitute the major underlying drivers of forest cover change in the study area. Thus, the need for participatory forest management and providing environmental education for the local people in the sustainable management of wood land resources is important to safeguard the dry forests. Therefore, the study calls for coordinated efforts for resources use and management at different levels, land use policy formulation, devising alternative sources of livelihoods and fuel, regulating migration and involvement of the wider community in policy formulation and implementations.

Keywords: Resettlement, Forest Cover Change, Drivers, Nensebo Woreda

CHAPTER ONE

1. INTRODUCTION

This chapter presents the background to the study, problem statement, objectives of the study, research questions, significance of the study, scope of the study, limitation of the study, definition of key terms and Organization of the Thesis.

1.1 Background of the Study

Resettlement is a planned or spontaneous phenomenon of population redistribution. It can be voluntary or forced; it can also be temporary or permanent (Abebe et al., 2019; Deribew, 2020). Resettlement is the act or process of helping someone move to another place to live, or the act of moving to another place of refugees. Resettling drought, earthquakes, floods, and other natural calamity sufferers evacuated to relatively safer sites has been one of the areas where governments of developing countries have been very active since the middle of the last century (Limenih et al., 2012).

Ethiopia has been practicing population resettlement going back to the 1960s and early 1970s under the imperial regime (1930–1974) when, through a combination of spontaneous and planned resettlement programs, mainly from famine-affected and degraded areas (Deribew & Dalacho, 2019;). This relocation of peasants was highly experienced from northern highlands (Tigray and Wollo) areas suffering from high population pressure, soil erosion, and deforestation to the south and south-western regions where there are scattered populations, under-utilized and fertile land (Abera et al., 2020).

Because of the drought and famine in 1984, the Derg government set in motion a resettlement policy that was initially designed to relocate 1.5 million people from areas in the north most severely affected by drought and famine to areas in the west and south that had experienced adequate rainfall.

The then government viewed resettlement program as a way out of the pressing problem of famine. It was proposed that the food security crisis would be addressed in

a durable way through a dual strategy of relieving population pressure in the highlands, which were perceived as chronically drought prone, over populated and environmentally degraded, and, on the other hand, of making lowland areas, which were perceived to be fertile, under-populated, under-exploited and more productive.

Resettlement was also considered as an opportunity to introduce social and economic change and pursue socialist transformation. It has been also suggested that it would be easier to convince or force people to move during the time of famine ((Alemayehu et al., 2019).

The decision to relocate such huge amount of people could also be explained by such factors as the Land Reform Act of 1975 that made public land available to be used for resettlement purposes and famine recurrence at short intervals calling for solutions in the form of embarking on resettlement in the areas with marked agricultural potential. The 1984/85 famine placed most affected localities in extremely precarious situation. The government responded to the famine by launching large-15 scale resettlement program. Accordingly, it was initially intended to resettle 1.5 million people to address the problem of recurrent food insecurity in risk-prone areas and some 600,000 people were resettled in the lowlands of western, southwestern and southern Ethiopia (Kassahun, 2000; Dessalegn, 2003b).

During EPRDF Government resettlement was suspended in the years following the downfall of the Derg regime. However, the EPRDF government appears to be increasingly enthusiastic and in favor of launching planned resettlement schemes during 2002/03. The plan envisages relocating over 2 million people within 3 years' time. The basic assumptions behind the resettlement program remained similar to those made during previous periods. It would be based on free consent and willingness of resettlers. It would be implemented at intra-regional level there by ruling out possibilities of massive movement from one region to another. Resettles retain their land use rights and other immovable properties in the original home villages for about 3 years after being relocated and Resettles can return to their original villages for good whenever they have change of mind (Kassahun, 2003; Feleke, 2004).

According to MORD (2003), the initiation of the voluntary intra-regional resettlement (access to improved land) rests on four major pillars that are important to avoid problems:

1. The program should be based on voluntary option of the potential settlers.
2. The availability of underutilized land. The survey conducted shows a total of 1. million ha of land is available in Amahara, Oromia, Tigray and SNNP regions
3. Consultation with the host communities. The regional governments have to hold discussions with host communities on the necessity of the program.
4. Proper preparation before implementation of the program. The minimum infrastructure set in the plan should be in place before moving people.

The document further states the government initiated a pilot resettlement program during 2000/01. This was carried out in response to the disparate movement of people to forests and national parks from hard-hit areas. Accordingly, 45,000 households were resettled voluntarily in Amhara, Oromia and Tigray regions in the year 2002/03.

Nensebo is one of West Arsi Zone Woreda that fall under a high rate of land use/land cover changes due to rapid population growth, resettlement and agricultural land expansion during the last few decades (SOS Sahel Ethiopia, 2010).

In the study area planed /government sponsored resettlement took place since the 2004, migrants from North Shewa, SNNPR (Sidama zone) and other parts Oromia (East and West Hararghe, West and East Shewa zone) respectively. There are 2971 households settled on Melka dembi; 313ha, Nensebo chabi; 55ha, Nensebo gorte 72.5ha. In addition to this, self-sponsored re-settler move to the study area through networking with friends and relatives put increasing pressure on forest resources.

Nansebo Woreda has been facing significant challenges related to forest degradation and deforestation due to rapid population growth, urbanization, and agricultural expansion. On top of that, the resettlement program has also raised concerns about its impact on forest resources.

Resettlement programs in Ethiopia have significantly contributed to forest land cover change, especially in areas like Nansabo Woreda in the Oromia region. The deforestation trends can be attributed to a combination of proximate and underlying drivers, as supported by several studies.

1. Proximate Drivers (Direct Causes)

Agricultural Expansion: The clearing of forest land for farming by newly resettled populations is the dominant cause of forest loss. This happens as resettlers prioritize food production over forest conservation (Mengistu, 2018).

Fuelwood Collection: Due to limited access to electricity or alternative energy sources, resettled households heavily depend on forests for fuelwood, accelerating forest degradation (Wondimu & Zeleke, 2020).

Infrastructure Development: Construction of homes, roads, and public services in resettlement areas requires land, often taken from nearby forested areas (Abebe, 2021).

Timber Harvesting: Increased demand for building materials and income generation encourages both legal and illegal logging in resettled regions (Mengistu, 2018).

2. Underlying Drivers (Indirect Causes)

Population Pressure: Resettlement increases population density in previously low-pressure areas, intensifying demand for natural resources (Wondimu & Zeleke, 2020).

Land Tenure Insecurity: Unclear or informal land rights lead to short-term land use decisions that favor clearing forests rather than conserving them (Gebreselassie, 2014).

Inadequate Planning: Many resettlement programs proceed without comprehensive land use or environmental planning, placing pressure on ecologically sensitive areas (Abebe, 2021).

Weak Institutional Enforcement: Forest conservation laws are poorly enforced, and local authorities often lack the resources or capacity to manage resettlement-related land use sustainably (Mengistu, 2018).

Forests in Nansebo Woreda play a critical role in maintaining ecosystem services, including regulating water cycles, providing habitat for biodiversity, and supporting local livelihoods. The program's potential to disrupt these ecosystem services is a major concern, particularly given the rapid pace of forest loss and degradation in the region.

If the present LULC changes continue people's livelihoods was highly affected and agricultural production system were under increasing threat. Hence, a systematic analysis of LULC change is so crucial to understand the extent of the change. Thus, the purpose of this study was to assess effect of resettlement program on forest resources: the case of Nensebo Woreda West Arsi Zone, Oromia National Regional State.

1.2 Statement of the Problem

The idea of resettlement is a phenomenon of population relocation from one geographical environment to other either in a planned or spontaneous manner where adaptations to various systems occur (Woube 2005). It is driven by a range of push and pulls factors at area of origin and destination respectively (Taffesse 2007). The major push factors include natural disasters (drought, flood, and earthquake), war, food insecurity and environmental degradation; while the pull factors include availability of unutilized land, good economic opportunities and conductive environment (Alemu 2015; Tafesse 2009; Tan 2008).

Ethiopia has a long tradition of resettling people from drought prone and degraded areas to sparsely populated and less exploited corners of the country (Pankhurst 2009). In the country, there have been population resettlement practices during Imperial, Derg and EPRDF led governments (Mulugeta 2009; Rahmato 2003). Most resettlement program carried out in Ethiopia during the past and present exerts pressure on resource of the environment due to insignificant consideration for resource management, absence of feasibility studies as well as poor consulting with settlers and host communities (Pankhurst and Piguet 2004; Walle et al. 2011; Walo 2012).

During EPRDF regime, Ethiopian government has carried out large scale intra-regional resettlement in four regional state of the country (Amhara, Oromia, Tigray and SNNPR) in 2003 to attain food security for 2.2 million chronically food insecure people (Hammond 2008).

Nensebo resettlement site is among these areas that hosted large number of settlers in Oromia Regional state. The government resettled massive number of

people from drought-areas of East and West Hararge zones to Nensebo area. Unplanned government resettlement Program without impact assessment unofficial newcomers (self-motivated)migrants from different parts of the country particularly from Sidama Regional State and other parts of Oromia (East and West Hararghe, West and East Shoa moves to NensaboWoreda through networking with friends and relatives in Nensebo Woreda and settled particularly in the MelkaDembi kebele ,Nensebo Chabi, Nensebo Gorte Kebele forest compartment and compete for the same resources with local people. The area was covered by dense forests and wood land vegetation and it has immense potential of vegetation resources. Particularly, the program lacks Environmental Impact Assessment and management plan for the sustainable utilization of the resources. As a result, large areas which were under vegetation cover are cleared and converted to other land use/cover type. Besides, deforestation, uncontrolled farmland and settlement expansion, forest fire, unwise use and indiscriminate cutting of trees are major observable problems in the area.

There are many studies that have been conducted in Ethiopia about resettlement and its impact on the Forest Resources (e.g. Dejene, 2011; Oshore, 2015; Getahun et al., 2017 and Zemenu et al., 2016). However, the lack of current knowledge of the extent and magnitude of land use and land cover change due to resettlement to promote sustainable land management encouraged the researcher to address the problem. Thus, up-to-date and spatially accurate time series about land resources are required for the study area.

Thus, the objective of present study was to investigate the effect of resettlement program on forest resources in Nensebo Woreda by using a mixed-method approach in conjunction with GIS and remote sensing techniques as well as socio-economic data to find appropriate management intervention strategies in the area.

Certainly, it is hoped that the results of LULC change analyses are important tools for policy and decision-makers, land planners, NGOs, regional and local administrations about magnitude and trends of forest cover changes for planning and the adoption of sustainable land management practices in the study areas.

1.3 Objectives of the Study

1.3.1 General Objectives of the Study

The overall objective of this study was to assess the effect of resettlement on a forest resource in NensaboWoreda, Oromia Regional State.

1.3.2 Specific Objectives of the Study

The specific objectives of the study were including the following points:

1. To examine the effects of resettlement program on the forest resources in the study area
2. To investigate forest land cover change in relation with population resettlement in the study area;
3. To indicate options for futures sustainable forest management in the study area.

1.4 Research Questions

In order to address the above-mentioned specific objectives, this study intended to answer the following set of research questions:

1. What are the effects of resettlement program on the forest resources in the study area?

2. What are the forest land cover changes in relation with population resettlement in the study area?

3. What are the options for futures sustainable forest management in the study area?

1.5 Significance of the Study

This study investigates the impact of resettlement programs on forest resources in Nensabo Woreda highlighting the potential consequences of large-scale land acquisitions and population settlement on local forest ecosystems. The findings of this study can contribute to the understanding of the complex relationships between human migration, land use, and environmental sustainability.

Moreover, the results of this study provides further information to all stakeholders mostly for policy, decision makers, NGOs and environmentalist to design appropriate policies and strategies for monitoring resource degradation and promote sustainable management of natural resources in Ethiopia in general and to study area in particular.

The study provides insights into the effects of resettlement programs on forest resources, enabling local communities to better understand the consequences of their actions and make informed decisions about their relationship with the forest.

The study was providing critical information on how resettlement affects natural resources, particularly deforestation and land degradation. By highlighting the long-term implications of unsustainable land use, it will empower local communities to adopt conservation practices and make informed choices about resource management. Participatory workshops and community forums were organized to discuss findings and promote dialogue on alternative livelihood strategies and sustainable land use.

Mechanisms for Dissemination of Findings, to ensure the findings reach all relevant stakeholders, the following dissemination strategies will be employed:

Community Engagement Sessions: Held in collaboration with local leaders and development agents to present results in accessible formats (local language summaries, posters, visual aids).

Policy Briefs: Summarized findings and actionable recommendations tailored for policymakers at the woreda and zonal levels.

Workshops and Roundtables: Inclusive events involving government officials, NGOs, researchers, and community representatives to discuss implications and policy responses.

Media Outreach: Local radio programs and print media to broadcast key messages to wider audiences.

Research Publication: The full report and peer-reviewed articles was made available for academic and institutional use.

By involving multiple stakeholders in both the research and dissemination processes, this study fosters shared ownership of the findings and encourages collaborative efforts for sustainable resettlement practices in Nansabo Woreda.

Moreover, the study was produce empirical evidence for future research.

Besides, the findings of this study serve as a basis for future researchers in the study area to reveal results of this study. Above all, a study better the district as there is no previously conducted investigation on the impacts of resettlement on forest resources at hand.

1.6 Scope of the Study

The impact of resettlement program is very broad and complex. So, it is very difficult to address all the issues in the study. Therefore, it is fundamental to delimit the study thematically, methodologically, area coverage and temporal aspect.

Thematically the study focuses on the effect of resettlement on the forest resource in Nensebo Woreda, which is found in west Arsi Zone, Oromia regional state. The Wereda consists of nineteen rural kebeles, out of nineteen Kebeles in the Wereda; the study is specifically conducted in three kebele of the woreda, were large number of settler live are Nansabo Chebi, Nansabo Gorte and Melka Dembi kebele.

Restricting the study to only three kebeles may limit the generalizability of the findings. These kebeles were selected based on their high resettlement activity and observable environmental change. However, other kebeles in the woreda may differ in ecological conditions, settlement history, and community responses. As a result, key variations in forest degradation, land use patterns, and social dynamics may not be captured, potentially narrowing the scope of policy recommendations. The study incorporates a temporal analysis to understand changes over time, focusing on three key periods:

Pre-resettlement (before 2005): To establish baseline environmental and socio-economic conditions.

Initial resettlement phase (2005–2010): To capture the immediate impacts of relocation on land use and livelihoods.

Post-resettlement adjustment phase (2011–2024): To evaluate long-term trends in forest cover, agricultural expansion, and community adaptation.

These timeframes were selected based on government policy shifts and program implementation milestones (e.g., the 2003 Voluntary Resettlement Program). Temporal analysis is supported by satellite imagery, land use maps, and oral histories from community members to assess both environmental and socio-economic transformations.(Ministry of Agriculture (2020). Resettlement Program Implementation Guidelines. Rahmato, D. (2003).

Methodologically, the study employs quantitative and qualitative approaches in order to achieve the intended study objectives. For this study, the researcher used both primary and secondary sources of data. The time it takes to conduct the research was from May 2023-February 2025.

1.7 Limitations of the Study

It is obvious that any study cannot be free of a limitation and this study is not exceptional. In addition to financial and time limitations, the study is constrained by the following major limitations:

The first limitations of this study are lack of sufficient information from the different governmental and non-governmental organizations. Some government offices were also reluctant to provide practical information due to the sensitivity of topic in country as a whole. The second constraints were lack of similar research works done in the study area used as a catalyst, unlike majority of other resettlement areas.

The third restraints of this study were lack of organized secondary data due to the absence of documentation and organized database system in the study area, this created huge burden on the researcher at the time of the fieldwork. Even if many challenging situations faced with this study, the researcher made maximum efforts to minimize the negative impact of such costrains on the result of the study. A major challenge faced during this study was the lack of sufficient and reliable information from governmental organizations, particularly regarding historical land use records, forest cover data, and detailed records of resettlement activities. This data gap had a notable impact on the scope and methodological rigor of the study.

Impact of Limited Governmental Data, the absence of comprehensive official datasets restricted the ability to conduct fully longitudinal, quantitative analyses and limited triangulation with administrative records. This, in turn, constrained the study's potential to systematically compare pre- and post-resettlement conditions across multiple kebeles and time periods. As a result, the research relied more heavily on community-level data and qualitative insights, which, while rich, present challenges in terms of generalizability and precision.

Steps Taken to Mitigate Limitations and Ensure Validity

To address these constraints and strengthen the credibility of the findings, the study employed the following strategies:

1. Triangulation of Sources: Data were collected from multiple independent sources, including household surveys, key informant interviews, focus group discussions, and satellite imagery analysis, to cross-verify information and enhance reliability.

2. Use of Remote Sensing: In the absence of formal land use records, satellite imagery (2005–2023) was used to analyze changes in forest cover and agricultural expansion, providing objective environmental data.

3. Community-Based Historical Reconstruction: Local elders and long-term residents were engaged to provide oral histories and qualitative accounts of environmental and socio-economic changes over time.

4. Collaboration with NGOs and Academic Institutions: Partnerships with non-governmental and academic bodies provided supplementary datasets and expert validation of methods and

interpretations.

5. Transparent Methodology and Limitations Acknowledgement: All methods, assumptions, and data gaps were clearly documented to maintain transparency and allow for future replication or expansion.

By integrating multiple data sources and openly addressing limitations, the study maintains a rigorous and contextually grounded understanding of resettlement impacts in Nansabo Woreda.(Ethiopian Ministry of Agriculture (2020).

1.8 Definition of Key Terms

Deforestation: is "the change of forest to another land-use category or the long-term declines of the tree cover below the minimum 10 percent threshold"(FAO, IPCC, & CIFOR ,2002).

Resettlement: is defined resettlement as the process by which individuals or group of people leave spontaneously or un spontaneously their original settlement sites to resettle in different areas where they can begin new trends of life by adapting themselves to the biophysical, social administrative systems of the new environment (Mengistu 2005).

Landscape: can be consider as the various mosaics of land uses across a large area

of land a Watershed (FAO 2018).

Land cover: refers to the physical and biological material over the surface of land, including

Water, grass, trees, bare soil, and/or artificial structures such as asphalt and settlements.

Settlers: Individual or group of people who are moved voluntary or involuntary under planned or spontaneous resettlement (wood, 1977)

Land degradation: is generally defined as a "persistent decline" in the provision of goods and services that an ecosystem provides, including biological and water related goods and services as well as land-related social and economic goods and services (Stacey, Friederike, Naomi, & Hannes, 2015).

The definitions used in this study are largely consistent with formal sources but also reflect an awareness of local interpretations. This dual alignment supports both academic rigor and practical relevance, promoting effective communication among stakeholders.

1.9 Organization of the Thesis

This research consists of five chapters. The first chapter presents the introduction part, which includes background of the study, statement of the problems, research questions, objectives, significance and delimitation of the study. The second chapter is review of related literature. The third chapter is research methodology which composed of research design, source of data, sampling and sampling techniques, data collection instruments, method of data analysis and ethical consideration. The fourth chapter is deals with results of the study and discussions. Finally, Chapter five will present the conclusions and recommendations of the study.

CHAPTER TWO

2. REVIEW OF THE RELATED LITERATURE

In this part, the attempt is made to review related literature. It provides a general overview on resettlement and its effect on forest resource.

2.1 Resettlement: An Overview

Because of rapid economic growth, population pressure and the degradation of natural resources, the resettlement of people to new locations has become a dominant development discourse in many parts of the world. Different scholars use different terms for the process of population distribution/ redistribution to new location. According to Desalegn (2003b) 'resettlement', 'colonization' and 'transmigration' all refer to the phenomenon of population redistribution, either planned or spontaneous. Chambers (1969:11) defined resettlement as "the planned and controlled transfer of people from one area to another". Resettlement is becoming attractive as a way out of pressing problems caused by food shortage, land fragmentation, population pressure, rampant unemployment, marginality of land and decline in productivity (Chambers, 1969).

Wood (1977:154) presents the expanded definition of the concept. According to him, resettlement is "a spontaneous or planned movement of people or group from their original home areas to settle in another area". The definition of 'resettlement' is the movement of people from areas where there do not exist factors that are suitable for smooth maintenance of life to areas presumed to be endowed with potentials that could provide opportunities for the same end (Kassahun, 2000). According to the same source, the destination of resettlement is to areas with under-utilized agricultural potential, and movement could take place either as a result of planned/organized intervention or spontaneously.

Mengistu (2005) defined resettlement as the process by which individuals or group of people leave spontaneously or un spontaneously their original settlement sites to resettle in new areas where they can begin new trends of life by adapting themselves

to the biophysical, social administrative systems of the new environment. A planned project involving the transfer of people most probably through selection and control from one region to another is called resettlement scheme. Implementation of a defined resettlement scheme may be termed as process of resettlement. It begins from recruiting of the settlers, transporting, and resettling them at already planned destination. The process of resettlement should also incorporate consultations of both the settlers and the host communities. If anyone of these procedural setting is missing, then the consequence of the scheme will be harmful in terms of ecological, socio-economic, environmental and institutional aspects. Resettlement schemes in Africa are characterized by poorly or hurriedly planned and their socioeconomic and institutional costs exceed the benefits a set of objectives that should be addressed in the projects (Mengistu, 2005; Desalegn, 2003b).

According to Mengistu (2005) resettlement could be classified into four types within two main categories. The first category is non-planned resettlement comprising spontaneous resettlement and emergency or forced resettlement. The second category is planned resettlement which comprises voluntary and involuntary resettlements planned resettlement consists of voluntary and involuntary types of resettlement. Voluntary resettlement is a process whereby settlers move to the destination willingly. If the settlers are well-informed about the new site, how they will be resettled and involve on planning and implementation of the program, voluntary resettlement could have become successful in achieving their objectives.

Planned resettlements are those initiated and/or supported by governments and aid agencies. Planned resettlement projects have been undertaken with aim of relieving population pressure and promoting land consolidation and sound agriculture in areas of high population density (World Bank, 1998). Spontaneous resettlements are those resettlement types that are accomplished by desperate movement of people from place of origin because of push factors (land scarcity, recurrent drought, loss of productivity due to land degradation) to new settlement areas with better potential to sustain life/pull factors (availability of un colonized and productive land) (Mengistu, 2005).

Around the world, there also exist involuntary resettlement processes caused by

development projects. They are caused by economic mobility, industrialization and urbanization, or by war, ethnic strife, or natural calamities such as droughts. Often the spatial distribution of people and resources do not coincide. Therefore, much of the impetus for population movements comes from efforts to match the people with the resources they need for sustenance and growth (Cernea, 1997). The African continent is the scene of massive population resettlement processes of all types, including painful involuntary displacements of people.

Currently, however, Africa's most important forced displacements are not those caused by development program, but those triggered by social and political causes such as civil wars, ethnic, racial and/or religious persecutions, or by natural causes such as droughts and famines. Resettled populations are not only themselves deprived of normal livelihood and pushed to the limits of poverty and starvation, but often represent an enormous burden on the host populations, thus compounding the complexity of the displacement-triggered problems. They may lower the hosts' standards of living and tend to rapidly deplete the natural resources of the areas of refuge (Cernea, 1997). In Africa, planned resettlement has been tried in countries as diverse as Kenya, Tanzania, Sudan, Ghana, Senegal, Burkina Faso, Egypt, and Ethiopia. While several of these schemes did in fact improve the wellbeing of participants, in general terms these efforts have fallen short of expectations. The expectations themselves may have been unrealistically high in many cases (Scudder, 2005).

Resettlement, whether driven by environmental, political, or developmental factors, has long-term implications for both people and ecosystems. This section reviews the historical background of resettlement programs and the ethical considerations associated with different types of resettlement, especially involuntary schemes, to contextualize the current study in Nensebo Woreda.

A. Historical Context and Its Influence on Present Outcomes

Historically, state-sponsored resettlement in Ethiopia—especially during the 1980s under the Derg regime—was implemented as a response to famine, conflict, and environmental degradation (Pankhurst, 2009). These earlier programs were often marked by inadequate planning, lack of community consent, and poor environmental

suitability, leading to food insecurity, deforestation, and disruption of indigenous livelihoods (Dessalegn, 2003; Devereux, 2000).

These legacies shape contemporary resettlement outcomes in several ways:

Institutional Distrust: Communities often carry skepticism toward new resettlement efforts due to past failures (Gebre, 2004).

Land Use Practices: Previous exposure to unfamiliar agroecological zones led to maladaptive practices that continue to influence land use today (Habtemariam, 2008).

Resource Pressure: Cumulative resettlement waves have accelerated forest encroachment and intensified competition over natural resources (Kebede, 2021).

Policy Shifts: Modern resettlement programs, including voluntary schemes, have been shaped by lessons from earlier coercive models, emphasizing livelihood support and environmental planning (World Bank, 2001).

B. Ethical Considerations in Resettlement

The ethics of resettlement are highly contested, particularly in cases of involuntary displacement, which often involves relocation without the full consent of affected communities (Cernea, 2000).

Key ethical concerns include:

Consent and Participation: Involuntary resettlement typically violates the principle of free, prior, and informed consent (FPIC), undermining the agency of affected populations (Robinson, 2003).

Cultural Dislocation: Forced resettlement can lead to the erosion of cultural identity, social networks, and indigenous knowledge systems (Oliver-Smith, 2010).

Compensation and Livelihood Restoration: Many schemes fail to provide adequate compensation or long-term livelihood options, exacerbating poverty and marginalization (Cernea & McDowell, 2000).

Environmental Justice: Resettled communities are often relocated to marginal lands, exposing them to ecological risks while benefiting external stakeholders such as investors or the state (Scudder, 2005).

In contrast, voluntary resettlement, when well-planned, participatory, and rights-based, can provide opportunities for improved access to services and livelihood diversification. However, even voluntary schemes must address power asymmetries, ensure genuine choice, and provide equitable resource access.

2.2 Resettlement in Ethiopia

In the Ethiopian context, resettlement scheme has long history as it began prior to and during imperial regime (Mengistu, 2005; Desalegn, 2003b). The very immediate cause to launch the program is drought, food insecurity, and population growth and land degradation. In order to tackle these problems, the three consecutive regimes of the country have developed and implemented resettlement schemes in 1960s, 1980s, and 2000s coupled with development- led decrees like land reform and villagization in different part of the country (Pankhurst, 1992; Mengistu, 2005).

The first planned resettlements schemes were undertaken in the imperial era during the regime of Haileselassie I. State-sponsored population resettlement schemes have grown in importance in the past forty years in Ethiopia. In imperial times, resettlement became part of government planning from 1960s with establishment of the Ministry of Land Reform and Administration. Following this event, thousands of settlers were moved to several dozen schemes, mainly set up on the initiative of local governors, missionaries or NGOs (Pankhurst, 1992). The major objective of the scheme was not food insecurity and famine as they were principal causes in the later government rather to relive population pressures in the highlands (Desalegn, 2003b).

The imperial regime encouraged resettlements in the south and southwest in order to appropriate the regions' rich wild coffee, timber and other non-timber forest products (e.g., honey, spice and wild animal products). The construction of all weathered road further intensified population influx in to the region (Wood, 1993). Similarly, the military government of Ethiopia resettled more than half a million settlers because of the incidence of famine in 1984/85 mainly from the North, notably Wello, Tigray and Shewa, to areas to the west and south west, especially Wellega, Kafa, Illubabor and Gojam. Though the resettlement was intended to be voluntary and a large proportion of settlers were famine-victims, targets were turned into quotas, food-aid was used as a trap, and coercion and victimization became common place (Pankhurst, 1992; Desalegn 2003b).

However, the basic rational to design the policy of the Derg in relation to

resettlements was the flawed estimate of unutilized and underutilized land resources found particularly in the south, and south-western parts of the country. The first schemes were intended to utilize these lucrative lands to resolve the 1973-74 famine and to rehabilitate the already degraded highlands. Hence, between 1975 to 1984 following the 1975 land reform proclamation, the resettlement authority (RA) and the relief and rehabilitation commission (RRC) jointly lunched the first phase planned resettlement program and thereby resettled 110,090 persons in 88 different sites (Mengistu, 2005). This resettlement program was criticized for its large social and environmental impacts involved during its implementation (Kassahun, 2000; Desalegn 2003b; Mengistu, 2005).

Another spectrum of the Derg regime was alternative way to resolve food shortage and to enhance self-reliance was villigization. The rational for this program was that existing arrangement of dispersed settlements made it difficult to provide social services and to use resources efficiently. It would provide rural people better access to amenities such as agriculture extension services, schools, clinics, water points (Kassahun, 2000; Desalegn 2003b; Mengistu, 2005).

The country also planned recently huge intra-regional resettlement scheme in 2002 after 18 years of suspension of such a program. The current resettlement by the EPRDF government states that the program is based on voluntary approach (Ministry of Agriculture and Rural Development (MoARD), 2003).

Therefore, the objective of ensuring food security can be achieved with minimum environmental impact because the settlers care for the resources based on the implementation manual prepared for this purpose though environmental impact assessments was not carried out for the program. The basic assumptions behind the current resettlement program remain similar to those made during previous periods (Imperial and Derg regime). But the later (EPRDF) program is essentially different from the preceding ones in the following respects (Kassahun, 2003; Feleke, 2004).

- It would be based on free consent and willingness of settlers;
- It would be implemented at intra-regional level there by ruling out possibilities

of massive movement from one region to another;

- Settlers retain their land use rights and other immovable properties in the original home villages for about 3 years after being relocated and
- Resettles can return to their original villages for good whenever they have change of mind.

According to MOARD (2003), the current resettlement program is environmentally friendly because the program is implemented inter and intra-regionally and based on voluntary basis that avoids introduction of diverse cultures to the resettlement areas so that different conflicts among the host community and the settlers will not occur. The discussion about the importance of the scheme held with the host community and the peoples to be resettled is believed to make the program to have minimum environmental impact.

The Federal Democratic Republic of Ethiopia planned intra-regional resettlement in 2003 with the aim of resettling about 400,000 households 2.2 million people in four regions such as Tigray, Amhara, Oromia and SNNPR to tackles problems of food insecurity and recover livelihood through improved access to land (NCFSE, 2003).

The plan had clearly presented in the document known as the 'New Coalition for Food Security in Ethiopia accomplished under four Pillars-voluntary, underutilized land, consultation with the host communities and proper preparation and other 13 key principles and approach (EPDRF, 2003). Nevertheless, some scholars argued that the current relocation plan is slightly unsatisfactory, costly, wasteful, swiftly undertaken and lacks public consultations (Messay and Bekure, 2011).

Understanding the environmental and institutional dimensions of resettlement is essential for evaluating its long-term effects on forest ecosystems and livelihoods. This section explores the degree to which environmental planning was embedded in past resettlement initiatives and how land tenure and governance structures have influenced resource use and forest degradation in resettled areas.

A. Environmental Integration in Resettlement Planning

Historically, resettlement programs in Ethiopia—particularly those of the 1980s—were implemented with minimal environmental assessment or planning. These programs often prioritized political or food security objectives over ecological

sustainability (Dessalegn, 2003; Pankhurst, 2009).

Key characteristics included:

Site Unsuitability: Resettlement sites were frequently chosen without thorough ecological or land suitability analysis, leading to settlement in forested or marginal lands (Habtemariam, 2008).

Deforestation and Land Degradation: Newly settled populations cleared forest land for agriculture, fuelwood, and shelter without guidelines for sustainable use, contributing to biodiversity loss and soil erosion (Wolde-Selassie, 2002).

Limited Environmental Safeguards: Environmental impact assessments (EIAs) were rarely conducted, and mitigation strategies were largely absent or poorly implemented (Yntiso, 2008).

Reactive Rather Than Preventive Approaches: Any environmental interventions were typically introduced post-settlement, after significant ecological damage had already occurred (Kebede, 2021).

While more recent programs have incorporated elements of integrated rural development and environmental sustainability—such as in the "Voluntary Resettlement Programme" (VRP) linked to the Productive Safety Net Programme (PSNP)—these efforts remain uneven and under-resourced (World Bank, 2011).

B. Land Tenure and Resource Governance Impacts

Land tenure security and resource governance structures play a pivotal role in shaping resettlement outcomes, particularly in forested areas.

Ambiguity in Land Rights: In many resettlement zones, newcomers lack formal or customary land rights, leading to tenure insecurity and short-term resource exploitation (Gebre, 2004; Crewett et al., 2008).

Weak Local Institutions: Forest governance institutions (e.g., local user associations or kebele administrations) often lack capacity or legitimacy, limiting enforcement of sustainable use rules (Jema & Moges, 2012).

Exclusion of Host Communities: Resettlement can disrupt existing tenure arrangements and exclude indigenous populations from traditional access rights, fueling conflict and overuse of common resources (Pankhurst, 2009; Gebre, 2004).

State Control and Bureaucratic Allocation: In Ethiopia’s state-owned land regime, the government allocates land to settlers without adequate consultation with host communities or consideration of local resource management systems (Bevan & Pankhurst, 1996).

Collective Action Challenges: The sudden influx of new users weakens social

cohesion and collective resource management, especially in areas previously governed by indigenous systems of forest stewardship (Teshome et al., 2016).

These institutional and governance gaps significantly magnify the environmental pressures associated with resettlement, particularly where forest resources serve as a buffer for insecure livelihoods.

2.3 Effects of Resettlement in Ethiopia

The large scale resettlement program during the Derg regime has been criticized for a number of problems. First, consultation between policy makers, implementers, the resettles and the host population was minimal. Second, high handedness in implementing plans entailed resettlements often quelled through coercive methods, which thus undermined possibilities for commitment. Third, the resource and socio-economic support necessary for bolstering the chances of meeting the stated targets were not optimally rallied and disorganization and confusion was the result (Kassahun, 2003). In general, impact of resettlement could be classified in to two major categories-social and environmental impacts. .

2.3.1 Social Impacts of Resettlement

Many studies have been carried out concerning the social impacts of resettlement in Ethiopia. Resettlement can cause many social impacts, especially if the ethnic and cultural composition of the resettles heterogeneous. Wolde-selassie (2004) reported that the impacts of resettlement in Metekel carried out in 1980s involved several social impacts. Primarily, the scheme disintegrated the resettles social institutions and organizations, which bind their infinite web of relations and interactions in manifold. The author also stated that resettlement program disrupted the resettles production systems and impoverished their livelihood. As a result, uncertainties and confusions may happen until painful adaptive adjustments may occur to the new environment.

Resettlement can also bring about break-up of families. The 1980s resettlement in Ethiopia caused many families to be broken. The schemes were carried out in lowland areas where the climate is completely different from their original homeland. As a result, they experienced difficulties since the new climate is less hospitable that led to excessive mortality due to diseases. They were also suffering from increased control to prevent escape. Village to village travel was only possible through pass letters obtained from village authorities. The scheme has also taken away traditional

resources of the indigenous host communities that affected their livelihood because their lives are mainly based on shifting cultivation, hunting, fishing and honey collection, Similarly, Dessalegn (2003b) reported that settlers experienced hardships due to changes in environment and diet. They were also subjected to lowland diseases such as malaria and trypanosomiasis. Therefore, the scheme claimed the lives of many peoples. In larger settlements settlers resented imposed collectivization. Although in some cases partnerships were formed with local people, in many areas settlers faced hostile relations with indigenous inhabitants. Ahmed (2005) reported that the host community particularly the youth started to develop negative attitudes as they view resettles as competitors over the use of natural resources.

2.3.2 Environmental Impact of Resettlements in Ethiopia

Planners sought to justify resettlement on the grounds that it would provide lasting solutions to the problem of food insecurity of the affected households. In fact, even if most settlers had remained in the resettlement areas, the removal of an overall average of 3% of the population in 1980s in the north would have had a negligible effect on reducing population pressure because the resettles abandoned the scheme and returned to their home areas. Resettlement was also claimed to provide a more rational use of available land, by readjusting man-land ratios. However, this assumption rested on the myth of vast underutilized lands.

Different source indicates that resettlement schemes in Ethiopia, both planned and spontaneous, involved environmental impacts. Accordingly, Dessalegn (2003b) reported that government sponsored resettlement programs that were carried out during 1984/85 involved considerable environmental damage by clearing large areas of vegetation to build homesteads, to acquire farmland, and to construct access roads. He also indicated that the scheme failed to adapt farming practices to agro-ecological conditions of the lowlands, and as a consequence the environmental damage involved was quite considerable.

Likewise, spontaneous resettlement/migration of people from drought-hit areas of Hararghe and Arsi zones to Bale zone of Oromia Regional State may have also

caused environmental damage to the new area. The reasons for their migration firs and consistent natural resource degradation in their home areas and secondly triggered and initiated by recurrent drought conditions that made their livelihood conditions to be below subsistence which allowed them neither survival nor livelihood improvements. In other words: for most of the people who decided to leave their homes in Hararghe and Arsi lowlands, the conditions did not leave them with any other alternative or option. The migration was intensified in May 2002 and most of the resettles have settled in Mana Hangatu, Berbere and Gololcha woredas of Bale Zone. Some parts of these areas fall in Bale Mountains National Park and the impact on the wildlife and their habitat may be considerable. Until the end of October 2002, 20,093 people were registered by the respective woredas. The number could be more because the flow of people arriving continued despite the regional government trial to stop these migratory movements (Dechassa, 2002).

The Government claims that such disparate movement of peoples initiated the pilot resettlement projects after which large scale resettlement schemes were planned to organize such movements. Likewise, the current resettlement program launched during 2002/03 is suspected of environmental damages. Getachew (2005) states the environmental consequences involved in the current resettlement as follows. The smallholder farmers clear the area for house construction and agriculture. Selling of fuel woods by settlers was also on the increase but the woreda officials banned this activity by using the police to enforce the ban.

The settlement was experiencing extensive destruction of woody plants. Assefa (2005) reported that the recent resettlement programs conducted in different parts of the country may have involved environmental damages despite differences in scale which includes huge loss of natural forests with great impact on sustainability of the environment contrary to what has been set out in the implementation manual of the scheme.

Social tensions due to the recent resettlement have also arisen in one of the site found in West Showa Zone of Oromia Regional State between the host community and the resettles because of competition over resource uses (Misganaw, 2005). He proposed rehabilitating the target population at their home of origin instead of

relocating them, which can be accomplished by the huge amount of money invested in the program to avoid such environmental and social impacts. Similarly, Ahmed (2005) reported that the recent resettlement program has resulted in large damage to the natural forest of the resettlement areas as well as the killing and fleeing of wild animals. Social and Environmental Challenges of Resettlement and Strategies for Sustainable Implementation

A. Social and Environmental Challenges of Resettlement in Ethiopia

Resettlement in Ethiopia has historically posed multifaceted social and environmental challenges that undermine the well-being of both resettlers and host communities:

Loss of Livelihoods and Food Insecurity: Displacement disrupts traditional livelihoods, often leading to dependency on external aid and reduced food security (Devereux, 2000; Gebre, 2004).

Cultural Disintegration: Resettlers frequently experience loss of cultural identity and social networks, increasing psychological stress and community fragmentation (Oliver-Smith, 2010).

Conflict over Resources: Competition for land, water, and forest resources between newcomers and host populations often leads to social tension and violent disputes (Pankhurst, 2009; Kebede, 2021).

Environmental Degradation: Deforestation, soil erosion, and biodiversity loss result from expanded agricultural clearance, fuelwood extraction, and poor land management practices (Habtemariam, 2008; Wolde-Selassie, 2002).

Insecure Land Tenure: Ambiguities in land rights exacerbate conflicts and discourage sustainable land use, undermining long-term environmental stewardship (Crewett et al., 2008).

B. Designing Resettlement Programs to Promote Positive Outcomes

To mitigate these challenges and foster resilience, effective resettlement programs should incorporate the following principles and practices:

Participatory Planning and Free, Prior, and Informed Consent (FPIC): Engaging resettlers and host communities in decision-making ensures respect for rights and cultural values, reducing resistance and conflict (Cernea, 2000; Robinson, 2003).

Environmental and Social Impact Assessments: Conducting rigorous pre-settlement evaluations guides site selection, identifies risks, and informs mitigation strategies (World Bank, 2001).

Secure Land Tenure and Resource Rights: Guaranteeing formal or customary tenure rights promotes investment in sustainable land management and reduces disputes (Gebre, 2004; Jema & Moges, 2012).

Livelihood Restoration and Support: Providing access to inputs, training, and markets helps restore livelihoods and reduce poverty dependency (Devereux, 2000).

Integrated Natural Resource Management: Incorporating agroforestry, soil conservation, and community forest management helps sustain ecosystems and buffer livelihoods (Kebede, 2021; Teshome et al., 2016).

Conflict Resolution Mechanisms: Establishing local forums for dialogue and dispute resolution can prevent escalation and foster coexistence (Pankhurst, 2009).

By aligning resettlement with sustainable development goals, policies can transform displacement from a source of vulnerability into an opportunity for socio-environmental resilience.

2.4 Effects of Resettlement on Forest Resources in Africa

The African continent is the scene of massive population resettlement processes of all types, including painful involuntary displacements of people. Currently, however, Africa's most important forced displacements are not those caused by development programs, but those triggered by social and political causes such as civil wars, ethnic, racial and/or religious persecutions, or by natural causes such as droughts and famines. These result in millions of refugees - either "international refugees" who cross international borders to find protection, shelter and food in another country, or "internal refugees" who still remain within the borders of their countries but have abandoned their houses and lands. Displaced populations are not only themselves deprived of normal livelihood and pushed to the limits of poverty and starvation, but often represent an enormous burden on the host populations, thus compounding the complexity of the displacement-triggered problems. They may lower the hosts' standards of living and tend to rapidly deplete the natural resources of the areas of refuge (Cernea, 1997).

In Africa, planned resettlement has been tried in countries as diverse as Kenya, Tanzania, Sudan, Ghana, Senegal, Burkina Faso, Egypt, and Ethiopia. While several of these schemes did in fact improve the well-being of participants, in general terms these efforts have fallen short of expectations. The expectations themselves may have been unrealistically high in many cases, given the resources available.

Key factors influencing the success or failure of resettlement programs in protecting forest resources in Africa.

Integration of community-based forest management (CBFM) into resettlement programs to promote sustainable use and conservation

Determinants of Resettlement Success in Forest Protection and the Role of Community-Based Management

A. Key Factors Influencing Resettlement Outcomes for Forest Resources

In Africa, the effectiveness of resettlement programs in conserving forest ecosystems is highly variable and context-dependent.

Multiple interrelated factors determine whether resettlement leads to sustainable outcomes or to environmental degradation:

1. Site Selection and Ecological Suitability

Resettlement into forested or marginal lands often results in deforestation and land degradation when ecological carrying capacity is not considered (Cernea & Schmidt-Soltau, 2006; Yntiso, 2008).

2. Land Tenure Security

Absence of secure, enforceable land and resource rights encourages unsustainable exploitation and discourages long-term stewardship (Crewett et al., 2008; Robinson, 2003).

3. Institutional Capacity and Governance

Weak local institutions and inadequate interagency coordination hinder enforcement of forest regulations and equitable resource distribution (Teshome et al., 2016).

4. Community Participation and Ownership

Programs that marginalize local voices or ignore traditional ecological knowledge often face resistance and poor compliance (Pankhurst, 2009; German et al., 2010).

5. Livelihood Alternatives and Support

Lack of income diversification, agricultural inputs, or access to markets increases dependence on forest resources for fuel, food, and shelter (Devereux, 2000).

6. Monitoring and Follow-Up

Absence of post-resettlement monitoring systems limits responsiveness to

emerging environmental pressures and social tensions (Kebede, 2021).

B. Integrating Community-Based Forest Management (CBFM) into Resettlement Programs

Community-Based Forest Management (CBFM) offers a promising pathway for aligning resettlement with environmental sustainability. When appropriately designed, CBFM empowers communities to manage, conserve, and benefit from local forest resources.

Key integration strategies include:

- Legal Recognition of Community Forest Rights

Assigning collective tenure to resettled and host communities incentivizes stewardship and reduces open-access exploitation (FAO, 2016; Ribot, 2002).

- Participatory Forest Planning

Involving communities in mapping forest boundaries, defining access rules, and setting harvesting quotas increases compliance and trust (German et al., 2010; Robinson & Makupa, 2015).

- Capacity Building and Technical Support

Training in sustainable harvesting, agroforestry, and forest-based enterprises strengthens local capacity and economic incentives for conservation (Teshome et al., 2016).

Integration with Livelihood InitiativesLinking CBFM to broader resettlement support—such as irrigation schemes, cooperative development, and food security programs—reduces pressure on forests (Chomba et al., 2015).

- Conflict Resolution Mechanisms

Embedding local institutions for mediation can address disputes between resettlers and hosts over forest access and use (Pankhurst, 2009).

- Multi-Stakeholder Governance

Collaborative governance involving NGOs, government agencies, and local communities ensures diverse interests are represented and supported (Andersson & Ostrom, 2008).

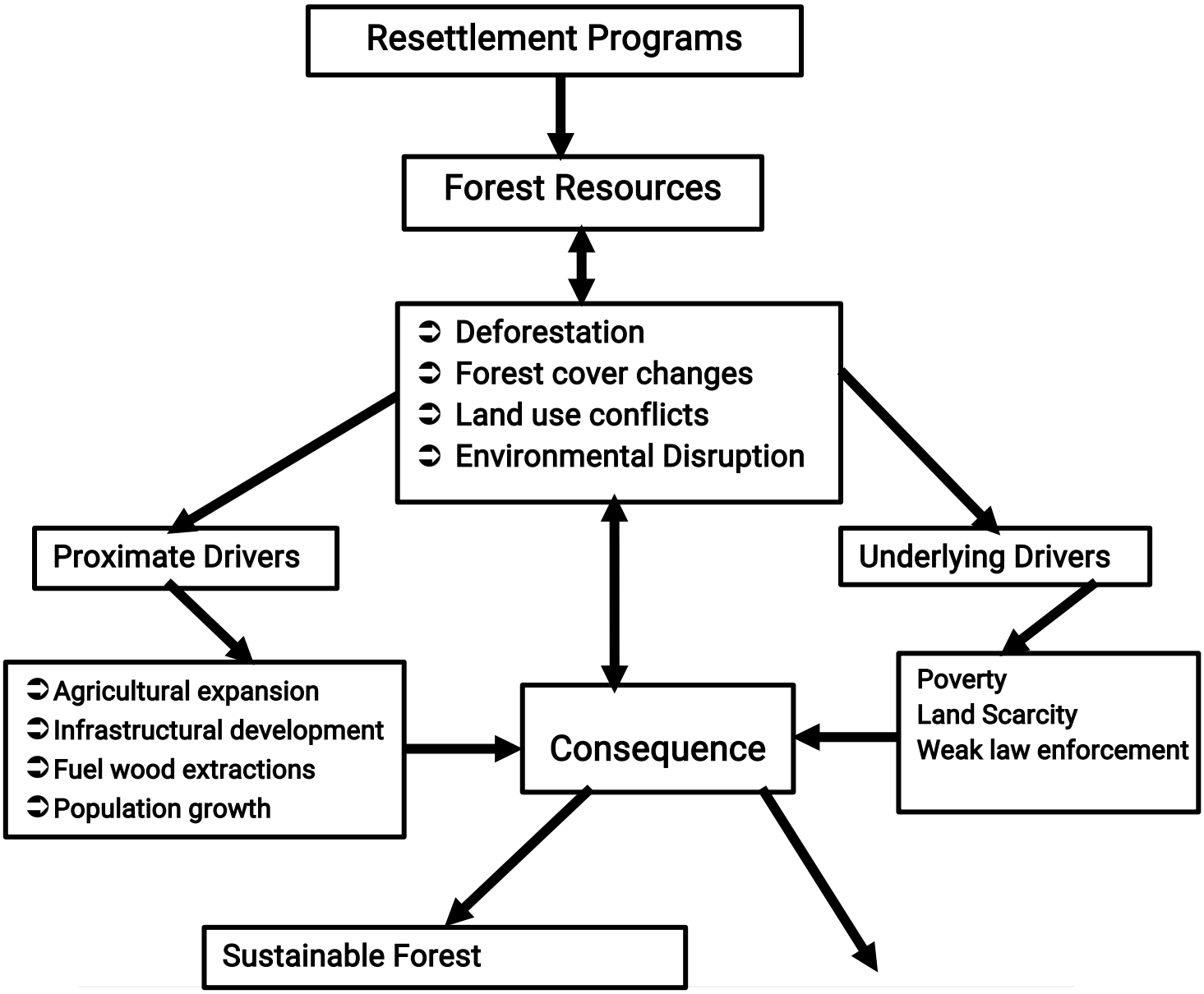
When resettlement programs incorporate CBFM principles—anchored in tenure security, participation, and equitable benefit-sharing—they are more likely to protect

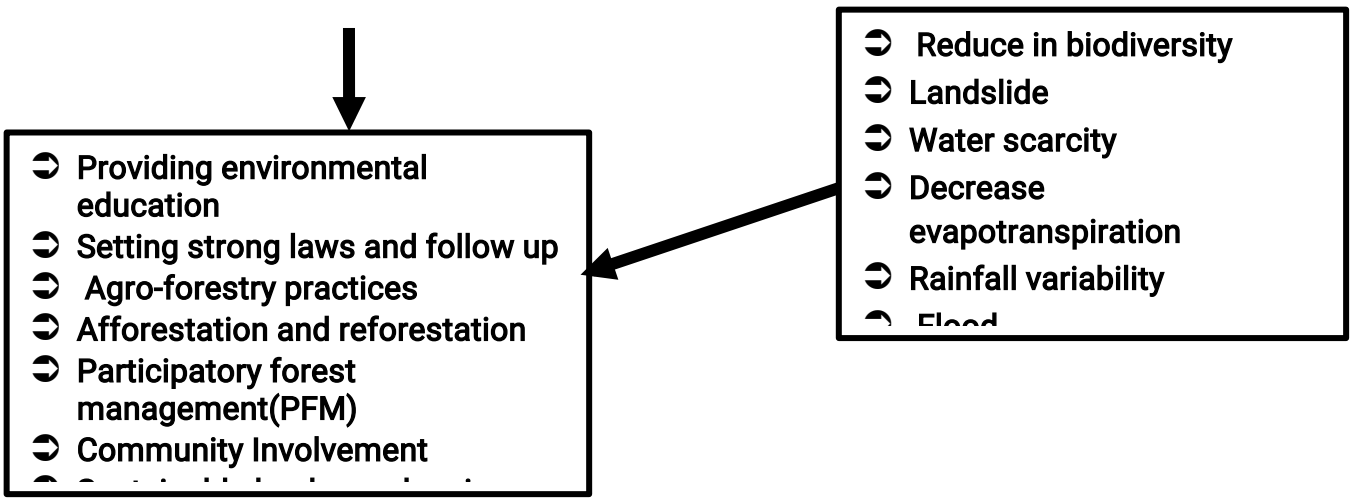
forests while enhancing community resilience.

2.5 Conceptual Framework

In order to understand the effect of resettlement program on forest resources: The case of Nensebo Woreda West Arsi Zone, Oromia National Regional State, a conceptual framework has been developed, which is shown below (Figure 2.1). This was developed based on an initial literature review undertaken on the effect of resettlement program on forest resources.

Figure 2.1: **Conceptual Framework of the study**





Source: Developed by Researcher (2024)

CHAPTER THREE

3 MATERIALS AND METHODS OF THE STUDY

This chapter clearly outlined the methodological issues used in conducting this study. A major aspects depicted in this chapter includes description of the study areas, a research design and approach, sampling techniques and sample size. Besides, the data type and sources, methods of data collection and analysis, validity and reliability of the instruments and research ethical issues also covered under this chapter.

3.1 General Descriptions of the Study Area

3.1.1 Location and Size

The study area, Nensebo Woreda, is one among the 14 Woredas of West Arsi Zone found in Oromia Regional State. Werka is the capital town of the Woreda, which is located at **382km** Southeast of the Addis Ababa and **132km** from zonal capital Shashemene Town. Administratively, the Woreda divided into 19 rural Kebeles and 3 urban administrations with the total area of NensebоWoreda covers a total area of **1641.4 km^2**.

Geographically, it lies between 6°17' 15" to 6° 48' 10" N latitude and 38° 56' 30" to 39° 30' 00" E longitude. Relatively, the Woreda shares a boundary line with Dodola in the North, Adaba and Mena Angetu Woreda of East Borena Zone on the East, Kokosa and Chire (Sidama NRS) on the West and Girja Woreda of Guji Zone and Meda Welabu of East Borena Zone on the South directions. The detail study area descriptions are shown in (Figure 3.1).

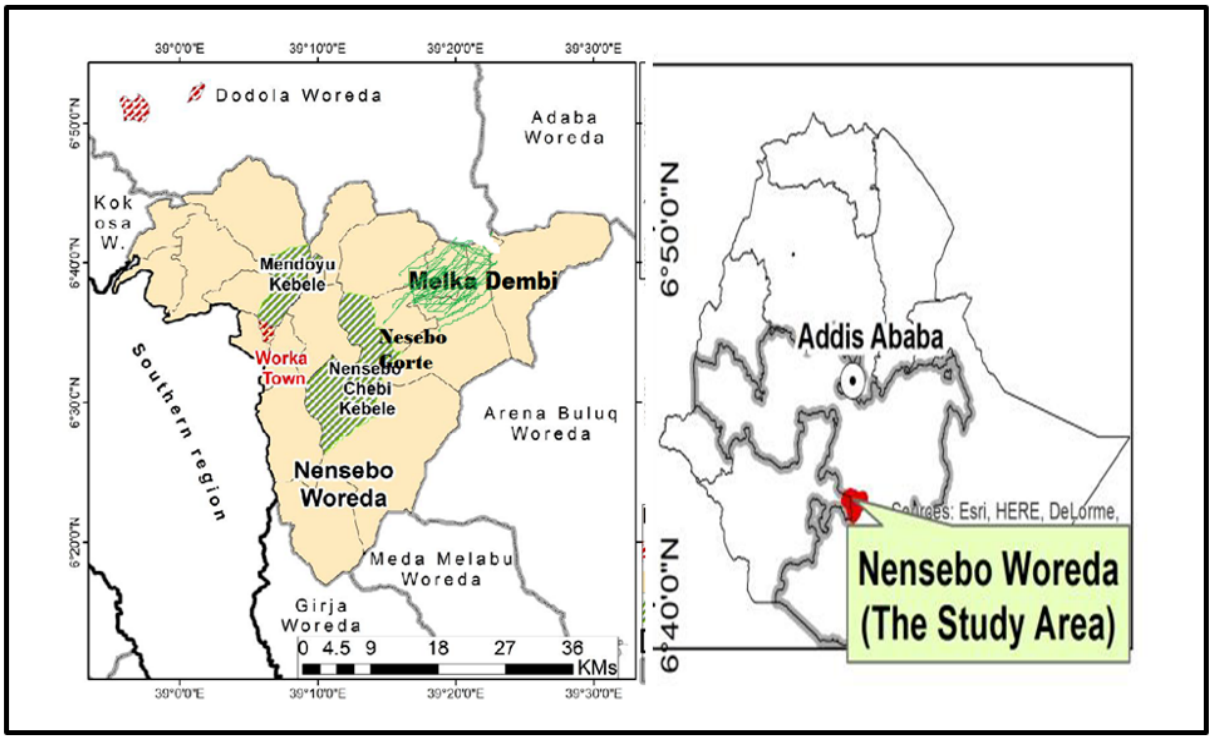


Figure 3.1: Location of the Study Area (Source: ESRI, ARC-GIS-10.5, 1999-2017)

3.1.2 Topography and Climate

A diverse topographic condition that consists of undulating terrain, mountains, hilly, plain, plateaus and valley characterizes the study site. Its altitude ranges between 1400-3278m above mean sea level. Hills and mountain ranges characterize 70% landform of the area and the famous once among others are Rusa Mountain, Gubo, Ladamo, Guticho, Barleda and Tunse Mountain (CSA, 2007).

The Woreda has three agro-ecological zones such as the Dega (Cool), Woina Dega (Mild) and Kolla (Warm) that covers about 37.5%, 62% and 0.5% of study area respectively. The study area experiences mean annual temperature and rainfall ranging from 18°C to 29°C and 1800 to 2200mm respectively (NWoANR, 2017).

The study area receives bimodal rainfall pattern with two wet seasons that are spring and summer with heavy rainfall occurs from June to November, with highest peaks in August and the short rainy season (spring) range from March to May with a peak in April. There are typically eight rainy months (March-October) and four dry months (November-February) in a given year (NWARDO, 2016 and 2017).

Table 3.1: Agro Climatic Zone of Nansebo Woreda.

Altitude	Annual Mean Temperature	Agro Climatic Zones	Area (%)
2370 - 3500m	15 -22	Warm temperature	0.5
2500 - 3000m	14 -18	Temperature	62
1500 - 2500m	10 -14	Cool temperature	37.5

Source: (NWARDO, 2016 and 2017).

3.1.3 Geology and Soil Types

Geologically, the Nensebo Woreda is included within the major formations of the South-eastern Highlands that formed during the Oligocene and Miocene geological periods, between 38-7million years ago. The area belongs to Trapp series of Tertiary volcanic eruptions that mostly composed trachyte's but also include rhyolites, basalts and associated agglomerates, and tuffs (OFWE et al., 2015). The major types of soil found in the study area are clay loamy soil (65%), Sandy soil (10%), Black loamy soil (5%) and others 20% and the average depth of the soil is about 1.5 meters (FARM Africa, 2005).

3.1.4 Vegetation Cover

NenseboWoreda is richest in forest resource. The distribution of the forest is from scattered land of Hyginea Abysinica to dense conifer forests. The main species of

trees found in the area are Geteme, Setamo, Tula, Wodessa (Cordia Africana), Juniprus procera and Bamboo (Arundinalia Alphine) the typical plant of moisture forest, occurs mainly in the mountain stream. From exotics like eucalyptus and cupreous species found dominantly. The forest resources inter waved with the livelihood of the community due to this reason there is high pressure on the resources (especially on Bamboo species). Hills and mountain ranges characterize 70% of this woreda; the rest consists of arid lands and plateaus (NWARDO, 2016 and 2017).

3.1.5 Water Resources

There are about 4 rivers in the area pass through the forest and flow throughout the year from these Hodem, Kuke, Bedesa, Aebamo, Dembi, Hamile and Bohere are the main rivers in the area. The rivers are well known and long distance flow to the Genale water shade. The potentiality of these rivers provides for hydropower, irrigation (small and large scale) and source of water for animals and humans. In addition to the above mentioned rivers, there are many spring waters. Waterfalls wet lands and mineral water in the area (Zonal & Woreda water supply office 2024).

3.1.6 Demographic and Socio-Economic Characteristics

According to the data from Woreda Agriculture and Natural Resource office, the total population of Nensebo Woreda (projected) in 2019 was about 148, 601 (Male, 75290 (51%) and Females, 73311 (49%), of which the rural population is 94.95% and urban populations is (5.05%) (NWoANR, 2019). The population density of Woreda is 40.71km^2 that is greater than the Zone average density of 27 people/km^2 (CSA, 2007).

The population of Nensebo Woreda comprises a variety of ethnic groups including Oromo constituted leading (77.45%) followed by Sidama (12.7%), Amhara (9.3%) and others (0.55%) (CSA, 2007). The main language commonly spoken in the area include Afan Oromo as a first language by (76.6%) followed by Sidamic (12.87%) and (10.38%) were spoken Amharic while, (0.63%) speaks all other primary languages

were reported (CSA, 2007).

Regarding to the religious affiliation of the area (65.91%) are followers of Muslim, (24.14%) are Protestant, (8.77%) are Orthodox, and (2.22%) are Catholic and the remaining (1.77%) of them are followers of the traditional religions (CSA, 2007).

The major livelihood of community in the area is mixed subsistence rain feed farming system (rearing of animals and crop production). The major crops cultivated in the area are Sorghum, Maize, Wheat, Teff, Barley and Enset (False Banana). While, Coffee and khat are grown mostly as cash crops. Besides, the cattle's, sheep, goat, horse, mule and donkeys are the main livestock species in area (NWoANR, 2024).

The study area is characterized by a combination of distinct biophysical and socio-economic features that significantly shape the nature and extent of resettlement impacts on forest resources.

Biophysical Characteristics

The region comprises ecologically sensitive landscapes with dense forest cover, moderate to high rainfall, and diverse flora and fauna. Soils are often fertile, supporting both subsistence and commercial agriculture, while terrain can range from lowland plains to hilly and forested zones. These conditions make forests a critical source of fuelwood, construction materials, and non-timber forest products (NTFPs) for local livelihoods (Tesfaye et al., 2011). Resettlement programs often target these fertile and relatively underutilized lands, resulting in increased deforestation and degradation due to land clearing for farming and settlement construction (Bekele, 2003).

Socio-Economic Characteristics

The area is home to communities with high dependence on natural resources, low income levels, and limited access to modern infrastructure. In-migrating resettlers often arrive with minimal assets and rely heavily on the surrounding environment for subsistence, increasing pressure on forest ecosystems (Woldeamlak, 2002). Population growth, limited environmental awareness, and weak enforcement of land-use regulations exacerbate this strain. The socio-economic profile—characterized by poverty, land scarcity in origin areas, and lack of livelihood alternatives—drives the unsustainable exploitation of forest resources in the host regions.

Environmental Challenges and the Role of Resettlement

- Major environmental challenges in the study area include:

- Deforestation and land degradation
- Biodiversity loss
- Soil erosion and water scarcity
- Unsustainable land use practices

Resettlement contributes to these challenges by increasing demand for agricultural land, fuelwood, and housing materials. The rapid conversion of forested land to farmland without proper planning or conservation measures results in habitat fragmentation and reduced ecosystem services (FAO, 2007). Inadequate infrastructure and institutional support often limit the ability of local authorities to implement sustainable land management strategies in newly resettled areas.

In this context, the study integrates both qualitative and quantitative methods to assess the extent to which the biophysical and socio-economic features of the area contribute to forest resource depletion, and how resettlement aggravates existing environmental vulnerabilities.

3.1.7 Land Use/Land Cover of the Study Area

A survey of the land in this woreda shows that 44.7% is Crop land,33% was forest land 8.6% settlement, 6.5% grassland 5.7% shrub land, and the remaining 1.5% is considered bare land respectively.

Table 3.2: Land use/Land Cover of Nensebo Woreda.

Land Use Type	Area Coverage (In Km^2)	Percent Of Total Area
Bare land	25.2	1.5
Crop Land	733.3	44.7
Forest	541.4	33.0
Grassland	106.9	6.5
Settlement	141.9	8.6
Shrub/Woodland	92.8	5.7
Totals	1641.4	100

3.2 Research Design and Approach

3.2.1 Research Design

Research design implies the methods and procedures for collecting, processing and analyzing the required data to answer the research questions. The research design that was employed in this study is descriptive survey research design. The rationale behind employing descriptive survey design was to collect data at a specific time, accurate description of situation, specific predictions with narration of facts and to explore the relationship between variables (Oshore, 2015).

3.2.2 Research Approach

This study also utilized a mixed method research approach through collecting and analyzing both qualitative and quantitative data types. According to Creswell (2003), mixed method research approach is the collection and analysis of data from different sources in a single study and applied triangulation method to enhance the quality of data during the analysis and interpretation. The rationale behind employing a mixed research approach, is it help the researcher to carry out the integration of both qualitative and quantitative data collection and analysis rigorously and intend to minimize the limitation of these approaches. This study employs a descriptive survey design to investigate the impacts of resettlement on forest resources, with a particular focus on how biophysical and socio-economic characteristics of the study area influence these impacts.

Strengths of the Descriptive Survey Design

Descriptive surveys are widely used in social and environmental research for their ability to capture a broad range of data efficiently and effectively. The key strengths include:

Broad Data Collection: Surveys facilitate the collection of data from a large number of

respondents, providing a comprehensive overview of community behaviors, land use practices, and perceptions regarding environmental change (Creswell, 2014).

Cost-Effectiveness and Practicality: Compared to experimental or longitudinal designs, surveys are less resource-intensive and more feasible in remote or resource -constrained settings (Kumar, 2011).

Descriptive Insights: The design is well-suited for identifying and describing trends, relationships, and spatial patterns in human-environment interactions, such as forest dependency and land conversion (Bryman, 2012).

Quantitative and Qualitative Integration: By incorporating both closed- and open-ended questions, the survey allows for a mix of numerical data and personal narratives, enhancing the depth of understanding (Orodho, 2003).

Limitations of the Descriptive Survey Design

Despite its advantages, the descriptive survey approach has several limitations:

Lack of Causal Inference: As an observational method, the survey cannot establish causal relationships between resettlement and environmental degradation (Creswell, 2014).

Response Bias: Respondents may offer socially desirable responses or avoid disclosing sensitive information, especially when topics relate to land use or state-led programs (Neuman, 2006).

Sampling Limitations: Achieving a fully representative sample can be challenging, particularly in resettlement contexts where population records are incomplete or recent arrivals are overlooked (Babbie, 2010).

Surface-Level Understanding: While effective in identifying broad patterns, surveys may not capture deeper ecological impacts or long-term changes without complementary data sources like satellite imagery or historical analysis (Yin, 2009).

Addressing Potential Biases

To enhance the validity and reliability of the study findings, several bias mitigation strategies will be employed:

Stratified Random Sampling: This method was used to ensure proportional representation of different subgroups (e.g., host communities vs. resettlers, gender groups), reducing sampling bias (Kothari, 2004).

Pilot Testing of Survey Instruments: The questionnaire were pre-tested in a small sample to refine questions for clarity, neutrality, and cultural relevance (Mugenda & Mugenda, 2003).

Enumerator Training: Enumerators was receive training in ethical data collection, neutral probing, and culturally sensitive engagement to reduce interviewer bias.

Triangulation: Survey data was cross-verified through key informant interviews, focus group discussions, and secondary sources such as satellite imagery and government reports (Denzin, 1978; Creswell & Plano Clark, 2011).

3.3 Sampling Technique and Sample Size Determination

3.3.1 Target Population

The target population is the entire population, or group, that researcher is interested in researching and analysing. The target population is essential for three primary reasons; Sets clear direction on the scope and objective of the research and data types. The Study population is a study of a group of individuals taken from the general population who share a common characteristic, such as age, sex, or health condition (Bell 2009). The study population in this study comprised of both native and resettlers people of the district.

3.3.2 Sampling Frame

The sampling frame in this study includes the list of the Hosts and settler populations that are found in the study area, that responsible for forest resource degradation. These are normally from the total numbers of the settler's households and hosts found in these kebeles and the data were selected using stratified sampling technique. The analysis unit was households, and DAs each sampled kebeles are respondents who participated in the study.

3.3.3 Sampling Technique

In order to achieve the objective of the research, determination of the right sampling method is quite crucial. So as select the appropriate and representative samples of the study the researcher applied both probability and non-probability sampling techniques.

In this study, a two stage sampling procedure was employed to identify the actual sampled areas and required number of sample households from each kebeles. At the first stage, three resettlement kebeles (i.e., Melka Dambi, Nensebo Chebi and Nansebo Gorte) were selected purposefully based on their larger number of 2003/04 resettled households and the problem of land use/cover changes is more critical.

In second stage, a total of **353** sample household heads i.e. (**212**) from the resettlers and (**141**) from Native people were selected for quantitative survey and semi-

structured questionnaires from a total of **2971** households using stratified sampling technique based on probability proportional to size. In this study, the selected samples were categorized into two distinct strata: "hosts" and "settlers." This stratification allowed us to ensure that each group was adequately represented in the final sample set. Subsequently, stratified sampling technique were employed to select samples from each stratum. This method involved selecting samples at regular intervals from an ordered list of items within each group, thereby minimizing bias and ensuring a more representative sample. This structured approach enhanced the reliability of our findings by providing a balanced representation of both hosts and settlers in the analysis.

Accordingly, **147 (41.6%)** of the respondents were taken from the Melka Dembi,**106 (30.1%)** from Nensebo Chebi and **100 (28.3%)** taken from the Nansebo Gorte kebeles respectively. Moreover, (10) and (16) key informants were selected by using purposive sampling for interview and FGDs guidelines respectively targeting individuals with substantial knowledge and experience concerning the resettlement.

3.3.4 Sample Size Determination

To determine the sample size of households those to participate in the study the simplified formula which was developed by Yamane, 1967 at 95% confidence level with degree of variability =0.05 and level of precision (e) =5% were applied. Thus, the sample size “n” is determined as follows.

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

$$\mathbf{n=}\ \frac{N}{1+N(e)^2} = \frac{2971}{1+2971(.05)^2} = \frac{2971}{8.42} = \mathbf{353}$$

Where: **n** = total samples included in the study,

N = Total number of households of selected sites (987)

e = desired level of precision (0.05).

Households living in these kebeles were identified by applying PPS formula. Table 3.3: shows the process followed in selected the samples sizes from each sample kebeles.

Table 3.3: Distribution of Sample Respondents Proportional to Size.

No	Selected villages	Total HHs	Number of Selected HHs		Total Sample Size	
			Native	Resettler's	In Number	In%
1	**Melka Dembi**	1246	65	82	147	**41.6**
2	**NensaboChebi**	880	36	70	106	**30.1**
3	**Nansabo Gorte**	845	40	60	100	**28.3**
	Grand Total	**2971**	**141**	**212**	**353**	**100**

Source: From the Offices of Sampled Villages**, (2024)**

The study employs a stratified random sampling technique to ensure that the selected sample accurately reflects the diversity and distribution of both resettlers and native residents in Nensebo Woreda. This approach enhances the reliability and generalizability of findings concerning the impacts of resettlement on forest resources.

Representativeness of the Sample

The population of Nensebo Woreda consists of both long-established indigenous communities and more recent resettled households, primarily relocated under government-supported voluntary resettlement programs. The sample is stratified by key variables including settlement status (resettler vs. native), kebele (village) location, gender, and household size. This ensures that all relevant subgroups are proportionally represented in the study (Kothari, 2004; Mugenda & Mugenda, 2003).

Careful attention is given to include kebeles with significant forest coverage and varying levels of resettlement activity to capture spatial variation in forest resource use.

Data from the Woreda Administration and Bureau of Agriculture is used as the sampling frame, helping align the sample with the actual population distribution. Community leaders and local development agents also assist in identifying hidden or

marginalized households, especially recent arrivals who may not yet be registered in formal records (Bryman, 2012).

Potential Sources of Sampling Error

Despite the structured approach, several potential sources of sampling error exist:

Coverage Error: Some resettler households, particularly those newly arrived or informally settled, may not appear in administrative records (Babbie, 2010).

Non-Response Bias: Certain groups (e.g., women, elders, or landless households) may be less likely to participate, leading to underrepresentation.

Selection Bias: Without randomization, field-level enumerators might unintentionally favor accessible or cooperative households.

Sampling Frame Errors: Outdated or incomplete household lists may result in the omission of eligible respondents.

Strategies to Minimize Sampling Error

To address these issues, the following measures are implemented:

Use of Updated Sampling Frames: Recent household lists from local offices and kebele records are cross-checked and verified with field visits (Neuman, 2006).

Stratified Random Sampling: Households are categorized and randomly selected within strata to ensure proportional representation and reduce selection bias (Kumar, 2011).

Enumerator Training and Supervision: Enumerators are trained to avoid bias during selection and data collection and are monitored throughout the survey process.

Oversampling of Underrepresented Groups: Additional sampling is conducted in groups with low initial response rates (e.g., women-headed households) to correct imbalances (Creswell, 2014).

Community Engagement: Working with local leaders enhances trust, increases participation, and helps identify omitted or vulnerable households.

Through these strategies, the sample is designed to yield reliable and representative insights into the socio-environmental dynamics of resettlement in Nensebo Woreda.

3.4 Types and Sources of Data

To achieve the objectives of the study, data were gathered from both primary and secondary sources. Thus, the primary data were collected from the sample households in three kebeles, experts at the districts office of Environment, Forest

and Climate Change Authority, Kebele administrators, elderly peoples and developmental agents.

Moreover, secondary data sources used in this study were collected from published and unpublished which are available in form of books, journal articles, performance reports from Woreda Agriculture and Natural Resource Office, Environment, Forest and Climate Change Authority office and other relevant organizations to support the reliability of primary data.

In addition to primary data collected through surveys, interviews, and focus group discussions, this study incorporates secondary data from government reports, satellite imagery, environmental assessments, and previous research on resettlement and forest resource use in Nensebo Woreda. While secondary data provides valuable context and supports triangulation, it also presents several limitations that require careful handling.

Limitations of Secondary Data

Outdated or Incomplete Information: Secondary data may not reflect recent developments, especially in dynamic contexts such as resettlement areas where population and land use change rapidly (Johnston, 2014).

Inconsistency Across Sources: Different institutions may use varying definitions, methods, or data collection periods, leading to inconsistencies in datasets (Kumar, 2011).

Lack of Local Specificity: National or regional datasets may overlook local-level variations in forest cover, livelihood practices, or demographic composition (Bryman, 2012).

Unknown Data Quality: The accuracy, validity, and reliability of secondary data may be uncertain, particularly if documentation of data collection methods is lacking (Babbie, 2010).

Addressing Limitations and Handling Data Gaps

To ensure the effective and responsible use of secondary data, the following strategies will be employed:

Source Evaluation and Cross-Verification: Secondary data sources was critically assessed for credibility, relevance, and consistency. Where possible, data will be cross-verified across multiple institutions (e.g., Ministry of Agriculture, CSA, FAO) to ensure accuracy (Neuman, 2006).

Triangulation with Primary Data: Data from household surveys, key informant interviews, and focus group discussions was used to validate or challenge findings from secondary sources (Creswell & Plano Clark, 2011).

Use of Multiple Temporal and Spatial Scales: Combining data from different years and geographic levels (e.g., kebele, woreda, zone) was help fill temporal or spatial gaps and highlight trends over time (Yin, 2009).

Transparency in Documentation: All sources of secondary data was clearly documented, and any limitations or assumptions made in the use of these data will be explicitly stated (Johnston, 2014).

Supplementation with Remote Sensing and GIS: Satellite imagery and spatial datasets was used to fill ecological data gaps, particularly in assessing land cover change and forest degradation where ground-based data is unavailable or unreliable (FAO, 2007).

Through these strategies, the study ensures that secondary data enhances rather than compromises the validity and completeness of the research findings.

3.5 Data Collection Methods and Instruments

A triangulation of methods was used in this study to collect both quantitative and qualitative data. Bryman (2012) argues that triangulation is a powerful solution to the problem of relying too much on any single data source or method as it tends to affect the validity and credibility of findings. Thus, the responses gathered from varied data sources were triangulated to evaluate convergence and divergence of views among different sources. The quantitative and qualitative data were collected through Satellite imagery, household survey, focus group discussions, key informant's interview, document analysis and field observations. These methods described as below:

3.5.1 Satellite Imagery

To assess the impact of resettlement on forest cover change in past thirty-seven years' years, the study utilized four years sets of sequential satellite images namely Landsat Thematic Mapper (TM) of 1986, 2003, 2013 and Land sat 8 OLI of 2023 that were downloaded from USGS official website (http://glovis.usgs.gov/ were used for the LULC changes analysis of the study area(Table 3.4).

The year 1986 image was taken as a reference for this study to know the former LC/LU circumstances prior to resettlement program in the area. The 2003 image was helpful to observe LU/LC conditions few years before the implementation of the current resettlement schemes at the end of 2003. The 2013 image were used to see the post resettlement conditions of the study area and the 2023 image were taken to show the current LULC change dynamics of study area.

To avoid the adverse effect of cloud cover on LULC classification, all of the satellite images were taken during the dry season month of January under 0% cloud cover conditions and there is difficulty of finding free cloud cover images for rest dry season years of the area.

Since a single image did not cover the spatial extent of the entire study area, mosaic of two-scene images with (path/row of 168/56 and 168/55) were made independently for each year and band combination are made. All downloaded images were already geometrically corrected, while radiometric correction was done using ENVI software version 5.3, where conversion of optical band data to top of atmospheric reflectance (TOA) and then to surface reflectance values using USGS file that ends with MTL.TXT.

The LULC classification was done on ERDAS Imagine 2014 software by employing a supervised maximum likelihood algorithm classification approach that is generally recognized as the popular classifier technique (MEFCC, 2016). More than 10 training samples areas were taken for each land cover classes to increase accuracy and reduce errors of the classification. LULC change detection analysis was employed using ArcGIS 10.4, to examine the land use/land cover types. Then, the areas of the LULC classes were calculated from the maps, and analysis of LULCC in percent and rate of changes was calculated using equations described by Alemayehu et al., (2019).

To ensure the accuracy and credibility of results, rigorous methods were applied in the processing and analysis of remote sensing, survey, and qualitative data. This section outlines the procedures used to enhance data validity and reduce bias.

Satellite Image Processing and LULC Classification

To assess land use/land cover (LULC) changes in Nensebo Woreda, satellite images (e.g., Landsat 8, Sentinel-2) were acquired for multiple years and seasons. The following procedures were implemented:

Preprocessing: Radiometric and geometric corrections were applied to reduce sensor noise, cloud cover, and atmospheric distortion using ENVI and QGIS software (Chuvieco, 2016; Lillesand, Kiefer & Chipman, 2015).

Supervised Classification: A maximum likelihood algorithm was used, with training data derived from field GPS points and high-resolution Google Earth imagery to ensure local relevance of LULC classes (Foody, 2002).

Accuracy Assessment: A confusion matrix and Kappa coefficient were generated using independent validation points. Classifications with an overall accuracy above 85% and Kappa > 0.8 were deemed acceptable (Congalton & Green, 2009).

3.5.2 Household Survey Questionnaires

A household survey was conducted using structured questionnaires designed in line with stated research objectives and research questions. As determined in sample size, in this study 212 settlers and 141 native people were participated in this survey. The questionnaire originally constructed in English by the researcher and then translated into Afan Oromo to enhance the comfort of every respondent and after data collected from respondents then translated back to English with help of experts.

The household survey questionnaires were composed of both open and close-ended types to collect reliable data about the impact of resettlement on land use/cover types, drivers and socio-economic condition of the respondents.

Prior to the formal survey, the first draft questionnaire submitted to the research advisor for comments and suggestions. Based on the feedback, some improvements made accordingly. The questionnaires were pre-tested with 10 purposefully selected non-sample respondents to check their validity and adjustments made accordingly.

To facilitate the primary data collection, process the researcher had recruited five development agents (DAs) enumerators that have well acquaintance with each kebeles and the local language (Afan Oromo). Then training was offered to enumerators for two days on how to approach the respondents, selection of appropriate place, time and how to control the interview situation and record the

information accurately and collected the data under close supervision of the researcher.

To reduce potential biases in the household survey and enhance representativeness:

Enumerator Training: Enumerators were trained in neutral questioning, ethical conduct, and local language use to prevent leading questions and respondent discomfort (Neuman, 2006).

Pilot Testing: The survey instrument was pre-tested in a non-sampled kebele, and ambiguous or culturally sensitive questions were revised (Mugenda & Mugenda, 2003).

Anonymity and Voluntary Participation: Respondents were assured of confidentiality and informed that participation was voluntary, promoting more honest and accurate responses (Babbie, 2010).

Stratified Random Sampling: This ensured that both resettlers and native households across different kebeles were proportionally represented, minimizing sampling bias (Kothari, 2004).

Inter-Coder Reliability in Qualitative Data Analysis

Qualitative data from focus group discussions and key informant interviews were transcribed and coded using thematic analysis:

Codebook Development: An initial set of codes was developed deductively from the research questions and inductively from raw transcripts (Braun & Clarke, 2006).

Double Coding: Two independent researchers coded a subset of transcripts. Discrepancies were discussed and resolved to refine the coding framework (MacQueen et al., 1998).

Inter-Coder Reliability Testing: Cohen's Kappa was calculated to measure agreement between coders. A Kappa value above 0.75 was considered strong agreement (Landis & Koch, 1977).

These steps ensured that the interpretation of qualitative data was consistent, transparent, and grounded in the lived experiences of respondents.

3.5.3 Key Informants' Interviews (KIIs)

In-depth interviews were also the other methods of data gathering that used to acquire the maximum information on the issues based on interview guideline from the key informants (KIs).

The participants were selected purposively based on their responsibilities they have and the researchers facilitated relevance to issues understudy and the discussions. Alemayehu (2011) indicated that purposive sampling is used primarily when there is a limited number of people that have expertise in the area being investigated. A total of 10 key informants were carefully chosen (four experts from the districts office of Environment Forest and climate Change Authority, three Kebele administrators and three developmental agents (DAs) worker who are assigned at community level were included during the study. The expert involvement in this process was required to get better information about the resettlement held in the district and its impact on forest resources.

The interview was guided by checklist of open-ended questions prepared and conducted in Afan Oromo, the native tongue of the case study area, later translated into English for analysis and writing. The interview questions, capturing their reflections on the before and after resettlement scenario, the extent and trends, drivers and its consequences of LULC were raised to crosscheck and enrich validity of information collected through survey questionnaires, and the researcher who was the moderator guided their responses.

3.5.4 Focus Group Discussions (FGDs)

Focus group discussions was also conducted to gather qualitative data which involves the investigator in gathering group of participants together to discuss a certain key issues of the research topic. The focus group discussions were held with elders on specific topics within two small groups one from the resettlers and the other from native society. Each group was composed of about 7 to 8 elderly people who have a good knowledge on the histories of forest change in the area. FGD participants were selected based on their familiarity with the resettlement process, involvement in local development activities, and permanent residency in the study area. Thus, 16 elderly people were involved to participate in the FGDs.

Furthermore, checklists of open-ended questions were used to assess their perception on the impacts of resettlement on forest resources carried out mid-June 2016 E.C. The information by FGDs later used to bridge the gap of questionnaires.

3.5.5 Field Observations

For this study, direct field observation was conducted in the three study Kebeles based on checklists designed in advance to observe the patterns of land use and the situation of the woodland and grazing lands as well as farmlands conditions in the study area. The field observations also support the researchers at the time of determining the scale of the change. This helped researcher to gather reliable primary data and information to understand the general condition of the environment.

3.5.6 Document Analysis

Various published and unpublished documents such as thesis, internet sources, satellite imagery and training manuals on forest deforestation were used as major secondary data for the purpose of supporting primary data in the study area.

3.6 Methods of Data Analysis

The relevant data collected through different instruments were processed and analysed by both quantitative and qualitative methods of data process and analysis. Accordingly, the quantitative data collected through household survey questionnaires were coded and filled into SPSS version 26 software and using descriptive statistics with tables, frequency and percentage methods because of its simplicity, clarity and easy to understand by the researcher and the reader.

During analysis and interpretation reasonable explanation for the relations and Interpreting tasks was accomplished only after considering relevant factors affecting the problem. In open ended characteristics of respondents, interviews focus group discussion, and document analysis were analyzed by using qualitative method of data analysis through interpretation and conceptual generalization. Finally, the results of the data were categorized, presented and interpreted.

Data that extracted from the satellite image organized and analyzed by using ERDAS IMAGINE 2014 and Arc GIS 10.4 software's. In order to analyse forest land cover change between 1986 and 2023, the maximum likelihood supervised classification approach was applied on ERDAS Imagine 2014 using training sites to classify

different land cover types and detect changes. Conversion matrixes were analysed for each period to clearly show the source and destination of the major LULC changes.

To enhance the depth and validity of findings, this study adopts a mixed-methods approach, integrating both quantitative and qualitative data sources. This design is used to provide a holistic understanding of how resettlement affects forest resources in Nensebo Woreda, accounting for both measurable trends and contextual, community-based perspectives.

Integration of Quantitative and Qualitative Data

A convergent parallel design (Creswell & Plano Clark, 2011) is used, where both quantitative (e.g., survey responses, remote sensing data) and qualitative data (e.g., interviews, focus groups) are collected and analyzed separately but interpreted together:

Triangulation: Quantitative data on land use change, household forest dependency, and socio-economic variables are cross-validated with qualitative insights from key informants and focus groups to confirm or clarify trends (Bryman, 2012).

Complementarity: Qualitative narratives provide context and explanation for patterns observed in the quantitative data. For example, statistical increases in forest product use can be explained by narratives of livelihood shifts post-resettlement (Greene et al., 1989).

Data Merging: Thematic findings are linked with survey metrics through matrix displays and joint analysis tables, allowing for integrated interpretation during the discussion and conclusio

phases (Tashakkori & Teddlie, 2003).

This approach enhances the robustness of conclusions and provides both breadth (quantitative) and depth (qualitative) in understanding the impacts of resettlement.

Control of Potential Confounding Factors

Confounding variables—such as household size, access to markets, education level, or prior exposure to forest management programs—can obscure the true relationship between resettlement and forest resource use. The study applies the following strategies to control for these:

Multivariate Statistical Techniques: Regression analysis (e.g., multiple linear regression, logistic regression) is used to statistically control for potential confounders by including them as covariates in the model (Field, 2013).

Stratification: During sampling and analysis, comparisons are made within subgroups (e.g., resettlers vs. non-resettlers, or by kebele) to isolate the effects of resettlement from other background factors (Kothari, 2004).

Matching: Where applicable, households are matched based on key demographic and ecological variables (e.g., land size, location), reducing the influence of baseline differences on outcomes (Rubin, 2001).

Qualitative Clarification: Confounding influences that cannot be fully quantified are explored in interviews—for instance, how social networks or traditional knowledge may influence resource use differently among population groups (Maxwell, 2012).

These combined strategies ensure more accurate attribution of observed environmental and social changes to the resettlement process rather than to unrelated external factors.

3.7 Methods of Controlling Validity and Reliability of the Data

As mentioned by (Creswell,2005) validity and reliability are two main criteria for determining data quality where validity presumes reliability, that is, if a measure is not reliable, it cannot be valid. Several measures have been taken to ensure the validity and reliability of the data collection instruments. Content validation established by cross-referencing content of the instruments to those elements contained in the stated objectives to determine if there was indeed a match. To minimize the mistake that might prevail in construction of the instrument, the researcher has shown the draft questionnaire for his advisor to be reviewed, commented and checked.

After the advisor gave the feedback, the pilot-test was conducted at 10 small group representative of the population that excluded from the actual sample of study. The reliability of questionnaires can be evaluated by linking responses given by respondents in time of pilot test administration. Similarly, a multiple data collection approaches were employed which further enhanced the trustworthiness of the study (Creswell, 2003).

The reliability of measurement is shown to range between 70%-90% using Crobanci's alpha, which is used to quantify internal consistency, or how well a set of items correlates inside a group. Then, to further the study's authenticity, proclamations, and other official papers were included, along with answers from homeowners in informal housing communities.

To ensure the credibility and trustworthiness of findings, this study identified and addressed key threats to data validity and reliability, as well as potential sources of

researcher bias during data collection and analysis.

Several threats were identified across different stages of the research:

Instrument Validity: Poorly worded or culturally inappropriate survey questions could lead to misinterpretation or inaccurate responses (Mugenda & Mugenda, 2003).

Measurement Consistency: Variation in data collection procedures could compromise the reliability of results, especially with multiple enumerators in the field (Neuman, 2006).

Sampling Bias: Underrepresentation of key subgroups (e.g., women, recent resettlers) could skew results and limit generalizability (Kothari, 2004).

Recall Bias: Respondents may provide inaccurate information due to memory limitations, especially on historical land use or livelihood changes (Babbie, 2010).

Contextual Validity: Applying standardized tools without considering local context could reduce the relevance or depth of findings (Maxwell, 2012).

Mitigation Measures:

Pretesting and Revision: All instruments were pilot-tested and revised to improve clarity, cultural sensitivity, and content validity.

Standardized Protocols: Enumerators were trained using uniform guidelines to ensure consistent administration of surveys and interviews (Creswell, 2014).

Stratified Random Sampling: This ensured representation across gender, settlement status, and location, improving both internal and external validity.

Multiple Data Sources (Triangulation): The use of household surveys, interviews, focus groups, and satellite data strengthened construct validity by cross-verifying findings (Bryman, 2012).

Use of Reliable Instruments: Remote sensing data were processed with validated classification methods (e.g., Kappa statistics for accuracy), while surveys drew on established livelihood and land use frameworks (Congalton & Green, 2009).

To reduce researcher subjectivity and confirmation bias, the following strategies were adopted:

Reflexivity: Researchers maintained reflexive journals to record personal assumptions, expectations, and decisions made during data collection and analysis (Berger, 2015).

Enumerator Neutrality Training: Enumerators were trained to avoid leading questions and to

maintain neutrality during interviews and discussions (Neuman, 2006).

Peer Debriefing: Regular team debriefings were held to challenge interpretations, share divergent views, and refine analytical approaches (Lincoln & Guba, 1985).

Inter-coder Reliability: In qualitative analysis, coding was conducted by multiple researchers, and agreement was measured using Cohen's Kappa to ensure consistency and reduce interpretive bias (MacQueen et al., 1998).

Anonymity and Confidentiality: These were guaranteed to participants to promote honest and open responses, reducing social desirability bias (Babbie, 2010).

Through these measures, the study enhanced the rigor and trustworthiness of the research process and outcomes.

3.8 Ethical Considerations

Ethical clearance and approval letter to conduct the current study were obtained from Madda Walabu University school of Graduate Studies, Department of Geography and Environmental Studies. Following the letter, Nensebo Woreda administrative office wrote a letter to all selective villages and respective sectors to assist researcher in providing support for the research work.

Taking the severity of ethical considerations in mind, this study has tried to be as ethical as possible by employing two basic research ethics principles: confidentiality and informed consent. During the course of all interviews, the researcher emphasized the impartiality of the study concerning the resettlement issue, allowing respondents

To minimize potential risks to participants, the study adhered strictly to ethical research principles, including informed consent, confidentiality, and voluntary participation (Israel & Hay, 2006). Participants were fully informed about the purpose, procedures, and potential risks of the study before data collection began. Sensitive questions were handled with care to avoid discomfort, and respondents were assured that they could withdraw at any time without penalty. Data were anonymized and securely stored to protect participant privacy.

Respect for local customs and cultural norms was a central component of the research process. Prior to fieldwork, the research team engaged with community leaders and local authorities to obtain permission and guidance on culturally

appropriate behaviour (Mackenzie et al., 2007). Data collectors received training on cultural sensitivity and local languages to foster respectful communication. Research activities were scheduled to avoid conflicts with community events, religious practices, or agricultural cycles, ensuring minimal disruption to participants' daily lives.

By embedding ethical safeguards and cultural awareness throughout the study, the research maintained trustworthiness and fostered positive community relations.

CHAPTER FOUR

4. RESULTS AND DISCUSSION

This chapter presents a detailed description of the results obtained from analysis and interpretations over impacts of resettlement on forest resources in Nensebo Woreda. In each section, the socio-economic data obtained from the household questionnaire survey, key informants' interview, interpretation of the satellite imagery, map, focus group discussions and field observations were analyzed thematically with the focus

on the effect of resettlement on forest resource, forest land cover changes in relation with population resettlement and options for futures sustainable forest management with reference to intended objectives of study.

4.1 Demographic and Socio-Economic Characteristics of the Respondents

Assessing the respondent's profiles, mainly demographic and socio-economic characteristics of the sampled households were important in terms of identifying and understanding the effects of resettlement on forest resources in the study area. To this end, some demographic aspects (age, sex, marital status and family size) of the respondents in the study area provided as below.

This study examines whether the educational level of household heads influences their awareness of the environmental impacts of resettlement, particularly on forest resources. Previous research suggests that higher education levels are positively associated with greater environmental knowledge and pro-conservation attitudes (Tadesse et al., 2016; Mekonnen et al., 2019). In the current study, awareness levels was assessed using structured survey questions, and relationships with education was tested using chi-square analysis and logistic regression models to determine the strength and significance of associations.

A potential limitation of the research is sampling bias, particularly the over- or under-representation of specific demographic groups, such as women, youth, or households with low literacy. For instance, educated households or those living closer to main roads may have been more likely to participate due to greater accessibility or willingness to engage with survey teams. This could lead to non-response bias and skew findings related to awareness levels or resource use practices.

To mitigate these issues, the study employed stratified random sampling and purposively included diverse respondents across gender, age, settlement type, and educational background. Nonetheless, any disproportionate representation is acknowledged and will be considered when interpreting the results. Limitations due to sampling biases will be transparently reported to inform the scope and generalizability of the findings (Fowler, 2014; Bryman, 2016).

Where significant differences are observed, these were explored further using multivariate regression to isolate the effects of specific demographic characteristics. This helps identify which groups are more likely to support or oppose conservation efforts, informing targeted policy interventions.

4.1.1 Age and Sex Structure of the Sampled Household Heads'

The survey result indicated that the majority (75.9%) and (75.9%) of the native and resettlers people respectively were males and (24.1%) of the natives and (24.1%) of resettlers were female's respondents (Table 4.1). Concerning to the age groups majority (51.8%) and (46.1%) of the resettlers and native people respectively were fall in age group of 30-39 years old followed by (23.5%) and (18.4 %) were found 40-49 years, while (14.2%) and (21.3%) were found 20-29 years old and the remaining (10.5%) and (14.2%) of the respondents were above 50 years old respectively

Table 4.1: Sex and Age Distribution of the Native and Resettlers Household

Variables	Categories	Natives		Resettlers		Grand Total	
		N= 141		N=212		N=353	
		N	%	N	%	N	%
Sex	Male	107	75.9	161	75.9	268	79.5
	Female	34	24.1	51	24.1	85	24.1
	Total	**141**	**100**	**212**	**100**	**353**	**100**
Age category	20-29	30	21.3	30	14.2	60	17.3
	30-39	65	46.1	110	51.8	175	49.6
	40-49	26	18.4	50	23.5	76	21.5
	50 above	20	14.2	22	10.5	42	11.6
	Total	**141**	**100**	**212**	**100**	**353**	**100**

Source: Field survey of the study area (2024)

4.1.2 Marital Status and Family Size of the Sample Household Heads'

As can be seen from Table 4.2, the marital status of the household heads shows that the majority (78.7%) of native people were married, (14.9%) were divorced and the remaining (3.6%) and (2.8%) of them were single and widowed respectively. While,

majority (75.9%) of resettlers people were married, (11.8%) divorced and the remaining (9.9%) and (2.4%) were single and widowed respectively (Table 4.2).

Concerning to the family size, majority (59.7%) and (62.3%) of the native and resettlers respondents have the family size of 7-8 followed by (17.1%) and (15.1%) had 9-10 members, (14.2%) and (10.8%) had 4-6 members, whereas (4.2%) and (1.8%) of the households have the family size ranges less than 3 whereas (4.9%) and (9.9%) of the households have the family size above 10 respectively.

The average household size of the sample population is 6.3 persons (Table 4.2). This suggests that the demand for agricultural land grows and large area of forest to be cleared for this purpose.

Table 4.2: Marital Status and Family Size of the Sampled Households.

Variables	Categories	Natives		Resettlers		Grand Total	
		No= 141		No= 212		No= 353	
		N	%	N	%	N	%
Maritus Status	Single	5	3.6	21	9.9	26	7.4
	Married	111	78.7	161	75.9	272	77.1
	Divorce	21	14.9	25	11.8	46	13
	Widowed	4	2.8	5	2.4	9	2.5
	Total	**141**	**100**	**212**	**100**	**353**	**100**
Total family Size	<3	6	4.2	4	1.8	10	2.8
	4-6	20	14.2	23	10.8	43	12.2
	7-8	84	59.7	132	62.3	216	61.2
	9-10	24	17.1	32	15.1	56	15.8
	>10	7	4.9	21	9.9	28	7.9
	Total	**141**	**100**	**212**	**100**	**353**	**100**

Source: Field survey of the study area (2024)

4.1.3 Religious Affiliation, Ethnicity and Educational Status

Different views and beliefs could influence how to use and manage environmental resources. Regarding religious composition, majority (58.9%) and (59.4%) of the native and resettlers people respectively were Muslims followed by (33.3%) and (31.1%) of protestant, (9.4%) of the resettlers were Orthodox and the remaining (7.8%) of the natives were the followers of Waaqeffata (traditional) religions (Table 4.3).

Concerning to the ethnic groups of household heads, majority (100%) of the natives and (52.4%) of resettlers people were belonged to the Oromo ethnic groups followed by Sidama (38.2%) and (9.4%) of Amhara ethnic groups respectively (Table 4.3). This shows that ethnic diversity was still present in the Woreda.

Regarding to the educational status, majority (61.7%) and (59.9%) of the native and resettlers people respectively were found to be illiterate, whereas (18.4%) and (15.1%) were read and write, (15.6%) and (14.6%) of them were attended primary school and the remaining (4.3%) and (10.4%) of the native and resettlers people were categorized in secondary education level (Table 4.3).

Table 4.3: Households Religious Affiliation, Ethnicity and Educational Status.

Variables	Categories	Natives		Resettlers		Grand Total	
		N=141		N=212		No= 353	
		N	%	N	%	N	%
Religious Affilition	Muslim	83	58.9	126	59.4	209	**59.2**
	Protestant	47	33.3	66	31.1	113	**32**
	Orthodox	-	-	20	9.4	20	**5.6**
	Traditional	11	7.8	-	-	11	**3.1**
	Total	**141**	**100**	**212**	**100**	**353**	**100**
Ethnicity	Oromo	141	100	111	52.4	252	**71.4**
	Sidama	-	-	81	38.2	81	**22.9**
	Amhara	-	-	20	9.4	20	**5.6**
	Total	**141**	**100**	**212**	**100**	**353**	**100**

Education Status	Cannot read and write	87	61.7	127	59.9	214	**60.6**
	Can read and write	26	18.4	32	15.1	58	**16.4**
	Primary (1-8)	22	15.6	31	14.6	53	**15**
	Secondary (9-12)	6	4.3	22	10.4	28	**7.9**
	Total	**141**	**100**	**212**	**100**	**353**	**100**

Source: Field survey of the study area (2024)

4.2 The Effect of Resettlement on Forest Resource

The focus of this section was describe the results obtained from analysis and interpretations over impacts of resettlement on forest resources in Nensebo Woreda obtained from the household questionnaire survey, key informants' interview, interpretation of the satellite imagery, map, focus group discussions and field observations were analysed thematically with the focus on the effect of resettlement on forest resource with reference to intended objectives of study.As this study, shows Nensebo Woreda are one of the state-sponsored resettlement programs for settlers who came from the lowlands East and West Hararghe Zone of Oromia Region during the current government in 2003/04.

Regarding to the impacts of resettlement on forest resource the majority (74.5%) and (80.2%) of the native and resettlers people are well aware of historic impacts resettlement on the forest resources in the area, while (25.5%) and (19.8%) of them responded that they did not observe any significant impacts of resettlement on forest resource in the study area (Table 4.4). The result showed that the majority of the people perceived considerable impacts of resettlement on the forest resources in the area.

With regards to the resettlement impact on on forest resource majority (67.4%) and (57.5%) of the native and resettlers people respectively were mentioned deforestation, while (12.1%) and (7.5%) stated forest cover changes and (20.5%) and (34.9%) of the native and resettlers people replied that land use conflicts as the most adverse effects of resettlement on the forest cover in the study area (Table 4.16). The result showed that substantial deforestation was the most adverse effects of

resettlement on the forest resource in the study area. This is in line with (Zemenu et al., 2016) argued that resettlement affected the forest cover change in Abobo Woreda in relation with deforestation and expansion of agricultural activities.

According to data obtained from FGDs and Key informants, interviews confirmed that deforestation because of resettlement is a driving factor for the forest resource cover changes in study area. The respondents argued that after the formal resettlement programme of the 2004, informal settlement continued in the forest both from the existing formal settlers themselves (children of the settlers when became independent of their parents) and other people coming from different areas outside the settlement area which contributed for the population increase in the forest. The reasons for the resettlement were mainly to acquire farmland for crop cultivation and forest resource extraction and these were the major causes of deforestation practiced without any control by the local government. In a similar study, Messay (2009) reported that alarming increase in population size following the 2003 and 2004 resettlement program in Jiru Gamachu in Central Ethiopia, the dense grasslands and woodland vegetation have been entirely converted to villages, grazing and farming lands. This was why forest cover decreased from (48.7% in 1986 to 33.0% in 2023) within the area as LULC changes result of this study shown.

The data gathered from field observation in the study area also revealed that, collecting fuel wood, slash and burn and expansion of farm land were the major types of deforestation in the study area. The result showed that migrants were practicing more deforestation than non-migrants in the study area.

This study explores the specific mechanisms by which resettlement contributes to deforestation and forest degradation in Nensebo Woreda. One of the primary drivers is the conversion of forestland into agricultural plots and homestead areas to accommodate resettled populations, often without adequate land-use planning or ecological assessment (Gebrewold et al., 2020; EFCCC, 2020). In addition, weak enforcement of forest boundaries and insufficient buffer zones exacerbate

uncontrolled forest encroachment.

A key mechanism of degradation is the widespread reliance on biomass energy—particularly fuel wood and charcoal—as the dominant household energy source. Both resettlers and native communities rely heavily on nearby forests for cooking and heating due to limited access to alternative energy sources (Lemenih & Kassa, 2014). This dependence leads to unsustainable wood harvesting, especially in densely settled areas, intensifying forest resource pressure and loss of biodiversity.

Despite these negative impacts, the study also considers positive effects of resettlement under certain conditions. For example, when Participatory Forest Management (PFM) schemes or community conservation initiatives are integrated with resettlement programs, they can enhance local stewardship and forest rehabilitation (Tadesse et al., 2016; Yonas et al., 2017).

Resettlement can also create opportunities for infrastructure development, which—if well-managed—may reduce dependency on forests by improving access to education, markets, and cleaner energy alternatives.

These dynamics was analyzed through a combination of household surveys, key informant interviews, and remote sensing data, triangulated to capture both the destructive and potentially constructive dimensions of resettlement on forest ecosystems.

Table 4.4: Perceived Effects of Resettlement On the Forest Resource

Variables	**Categories**	**Natives**		**Resettlers**		**Total**	
		N=141		**N=212**		**N=353**	
		N	**%**	**N**	**%**	**N**	**%**
Did you observe impacts resettlement on the forest resources?	Yes	105	74.5	170	80.2	275	77.9
	No	36	25.5	42	19.8	78	22.1
	Total	**141**	**100**	**212**	**100**	**353**	**100**
How resettlements affect forest resource in	Deforestation	95	67.4	122	57.5	217	61.5
	Forest cover	17	12.1	16	7.5	33	9.3

your area?	changes						
	Land use conflicts	29	20.5	74	34.9	103	29.8
	Total	**141**	**100**	**212**	**100**	**353**	**100**

Source: Field survey of the study area (2024)

4.2.1 Common Energy Usage and Their Major Sources

It is obvious that like other developing country, the majority of rural people our country in general and farmers of the study area depend mainly on biomass for energy (EFAP, 1994).

Concerning to the types of energy sources majority (77.3%) and (70.8%) of the native and resettlers people respectively used fuel wood for cooking in their homes, whereas (17.7%) and (21.7%) were used charcoal and the remaining (5%) and (7.5%) used crop residue as a source of energy respectively (Table 4.5). The result showed that the majority of the people collecting fuel wood and charcoal from the common forests were the major source of energy for cooking in the study area. The result in line with study of Meseret (2009) found similar results at Adaba-Dodola forest priority area, Ethiopia who stated that firewood and charcoal productions accelerated the removal of the forest cover in which the forest cover reduced in terms of its areal extent and species.

Pertaining to the main sources of household energy majority about (73.8%) and (67.5%) of the native and resettlers people respectively were gets their fuel wood demand from the natural forest, (6.4%) and (12.7%) from communal forest and the remaining (19.8%) and (19.8%) from homestead respectively that has been causing forests degradation (Table 4.5).

According to data obtained from FGDs and Key informants, interviews confirmed that woodlands are a major source of household energy requirement for cooking. The application of such non-renewable resource for household use contributes greatly to the debilitating effects of limited forest resources in the sample Kebeles as well as the Woreda as a whole. Moreover, use of fuel wood as a source of energy has a negative impact on the forest resource the area

Table 4.5: Main Types of and Sources of Energy for Household Consumption

Variables	**Categories**	**Native**		**Resettlers**		**Total**	
		N=141		**N=212**		**N=353**	
		N	**%**	**N**	**%**	**N**	**%**
Types of energy used for household at home.	Fuel wood	109	77.3	150	70.8	259	73.4
	Charcoal	25	17.7	46	21.7	71	20.1
	Crop residue	7	5	16	7.5	23	6.5
	Total	**141**	**100**	**212**	**100**	**353**	**100**
Sources of energy for household consumption	Natural forest	104	73.8	143	67.5	247	70
	Homestead	9	6.4	27	12.7	36	19.8
	Community forest	28	19.8	42	19.8	70	19.8
	Total	**141**	**100**	**212**	**100**	**353**	**100**

Source: Field survey of the study area (2024)

4.2.2 Rate of **Resettlement Effect** On Forest Resource **Exploitation**

In order to show the effect of resettlement on forest exploitation presented in table 4.6 below majority about (80.1%) and (81.1%) of the native and resettlers respondents

claimed that the rate of resettlement effect on forest resource exploitation was very high, whereas about (12.1%) and (11.3%) of the respondents agreed on high and the remaining (7.8%) and (7.5%) said that the rate of resettlement effect on forest resource exploitation was low in the study area.

The result showed that the majority of the people perceived the rate of resettlement effect on forest resource exploitation was very high in the study area. These findings are supported by results from satellite imagery interpretation that shows a decrease in forest cover from (48.7% in 1986 to 33.0% in 2023).

In addition to this almost all of FGD participants responded that the rate of population pressure on forest resources was rapid but a few of them responded saying it was moderate. Likewise; almost the entire of interview participants responded that the rate of population pressure on forest resource was speedy. The result showed that there was significant relationship between Population size and the rate of forest resource exploitation in the study area. Similarly, the majority of FGD respondents decided as there were different types of deforestation in which forest lands were cleared for the purpose of fuel wood, agricultural, settlement and grassing lands in the study area.

Table 4.6: Rate of Resettlement Effect On Forest Resource Exploitation

Variables	**Categories**	**Natives**		**Resettlers**		**Total**	
		N=141		**N=212**		**N=353**	
		N	**%**	**N**	**%**	**N**	**%**
Rate of forest exploitation in the study area.	Very high	113	80.1	172	81.1	285	80.7
	High	17	12.1	24	11.3	41	11.6
	Moderate	11	7.8	16	7.5	27	7.6
	Total	**141**	**100**	**212**	**100**	**353**	**100**

Source: Field survey of the study area (2024)

4.3 Forest Land Cover Changes in Relation with Population Resettlement

Under this section data obtained from different sources through questionnaires,

interviews, document records and satellite images on the forest land cover changes in relation with population resettlement were analysed, discussed and interpreted.

The transformation of forested lands by human actions represents one of the great forces in global environmental change and one of the great drivers of forest loss. The impact of people has been and continues to be heavy. Forests are cleared, degraded and fragmented by timber harvest, conversion to agriculture, road-building, human-caused fire, and in countless other ways.

Similar to the remote sensing data, in order to show the occurrence of forestland covers changes in relation to population resettlement majority about (74.5%) and (80.2%) of the native and resettlers people are replied that there was forestland cover changes in relation to population resettlement, while (25.5%) and (19.8%) of them responded that they did not observe any significant impacts of migration on the forestland cover changes in the study area (Table 4.6). The result showed that there was significant forestland covers changes in relation to population resettlement in the study area. The result in line with study of Tesfaye (2004) in his study stated that, a sizable proportion of the forest cover had been lost due to the continuous process of migration and resettlement in eastern Wallaga.

As stated by FGDs and KIIs reveals that agricultural land expansion, resettlements and wood extractions were among major proximate drivers causing LULC changes in the study area. The increase in population for of resettlement in the region increased the demand for farm plots, firewood and charcoal production, construction materials and settlement areas have resulted in changing the land use/cover of the area.

According to personal observation in the field most of the LULC in general and forest cover changes in particular were facing a great challenge from resettlement program followed by expansion of farmland, forest fire, illegal logging, charcoal and fuel wood extraction has largely contributed to the decline of forests in the study area.

Pertaining to the trends of forest land cover changes in the study area majority about (80.1%) and (81.1%) of the native and resettlers people respectively reported that the trends of forest land cover changes was very high, while about (12.1%) and (11.3%) of the respondents agreed on high and the remaining (7.8%) and (7.5%) said that the

trends of forest land cover changes low in the study area (Table 4.6).The result showed that the majority of the people perceived the trends of forest cover decline was very high in the study area.These findings are supported by results from satellite imagery interpretation that shows a decrease in forest cover from (48.7% in 1986 to 33.0% in 2023) and an increase in farmland and settlement between 1986 and 2023.

According to data obtained from FGDs and Key informants, interviews confirmed that the decrease in the trend of the forest cover is associated with the farmland expansion by resettlers that forced families to extract locally available resources (forest resources). Similarly, the rise in population growth caused the division of forestland and other shrub lands' maximum production, which is consistent with the study by Tamrat (2010) argued that large cleared and vegetation areas by resettlers to be used for agriculture are common observable phenomenon in Abobo resettlement area; due to this, the natural vegetation cover of the study area is shrinking from time to time.

Table 4.7: Forest Land Cover Changes in Relation with Population Resettlement.

Variables	**Categories**	**Natives**		**Resettlers**		**Total**	
		N=141		**N=212**		**N=353**	
		N	**%**	**N**	**%**	**N**	**%**
Occurrence of forestland cover changes in relation to population resettlement.	Yes	105	74.5	170	80.2	275	77.9
	No	36	25.5	42	19.8	78	22.1
	Total	**141**	**100**	**212**	**100**	**353**	**100**
The trends of forestland cover changes in the study area	Very high	113	80.1	172	81.1	285	80.7
	High	17	12.1	24	11.3	41	11.6
	Low	11	7.8	16	7.5	27	7.6
	Total	**141**	**100**	**212**	**100**	**353**	**100**

Source: Field survey of the study area (2024)

4.3.1 Drivers of Forest Cover Changes in Relation with Population Resettlement

Similar to the remote sensing data, pertaining to the main proximate drivers of forest cover changes majority about (49.6%) and (53.8%) of the native and resettlers people respectively said commercial agricultural expansion, while about (31.9%) and (30.2%)

of the respondents agreed on population growth, (11.3%) and (9.9%) of the respondents replied fuel wood extractions and the remaining (7.1%) and (6.1%) said that infrastructural development the main proximate drivers of forest cover changes in the study area (Table 4.8).

The survey results were shown that commercial agricultural expansion and population growth are the main proximate drivers of forest cover changes in the study area in relation with population resettlement. These major factors were commonly reported in many studies conducted in Ethiopia and elsewhere (Messay and Bekure, 2011; Yonas et al., 2013 and Oshore, 2015).

As stated by FGDs and KIIs reveals that commercial agricultural land expansion, population growth and wood extractions were among major proximate drivers causing forest cover changes in the study area. The increase in population for of resettlement in the region increased the demand for farm plots, firewood and charcoal production, construction materials and settlement areas have resulted in changing the land use/cover of the area.

According to personal observation in the field most of the LULC in general and forest cover changes in particular were facing a great challenge from resettlement program followed by expansion of farmland, forest fire, illegal logging, charcoal and fuel wood extraction has largely contributed to the decline of forests in the study area.

In order to show the main underlying drivers of forest cover changes presented in table 4.8 below majority about (66%) and (65.6%) of the native and resettlers respondents said weak law enforcement, whereas (22%) and (21.2%) of the respondents agreed on land scarcity and the remaining about (12%) and (13.2%) said poverty as the main underlying drivers of forest cover changes in the study area. The result of this study showed that weak law enforcement and land scarcity the main underlying drivers of forest cover changes in the study area in relation with population resettlement. The result in line with study of OFWE et al., (2015) reported that weak law enforcement and population growth are underlying drivers of forest cover changes in the Bale Mountain Eco-Region of Ethiopia.

The analysis of satellite imagery and household survey data reveals that population

resettlement is a significant driver of forest cover change in Nensebo Woreda. Following the implementation of the government-led resettlement program in the early 2000s, forested areas near newly established settlements experienced substantial degradation. Between 2000 and 2020, forest cover declined by more than 35%, particularly in lowland and mid-altitude zones, where land was cleared for housing, crop farming, and fuelwood collection (Gebrewold et al., 2020; EFCCC, 2020). Spatial analysis confirms that areas within a 5–10 km radius of resettlement clusters showed the highest rates of deforestation, indicating a strong spatial link between resettlement and forest loss.

The major land use/land cover transitions observed include:

- Forest to cultivated land (due to agricultural expansion)
- Forest to shrubland or grassland (from overharvesting and land degradation)
- Forest to settlement/built-up areas (from infrastructure and housing expansion)

These transitions highlight the intense pressure on forest ecosystems from both subsistence agriculture and population growth.

The patterns of forest cover change vary significantly across the study area. Northern and north-eastern zones of the woreda, which host a higher concentration of resettled populations, experienced the most pronounced deforestation. In contrast, southern and central highland areas retained more forest cover, partly due to topographic inaccessibility and the presence of community-based conservation efforts, including Participatory Forest Management (PFM) initiatives (Yonas et al., 2017; Lemenih & Kassa, 2014).

This spatial heterogeneity underscores the importance of context-specific interventions. While resettlement plays a major role, forest change is also influenced by proximity to roads, land suitability for farming, and local enforcement capacity.

Table 4.8: Major Proximate and Underlying Drivers of Forest Cover Changes.

Main Drivers	Specific Drivers	Natives	Resettlers	Total
		N=141	N=212	N=353

		N	%	N	%	N	%
The proximate drivers of forest cover changes	Commercial agricultural expansion	70	49.6	114	53.8	184	52.1
	Infrastructural development	10	7.1	13	6.1	23	6.5
	Fuel wood extractions	16	11.3	21	9.9	37	10.5
	Population growth	45	31.9	64	30.2	109	30.8
	Total	**141**	**100**	**212**	**100**	**353**	**100**
The underlying drivers of forest cover changes	Poverty	17	12	28	13.2	45	12.7
	Land Scarcity	31	22	45	21.2	76	21.5
	Weak law enforcement	93	66	139	65.6	232	65.7
	Total	**141**	**100**	**212**	**100**	**353**	**100**

Source: Field survey of the study area (2024)

4.3.2 Methods of Forest Cover Exploitation Practiced by Households

The methods of forest cover exploitation as presented in Table 4.9 showed that majority about (80.1%) and (81.1%) of the native and resettlers respondents gathering and cutting down trees, whereas, (12.1 %) and (11.3%) of the respondents were used fire for the preparation of their land for cultivated different crops and the remaining (7.8%) and (7.5%) of the respondents said that they were cultivating between trees. The result showed that hand clearing (cutting) is the major means for the of forest resource exploitation in the study area.

Similarly, interviewee and FGD participants believed that major ways of forest exploitation were cutting down trees and gathering for the purpose of house construction, expansion of farm land and fuel wood contribute to loss the forest cover in the study area.

Table 4.9: Methods of Forest Cover Exploitation Practiced by Households.

Variables	Categories	Natives	Resettlers	Total
		N=141	N=212	N=353

		N	%	N	%	N	%
Methods of forest cover exploitation practiced by households.	Fire	17	12.1	24	11.3	41	11.6
	Hand clearing (cutting)	113	80.1	172	81.1	285	80.7
	Cultivation between trees	11	7.8	16	7.5	27	7.6
	Total	**141**	**100**	**212**	**100**	**353**	**100**

Source: Field survey of the study area (2024)

4.3.3 LULC Categories and Their Description in Nensabo Woreda, Ethiopia

Four years' sequential satellite images namely Land sat (5TM 1986, 2003, 2013 and land sat 8 of OLI 2023) were used in this study to classify LULC types of the study area. Hence, six major LULC types namely (cropland, forest, grassland, settlement, shrub/woodland) and bare land cover were identified and mapped. The detail description of these land use/cover categories of the area are presented as follows in (Table 4.10).

Table 4.10: Description of LU/LC Types Identified in the Study Area.

No	LULC Classes	Class Name Description
1	Cropland	Contagious areas used for rain fed and irrigated cultivation including fallow plots, cultivated land mixed with some bushes, trees and rural.
2	Forest land	Areas covered by trees both natural and planted, forming closed canopies which are relatively tall and dense **(FAO 2010).**
3	Grassland	The land is dominated by grasses, forbs, and herbs with nil or little proportion of shrubs.
4	Settlement	Land covered with settlement areas in rural or urban places.
5	Shrub/woodland	Areas covered by small trees, bushes, and shrubs mixed with grasses; less than forests.
6	Bare Land	Areas with little or no vegetation cover consist of exposed soil and/or rock outcrops and quarries

Source :EMA

4.3.4 Analysis of Land Use and Land Cover Types of Study Area from 1986-2023

The results of the image classification revealed that during the study period (1986–2023) Six land use/land cover classes namely; Bare land, Cropland, Forest, Grassland, Settlement and Shrub land were identified in Nensebo Woreda. The distribution of LULCC over 37 years presented as follows in (Table 4.11).

The land use land cover classification for 1986 from Land Sat TM image showed that, forest land, accounted for the largest part 798.7 km^2 (48.7%), cropland, 394.2 km^2 (24%), grassland 162.2 km^2 (9.9%), settlement 4.6km^2 (0.3%), shrub land 253.5 km^2 (15.4%), and bare land 28.4 km^2 (1.7%) (Fig. 1 and Table 4.11).

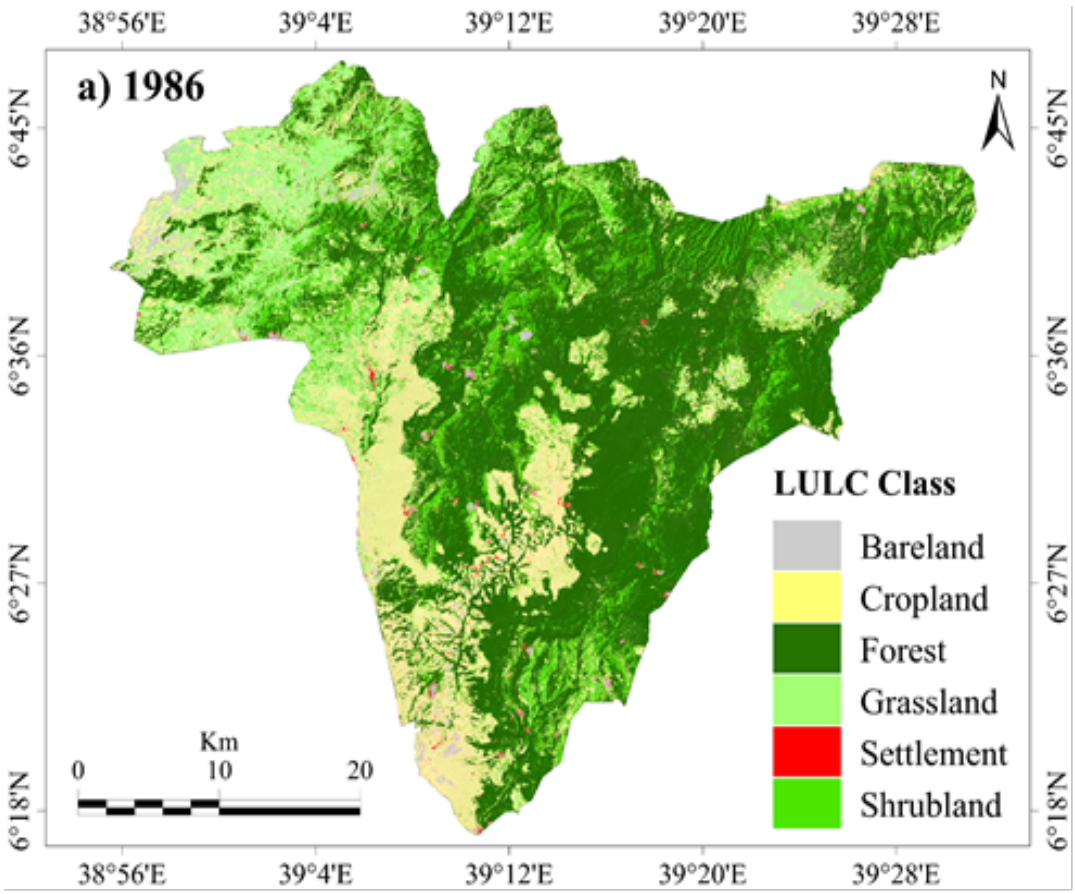


Figure 4.1: Spatial-Temporal Distribution of LULC Map of Nensabo Woreda in 1986

In 2003 (Fig 2) Forest land were also accounted for the largest part 789.4km^2 (48.1%), Cropland, 512.3 km^2 (31.2%), grassland 85.1 km^2 (5.2%), settlement 10.9km^2 (0.7%), shrub land 224.6 km^2 (13.7%), and bare land 19.3 km^2 (1.2%) (Fig. 2 and Table 4.11).

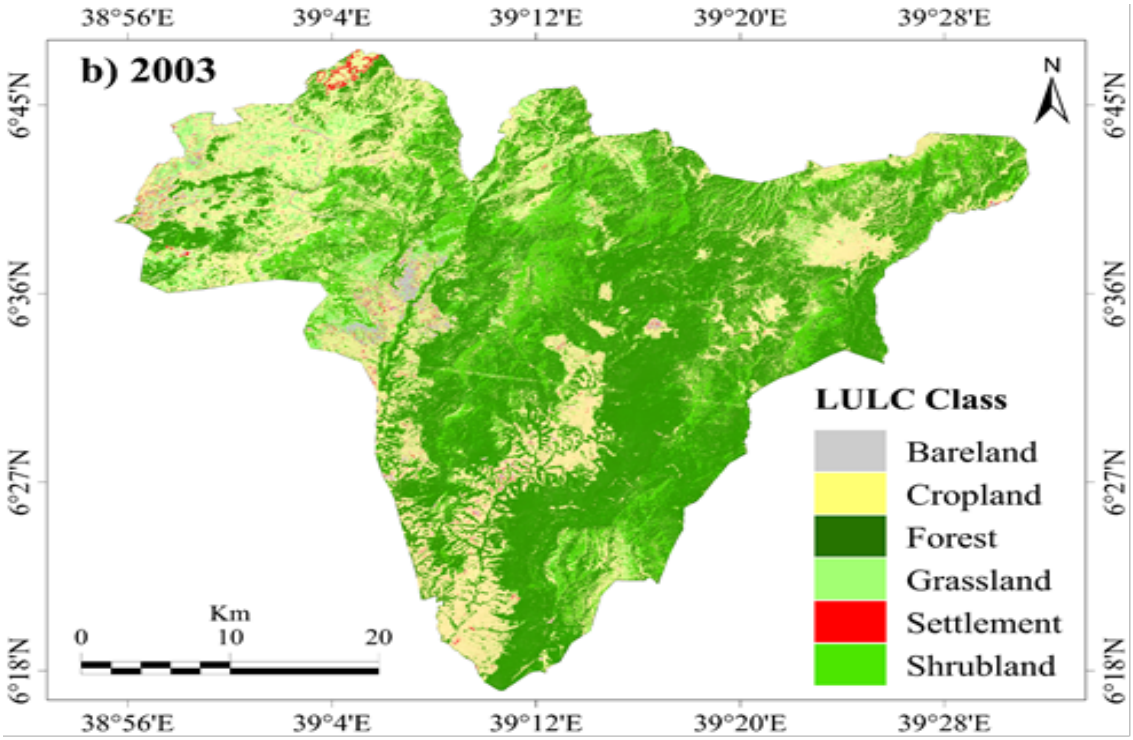


Figure 4.2: Spatial-Temporal Distribution of LULC Map of Nensabo Woreda in 2003

In the third study period (2013) crop land were accounted for the largest part 656.3km^2 (40%), followed by forestland 638.9km^2 (38.9%), grassland 87.2km^2 (5.3%), settlement 60.4km^2 (3.7%), shrub land 191.0km^2 (11.6%), and bare land 7.7 km^2 (0.5%) (Fig. 3 and Table 4.11).

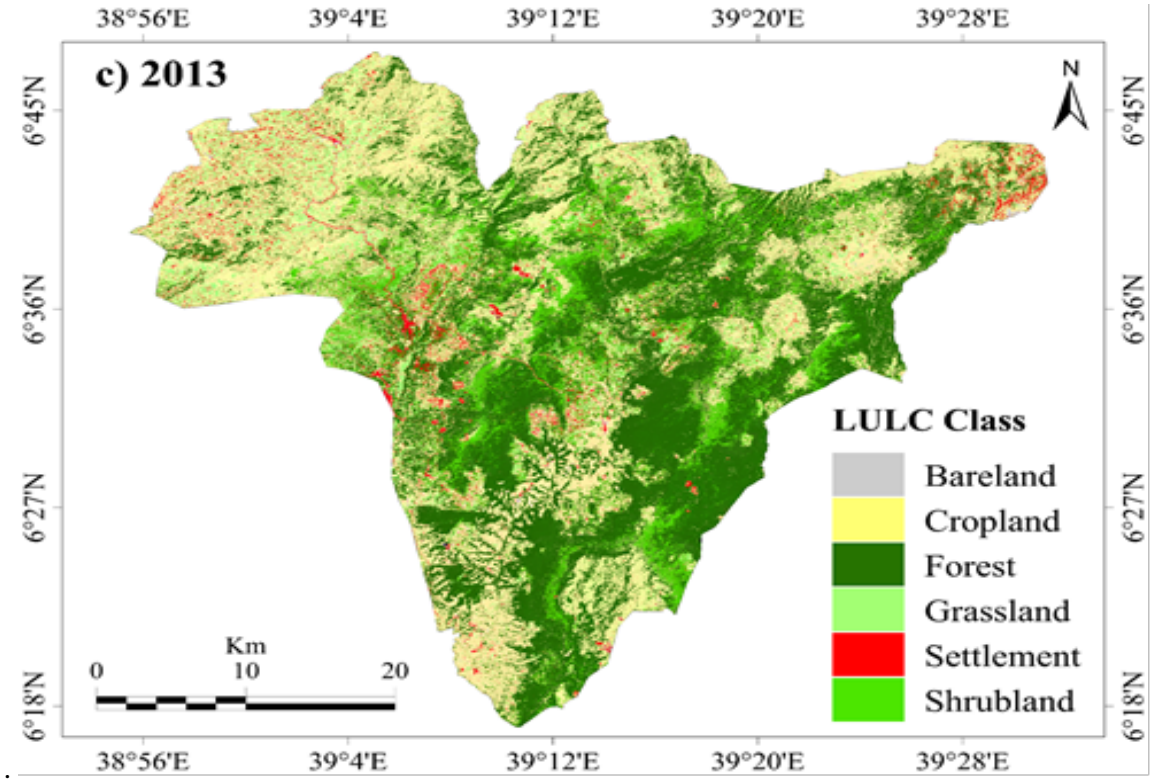


Figure 4.3: Spatial-Temporal Distribution of LULC Map of Nensabo Woreda in 2013

During the study period (2023) about 44.7%(733.3 km^2) of the study area was covered by croplands, followed by forestland 541.4km^2(33.0%), grassland 106.9km^2 (6.5%), Settlement 141.9km^2 (8.6%), shrub land 92.8 km^2 (11.6%), and bare land 25.2km^2 (1.5%) (Fig. 4 and Table 4.11)

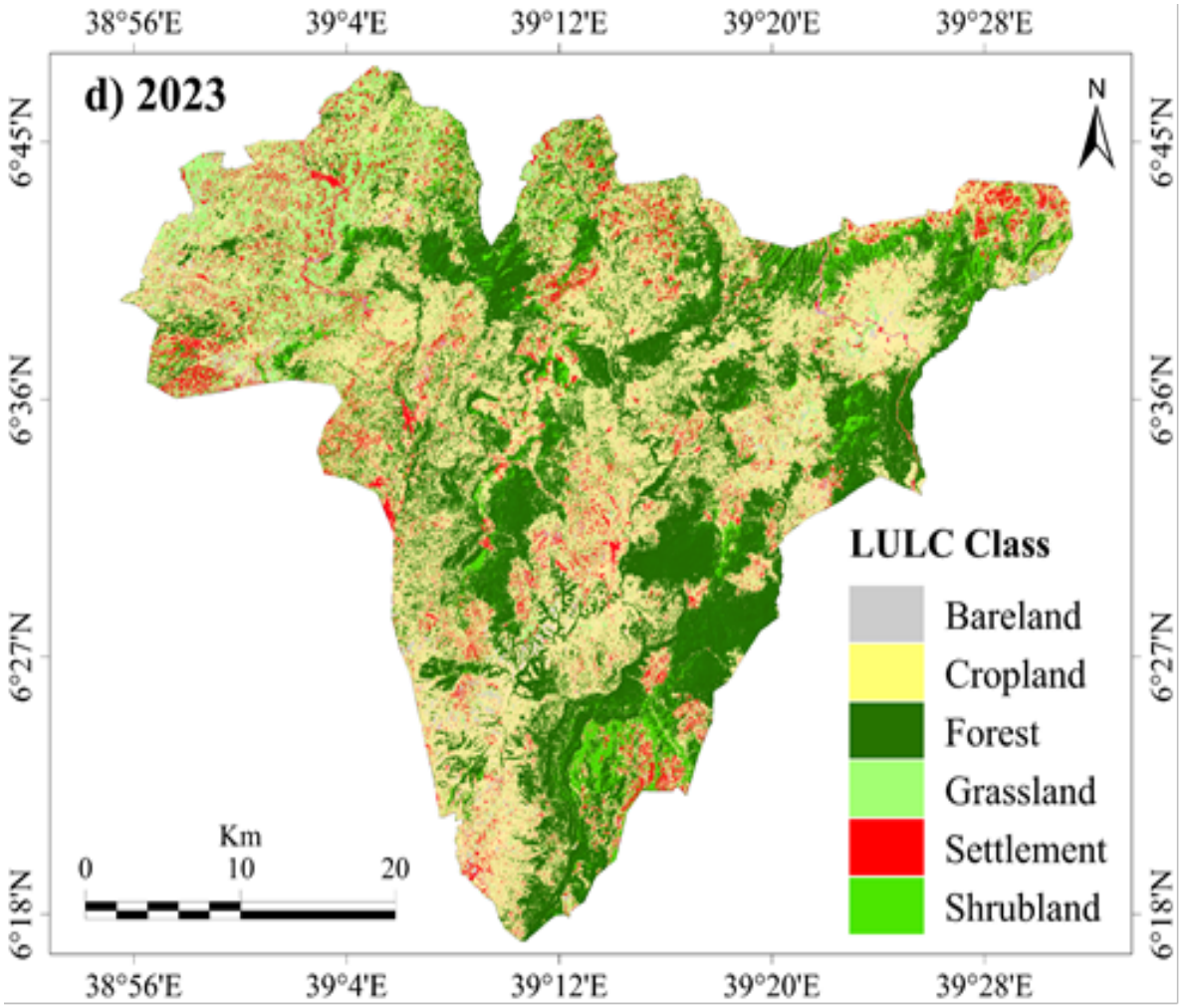


Figure 4.4: Spatial-Temporal Distribution of LULC Map of Nensabo Woreda in 2023

Table 4.11. Statistics On LULC Class by Area (Km^2) and Percentage (%)

LULC Class	1986	2003	2013	2023

	Km^2	%	Km^2	%	Km^2	%	Km^2	%
Bare land	28.4	1.7	19.3	1.2	7.7	0.5	25.2	1.5
Cropland	394.2	24.0	512.3	31.2	656.3	40.0	733.3	44.7
Forest	798.7	48.7	789.4	48.1	638.9	38.9	541.4	33.0
Grassland	162.2	9.9	85.1	5.2	87.2	5.3	106.9	6.5
Settlement	4.6	0.3	10.9	0.7	60.4	3.7	141.9	8.6
Shrub land	253.5	15.4	224.6	13.7	191.0	11.6	92.8	5.7
Total	**1641.4**	**100**	**1641.4**	**100.0**	**1641.4**	**100**	**1641.4**	**100**

Overall, based on the current LULC change study a considerable decline happened in the forestland, grassland and shrub land area. While, the cropland, and settlement area showed continuous increase. The distribution of LULCC over 37 years presented as follows in (Table 4.11).

According to data obtained from FGDs and Key informants, interviews confirmed that the most dominant LULC class of study area before the resettlement held was forest and grass land. but through time the coverage of both forest and grass land decreased as result of growing demand of land for different purpose. The main influencing factor for the change in 2000 was the state sponsored resettlement program implemented in the district. Concurrently, the increased number of populations in the district resulted in high demand for expansion of cropland. Such conversion of forestland into crop production in relation to government and policy changes resulted in the reduction of ecosystem services of forests. This is in line with (Zemenu et al., 2016) argued that resettlement affected the LULCC in Abobo Woreda in relation with state sponsored resettlement program implemented in the

district.

4.3.5 Analysis of Land Use/Land Cover Change Conversions Matrix

The LULC change matrix depicts the direction of change and the land use type that has not changed between 1986-2023. In all change matrixes, gain for each category is calculated as column total minus diagonal values; while, loss for each category is calculated as row total minus diagonal values. Whereas, OP: overall persistence (i.e., the sum of the diagonals denotes the proportion of unchanged classes account for the total area).

Generally, findings of LULC conversion matrix analysis of 37 years from 1986 to 2023 of the study are shows that the largest area of about (29.7%) of forests, (16.1%) of shrub land and (10%) of grasslands were converted to the farmland with an estimated total area of (55.7%) between 1986 and 2023 as shown in (Table 4.12,13,14). This indicates farmland experienced the highest area gain, whereas forest and shrub/woodland experienced the highest area loss during the study period. The result in line with study of Haile Mariam, et al. [2016], found a substantial increase in farmland and a decrease in forest and woodland over four decades in the Bale Mountain Eco-Region of Ethiopia during 1985 to 2015.

Table 4.12: Extents of Spatial Changes in LULC in The 1986–2003 Period (%)

	LULC Class	**1986**						
		Bare land	Cropland	Forest	Grassland	Settlement	Shrubland	**Loss**
Land Cover 2003	Bare land	***0.2***	1.0	0.1	0.2	0.1	0.1	**1.6**
	Cropland	0.7	***13.4***	6.3	1.4	0.4	1.9	**10.6**
	Forest	0.0	5.8	***38.2***	0.5	0.0	4.1	**10.5**
	Grassland	0.2	5.6	0.6	***1.9***	0.2	1.4	**7.9**
	Settlement	0.0	0.1	0.1	0.0	***0.0***	0.0	**0.3**
	Shrubland	0.0	5.3	2.8	1.1	0.0	***6.2***	**9.3**
	OP							***59.9***
	Gain	**1.0**	**17.8**	**9.9**	**3.3**	**0.7**	**7.5**	

Table 4.13: Extents of Spatial Changes in LULC in The 2003–2013 Period (%).

	LULC Class	**2003**						
		Bare land	Cropland	Forest	Grassland	Settlement	Shrubland	**Loss**
Land Cover 2013	Bare land	***0.1***	0.6	0.1	0.1	0.2	0.1	**1.6**
	Cropland	0.2	***20.0***	4.9	2.4	1.6	2.1	**10.6**
	Forest	0.0	11.4	***30.8***	0.7	0.9	4.2	**10.5**
	Grassland	0.0	2.4	0.4	***1.1***	0.4	0.8	**7.9**
	Settlement	0.0	0.4	0.0	0.1	***0.1***	0.0	**0.3**
	Shrub land	0.0	5.1	2.7	1.0	0.5	***4.4***	**9.3**
	OP							***59.9***
	Gain	**0.4**	**20.0**	**8.1**	**4.2**	**3.6**	**7.3**	

Table 4.14: Extents of Spatial Changes in LULC in The 2013–2023 Period (%).

	LULC Class	**2013**						
		Bare land	Cropland	Forest	Grassland	Settlement	Shrub land	**Loss**
L	Bare land	***0.1***	0.1	0.0	0.1	0.1	0.0	**0.4**

	Cropland	1.0	*22.5*	4.6	4.4	4.6	2.8	**17.5**
	Forest	0.0	12.5	*24.6*	0.1	0.6	1.1	**14.3**
	Grassland	0.2	2.0	0.1	*1.5*	1.3	0.1	**3.8**
	Settlement	0.1	1.9	0.4	0.2	*0.9*	0.3	**2.8**
	Shrubland	0.1	5.7	3.3	0.2	1.1	*1.4*	**10.3**
	OP							*51*
	Gain	**1.4**	**22.2**	**8.3**	**5.0**	**7.8**	**4.3**	

4.4 Possible Options for Futures Sustainable Forest Management

Resource conservation and rehabilitation in Ethiopia in general is very limited as compared to its loss and degradation (Berhanu,2007). The removal of trees without sufficient reforestation has resulted in damage to habitat, biodiversity loss and aridity and deforested regions often degrade into wasteland (Tigabu, 2016). Thus wise use of forest resources is crucial for sustainability of the forest and trees should be replaced by planting seedlings.

In order to show the mechanisms of forest conservation as presented in Table 4.15 Most of the respondents (74.5%) and (80.2.5%) of the native and resettlers were mentioned that they did not engage implementation of forest conservation practice and the rest of the respondents about (25.5%) and (19.8%) was implemented forest conservation around farmlands and homesteads left for different purposes which could substitute the wood products from the natural forest. The result of the study shows that there are no conservation measures initiated in the area. This is in line with Teshome et al. (2011) reported that in the resettlement areas of Metema and Quara districts, in general, natural resource degradation was moving at an alarming rate, resettlers' total level of participation in natural forest protection and tree planting was found to be at low level because of lack of awareness.

According to data obtained from FGDs and Key informants, interviews confirmed

that implementation of conservation practices to control forest deforestation relatively were low in the study area**.** Therefore, it has significant adverse effect on the environment and sustainable development of the area. However, deforestation is much higher than replanting trees in the area. So special care should be in place to ensure the sustainability of the environment. The result in line with study of Amare et al. (2013) parallel to rapid population growth and low socio-economic development forest cover decreased. Therefore, the forest cover of Ethiopia which was 40% at the beginning of 20^{thc} has declined to 3% at the present.

In the survey, it was also attempted to assess options for futures sustainable forest management about (39.1%) and (37.7%) of the native and resettlers people respectively said that participatory forest management,(29.1%) and (31.6%) replied providing environmental education,(14.2%) and (11.8%) said that afforestation and reforestation program,whereas about (9.2%) and (11.3%) the sampled households said setting strong laws and follow up and the remaining (11.3%) and (9.9%) said that practicing agro-forestry was the method for futures sustainable forest management in the study area (Table 4.15). The result of the study shows that participatory forest management and providing environmental education the main suggested options for futures sustainable forest management in the study area.

The result in line with study of Bishaw (2001), to overcome driving factors of forest cover change in Ethiopia including deforestation and forest degradation to manage forest on a sustainable basis and to ensure healthy ecosystems, participatory forest management and providing environmental education are proposed.

According to data obtained from FGDs and Key informants, interviews confirmed that due attention should be given to slow down the ever increasing depletion of the woodland in the short run and to reverse the ecological degradation in the long run so as to ensure sustainable utilization and development of natural resources. These are implementation of agro forestry and social forestry in the rural areas where subsistence farming is practiced; expansion of plantation forestry both industrial and non-industrial on currently uncultivated and sloping lands; conservation of the remaining natural forests to conserve species and biodiversity; to revise social, economic and investment policies of the country and training and research capacity

building and reinforcement.

Table 4.15: Perceived Possible Options for Futures Sustainable Forest Management.

Variables	Categories	Natives		Resettlers		Total	
		N=141		N=212		N=353	
		N	%	N	%	N	%
Implementation of forest conservation efforts	Yes	36	25.5	42	19.8	78	22.1
	No	105	74.5	170	80.2	275	77.9
	Total	**141**	**100**	**212**	**100**	**353**	**100**
Suggested options for futures sustainable forest management	Providing environmental education	41	29.1	67	31.6	108	30.6
	Setting strong laws and follow up	13	9.2	24	11.3	37	10.5
	Practicing Agro-forestry	11	7.8	16	7.5	27	7.6
	Afforestation and reforestation	20	14.2	25	11.8	45	12.7
	Participatory forest management(PFM)	56	39.1	80	37.7	136	38.5
	Total	**141**	**100**	**212**	**100**	**353**	**100**

Source: Field survey of the study area (202

Key strategies include implementing community-based forest management (CBFM), promoting agro forestry, and strengthening forest monitoring and enforcement mechanisms. Integrating traditional ecological knowledge with modern conservation practices and promoting alternative livelihoods can also reduce pressure on forest resources. (FAO, 2015).

Local communities can be empowered through participatory planning, capacity-building programs, and legal recognition of community land rights. Establishing local forest user groups and providing access to forest-related information and decision-making platforms enhances community engagement and ownership. . (Larson & Ribot, 2007).

Policy reforms should focus on decentralizing forest governance, ensuring equitable benefit-sharing, and incentivizing sustainable practices. Strengthening legal frameworks to recognize customary rights and incorporating community voices in forest management policies are crucial for long-term sustainability. (Meinzen-Dick et al., 2002).

Sustainable forest management (SFM) in Nensebo Woreda requires a multifaceted approach that integrates ecological preservation with community needs. Based on

the study's findings, the most effective strategies include:

- Expanding Participatory Forest Management (PFM) programs that legally recognize community user rights while mandating sustainable harvesting limits (Yonas et al., 2017).
- Promoting alternative livelihoods such as beekeeping, agroforestry, and eco-tourism to reduce dependence on direct forest extraction (Lemenih & Kassa, 2014).
- Providing access to renewable energy technologies (e.g., fuel-efficient stoves, biogas) to mitigate the reliance on biomass for fuel (EFCCC, 2020).

Empowering local communities is critical for long-term forest stewardship. Strategies include:

- Strengthening community institutions by offering training on forest management, recordkeeping, and conflict resolution (Tadesse et al., 2016).
- Ensuring inclusive decision-making, particularly involving women and youth in local forest committees.
- Implementing benefit-sharing mechanisms, where communities receive a portion of revenues generated from sustainable forest use or carbon offset programs like REDD+ (Lemenih & Kassa, 2014).

Several policy changes are essential to support these strategies:

- Revising the land and forest tenure system to provide legal recognition of customary forest use rights.
- Enhancing inter-sectoral coordination between environmental authorities, resettlement planners, and local governments to prevent forest loss near resettlement sites (Pankhurst & Piguet, 2009).
- Allocating public investment for long-term monitoring, community forest initiatives, and reforestation programs. By aligning ecological priorities with local socio-economic realities, these strategies and policy reforms can advance both forest conservation and community well-being.

CHAPTER FIVE

5. CONCLUSIONS AND RECOMMENDATIONS

5.1 CONCLUSION

Ethiopia has a long history of practicing population resettlement either spontaneously or in a planned way to overcome the problem of chronic food insecurity in the country. On top of this, this study analyzed the effect of resettlement program on forest resources in the Nensabo Woreda, West Arsi Zone of Oromia Regional State.From the overall research findings, some important

conclusions can be drawn. Remote sensing has an outstanding value as an independent and objective source of information on LULCC.The results showed that Nensebo Woreda has undergone considerable forest cover change since population resettlement in the area. The results of this study revealed that the resettlement resulted in severe deforestation of Nensabo forest and rate of resettlement effect on forest resource exploitation was very high in the study area. The resettlers use the woodland product for firewood, charcoal, for construction and for preparing their farming tools. The results of this study showed that the rate of resettlement effect on forest resource exploitation was very high and there was significant forestland covers changes in relation to population resettlement in the study area. Due to this reason land use and land cover changes are accelerating from time to time as a result of resettlement**.** Results from the land use/land cover changes analysis shown that the study area has undergone a dynamic increase and reduction in LULC extent during the last 37 years. Accordingly, the area under forestland, shrub/woodland, grassland and bare land cover were declining continuously by 15.7%,9.7%, 3.4% and 0.2% respectively during the study period (1986–2023). On the other hand, cropland and settlement areas have increased dramatically by 20.7% and 8.3% % respectively over the study period. Forest cover change in the study area were attributed to a combination of drivers (proximate and underlying causes). This study also identified the major proximate driving forces of forest cover change in the study area are commercial agricultural expansion, infrastructural development, fuel wood extractions and population growth. On the other hand, the major underlying driving forces are land scarcity, illegal settlement expansion; poverty and weak law enforcement were identified by the key informant and focus group discussants of this study. Moreover, the study disclosed there are no conservation measures initiated in the area. Thus, the need for participatory forest management and providing environmental education for the local people in the sustainable management of wood land resources is important to safeguard the dry forests. Thus, a study recommends strong institutional framework for enforcement of land use plans aimed at sustainably protecting of the fragile environments is very crucial to guide policy makers. Therefore, to ensure more dependable information regarding effects of resettlement on forest resource's; a further longitudinal research is mandatory, that covers wide areas of the Woreda.

The resettlement program in Nansabo Woreda moderately improved food security and access to basic services for relocated households (Desalegn, 2003; Teshome & Bayu, 2015). However, these gains came at the expense of forest degradation, loss of biodiversity, and land-use conflicts due to insufficient environmental planning and weak institutional oversight (Bekele, 2008; EFCCC, 2020). Forests were cleared for agriculture and settlements without proper sustainability measures in place.

Critical lessons include the need for environmental impact assessments prior to resettlement, better integration of local community input, and post-settlement

support systems such as extension services and land tenure security (Yonas et al., 2017). Additionally, the failure to coordinate with regional forest management bodies highlighted institutional gaps that undermined sustainability.

While specific to Nansabo Woreda, the findings reflect common patterns across resettlement

sites in Ethiopia—such as initial food security gains followed by long-term ecological strain (Pankhurst & Piguet, 2009). These insights are generalizable to other highland-forest areas in Ethiopia and countries with similar state-led internal resettlement schemes, provided socio-ecological contexts are comparable.

5.2 RECOMMENDATIONS

Depending on the results of this study the following recommendations are forwarded for policy development implications and future research directions to safeguarded the forest landscape in the study area:

- Resettlement and forest preserving are incompatible, so it is essential to take into account in planning and execution of future resettlements programs.
- The Woreda administrators and concerned bodies should not resettle people in forests for future possible resettlements.
- The wereda and the Kebeles administrators should to stop further illegal resettlers and farmland expansion in the study area. Because; these are the major cause of woodland degradation of the study area.
- The Woreda administrators in cooperation with responsible government authorities should struggle illegal farmland expansion.
- To decrease the degree of deforestation in the study area woreda administrative government should revise the forest land demarcation and monitor the effectiveness of sustainably.
- Promoting community to planting and use of trees like Eucalyptus as alternative for firewood and construction material to reduce burden of natural vegetation.
- Awareness raising activities should be conducted by the development agents and extension workers about conservation of forests, and proper utilization of other national resources in a sustainable and environmentally friendly manner.
- The local government has to create positive relationship with NGOs and other welfare associations in promoting active participation in forest conservation

methods and scale up participatory forest management

- Effective trade-off management requires integrated land-use planning, enforcing buffer zones, and implementing Participatory Forest Management (PFM) alongside resettlement.
- Coordination between resettlement authorities and environmental agencies is essential to avoid placing new settlements in ecologically sensitive areas.
- Providing secure land tenure, payment for ecosystem services (PES), access to alternative livelihoods, and benefit-sharing from forest resources can motivate local participation in conservation.
- Training and involving communities in forest monitoring also increase local stewardship and accountability.
- Effectiveness can be tracked through a community-based monitoring system, periodic forest cover assessments using remote sensing, and independent impact evaluations
- Involving local institutions and woreda-level stakeholders in data collection ensures both transparency and sustainability of monitoring practices.
- Finally, this research is limited to the effect of resettlement program on the forest resources and hence the other aspect of the settlers was not studied. Therefore, the study calls for further research in the area for other social, cultural, economic, political, and poverty alleviation areas in the woreda especially for the settlers.

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APPENDICES

Appendix I: Survey Questionnaires filled by Resettled and Native Households

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Dear Respondent!

The objective of this questionnaire is to collect data in order to assess **"Effects of Resettlement On the Forest Resources in Nensebo Woreda of West Arsi Zone, Oromiya Regional State"** for partial fulfillment of the requirement for successful completion of the Master's Degree in Geography and Environmental Studies from Meda Welabu University.

Therefore, you are kindly requested to sacrifice some of your time to fill the questionnaire objectively and provide accurate response to each of the items as much as possible. Please be sure that all the information provided in this questionnaire used for the research purpose only and treated with at most confidentiality.

Thank You Very Much for Your Cooperation!

General Direction:

A. It is not necessary to write your name on the questionnaire.
B. Please try to answer every question in accordance to the instruction provided.
C. For all closed-ended questions use circling the number of your choice.
D. For all open-ended questions, give your short and precise answer.

Part I: General Background Information of the Households.

1. Name of household head: _____
2. Gender of household head 1. Male 2. Female
3. Age of the household head (in years)
    1. 20-29 2. 30-39 3. 40-49 4. 50 above
4. What is the education level for the Household head? (Please circle)
    1. Single 2. Married 3. Divorced 4. Widowed
5. Total number of family members:
    1. <3 2. 4-6 3. 7-8 4. 9-10 5. Above 10
6. Religious Affiliation of the household heads:
    1. Muslim 2. Protestant 3. Orthodox Christian 4. Waqeffataa
7. To what Ethnic group do you belong?
    1. Oromo 2. Sidama 3. Amhara 4. If Others, specify _____
8. Educational level attained by household heads:
    1. Illiterate 2. Read and write 3. Primary 4. Secondary 5. Above Secondary

Part II. Questionnaire on Effect of Resettlement on Forest Resource.

9. Did you observe the effects resettlement on forest resources in your locality?
    1. Yes 2. No 3. I don't know
10. How does the resettlement influence the forest resource in your locality?
    1. Deforestation 2. Forest cover changes 3. Land use conflicts
11. What types of energy do you use for cooking and heating at home?
    1. Fuel wood 2. Charcoal 3. Crop residue 4. Kerosene 5. Cow dung
12. Where are the main sources of fuel wood energy for the household in the study area?
    1. From natural forest 2. Homestead 3. Communal forest
13. What was the level of deforestation in your locality?

1. Very high 2. High 3. Moderate 4. Low

Part III. Forest Land Cover Changes in Relation with Population Resettlement.

14. Did you observe the forestland cover changes in relation to population resettlement in your local area?

    1. Yes 2. No 3. I don't know

15. Based on your knowledge, what are the trends of forestland cover changes of the area?

    1. Very high 2. High 3. Moderate 4. Low

16. What are the major proximate causes of forest cover changes usually common in the study area? **(Multiple responses are possible).**

    1. Commercial agricultural expansion 3. Fuel wood extractions
    2. Infrastructural development 4. Population growth

17. What are the key underlying causes of land use/cover changes along each proximate driver? **(Multiple responses are possible).**

    1. Poverty 2. Land Scarcity 3. Weak policy enforcement

18. What are the main methods of forest cover exploitation usually common in the study area? (**Multiple responses are possible**).

    1. Fire 2. Hand clearing (cutting) 3. Cultivation between trees

Part IV. Possible Options for Futures Sustainable Forest Management.

19. Did you observe the implementation of forest conservation efforts in your local area?

    1. Yes 2. No 3. I don't know

20. What are the major suggested options for futures sustainable forest management in the study area? (**Multiple responses are possible**).

    1. Providing environmental education
    2. Setting strong laws and follow up
    3. Practicing Agro-forestry
    4. Afforestation and reforestation

5. Participatory forest management (PFM)

.

Appendix II: Semi-Structured Interview Prepared for Key Informants

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A. Key Informants Interview Guide for District Environment, Forest and Climate Change Authority Experts

Dear respondents, I am conducting research on **"Effects of Resettlement On the Forest Resources in Nensebo Woreda of West Arsi Zone, Oromiya Regional State"**

for partial fulfillment of the requirement for successful completion of the Master's Degree in Geography and Environmental Studies from Meda Welabu University.

I, therefore, kindly requested your active participation in this discussion for the realization of this study. Please be sure that all the information provided in this interview should be used for the research purpose only and treated confidentiality. You are not obliged to answer any interview question that you do not want to answer.

Would you like to participate in this study? Yes: _____ No: _____

1. What are the major causes for the forest cover changes in the study area?
2. What are underlying /root /causes of forest cover changes in your locality?
3. How do you rate the extent of land use/cover change in the study area?
4. How does resettlement impact the forest cover changes found in your locality?
5. What are the options for futures sustainable forest management local communities?

Thank You for Your Cooperation!

B. Key Informant Interview Checklist for Kebele Leaders and Development Worker Agents

1. What are the main drivers of the forest cover changes common to the study area?
2. What are underlying /root /causes the forest cover changes in your locality?
3. How do you rate the extent of the forest cover changes in the study area?
4. Did you observe the impacts of resettlement on forest cover changes in your local area?
5. What are the largely perceived impacts resettlement on forest cover changes on the local communities?

Thank You Very Much for Your Cooperation!

Appendix-III: FGDS Checklist for Native and Resettlers Elderly Peoples

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Dear respondents, I am conducting research on **"Effects of Resettlement On the Forest Resources in Nensebo Woreda of West Arsi Zone, Oromiya Regional State"** for partial fulfillment of the requirement for successful completion of the Master's Degree in Geography and Environmental Studies Meda Welabu University.

I, therefore, kindly requested your active participation in this discussion for the realization of this study. Please be sure that all the information provided in this interview should be used for the research purpose only and treated confidentiality.

FGD Guiding Questions

Administrative Unit: Region: _____Zone: _____Woreda: _____

FGD site/Village/:_____

Number of the participants: 1. Male_____2. Female_____

Date of the (FGD) _____Start time: _____End time: _____

1. What are the major drivers of land use/cover changes in your locality?
2. What are the underlying causes along each proximate driver?
3. How do you see the impact of resettlement on forest cover changes in your respective site?

4. What are the largely perceived impacts of resettlement on forest cover changes on the environment of the local communities?

Thank You Very Much for Your Cooperation!

Appendix-IV: Field Observation Checklist

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Investigator put a tick mark *(√)* if he observed facts about somebody/something at the space provided below: -

1. Land cover of the study area
2. Magnitude forest cover chang
3. Major drivers of forest cover changes in the a
4. What impact dose resettlement on the forest cover ch
5. Major environmental challenges of the LU/LC Changes in the s a