ASSESSMENT OF KEY DRIVERS OF DEFORESTATION AND LOCAL COMMUNITY'S PERCEPTION ON IMPACTS OF DEFORESTATION IN THE CASE OF SHABE SOMBO DISTRICT, JIMMA ZONE, SOUTH WEST ETHIOPIA

MSc. Thesis

By: Shambel Degaga

May, 2024

Jimma Ethiopia

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MSc Thesis

Submitted to the Department of Natural Resource Management, College of Agriculture and Veterinary Medicine, Jimma University in partial fulfillment of the requirements for the Degree of Master of Science in Natural Resource Management (Specialization in Forest and Nature Management)

By: Shambel Degaga Ido

Major Advisor: Dereje Bekele (PhD Scholars)

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I have incorporated the suggestion and modification given during the external thesis defense and got the approval of my advisors. Hence, I hereby kindly request the department to allow me to submit my thesis.

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Decision/suggestion of department graduate council (DGC)

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DECLARATION

I hereby declare that the thesis entitled “Assessment of Key Drivers of Deforestation and local Community's Perception on Impacts of Deforestation in the Case of Shabe Sombo District, Jimma Zone“ is my original work and has not been presented for a degree in any other University, and all sources of material used for this thesis have been duly acknowledged.

BIOGRAPHY

The author was born in serbo town, Kersa District, Jimma zone Oromia regional state, Ethiopia in 1990. He completed his elementary and secondary education Kersa District, Serbo elementary and secondary school and Jimma preparatory school respectively. After completing his secondary school, he attended BSc Degree in Natural Resource management at Mizan Tep University, college of Agriculture and Natural resource from December 2010 to June 2012. After graduation he was employed at Jimma Zone Agrcultural office and Oromia forest and wildlife enterprise Jimma Branch at different position as forest expert, forest department head and District manager. Soon after, he joined Jimma University College of Agriculture and Veterinary Medicine to follow his M.Sc. in Natural Resource Management (Specialization Forest and Nature Management).

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ABBREVIATIONS AND ACRONYMS

CSE:	Conservation Strategy of Ethiopia
FGD:	Focus group discussion
HHs:	Household
IPMS:	Improving productivity and marketing success
FAO:	Food and agriculture organization
KI:	Key informant
NGOs:	Non-governmental organizations
UNEP:	United Nations Environmental Program
WBISPP:	Woody Biomass Inventory and Strategic Planning Project.

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ABSTRACT

Deforestation is defined as a direct, human-induced conversion of forested land to non-forested land. There are several reasons why deforestation occurs: trees or derived charcoal can be sold as commodity and used by humans, while cleared land is used as pasture, farming, plantations of commodities and human settlement. Despite forest degradation could have an impact on populations" livelihoods and income generation activities through the reduction and loss of direct economic services . This study was aimed to assess key drivers of deforestation and community perception on the impact of deforestation in the case of Shabe sombo district, Jimma zone, south west Ethiopia. The study has been conducted in Shabe Sombo wereda located in Jimma zone, Oromia regional state. A cross-sectional study design was employed. The primary data were collected via questionnaire from 187 household heads selected through simple random sampling. Additionally, interview and FGDs were conducted with purposively selected individuals. Descriptive research method was employed to achieve these stated objectives. Socio-economic data on deforestation causes and impacts were collected via questionnaires, interviews, and focus groups. Quantitative analysis with SPSS examined questionnaire responses, while qualitative content analysis delved into interview and focus group discussions. Agricultural expansion. Settlement,over grazing and fuelwood collection were identified as Direct causes of deforestation while economic factors, policy and institutional factors, social factors, population growth, which was common across in as indirect causes of the deforestation in the study area. From the analysis of result suggestion as possible recommendation minimize of deforestation isDesign appropriate policies and strategies ,reforestation, Afforestation, Controlling Illegal cutting, and using alternative energy in the study area and other similar areas of the zone and the region at large.

Keyword: Deforestation, Direct and indirect cause, key drivers and community perception

1.INTRODUCTION

1.1. Background and justification

Deforestation is defined as a direct, human-induced conversion of forested land to non-forested land (UNFCC 2011). Forest degradation occurs when the ecosystem functions of the forest are degraded but where the area remains forested rather cleared FAO (2010). Deforestation is a conventional environmental challenge substantially affecting the resilience and distribution of forests across different boundaries. It is simply defined as the loss of tree cover usually as a result of forests being cleared for agriculture and other land uses (Gorte, and Sheikh, 2010). In different African countries, forests provide goods such as timber and other non-timber products (e.g. bamboo, chew stick, game) which help most communities to meet the requirements for rural economy (Ayanwuyi *et al.,* 2007).

Deforestation is primarily a concern for the developing countries including Ethiopia because of its negative consequences, which include the loss of biodiversity and the increase of greenhouse emission (Angelsen *et al.,* 1999). There are several reasons why deforestation occurs: trees or derived charcoal can be sold as commodity and used by humans, while cleared land is used as pasture, farming, plantations of commodities and human settlement (Alemu, 2017). Despite forest degradation could have an impact on populations‟ livelihoods and income generation activities through the reduction and loss of direct economic services (Muleta *et al.,* 2020).

Ethiopia is one of the countries endowed with ample natural resources but at the present time natural resources are under intense pressure and tribulation as a result of population growth coupled with weak economic development, destructive ways of utilization, recurrent drought and mismanagement of natural resources. Deforestation and degradation of forest resources are the major challenges facing the country's striving to sustainable socio economic development (Teketay, 2001) which manifested in land degradation, depletion of water resources, climate change, prolong dry season, crisis of biodiversity and decline of agricultural productivity (Srinivasan, 2014).

Ethiopia has well diversified forest resource that ranges from lowland scrubs to tropical rain forests (FAO, 2005). Apart from environmental values; forest in Ethiopia has immense economic and socio-cultural contributions: creation of job; generation of income; livelihood diversification;

combating poverty and food insecurity and source of energy (Fekadu, 2015). It is also important for timber production and tourism development (Feyera, 2007). Production of traditional medicines for human and livestock is the other special contribution forest in Ethiopia, especially in the rural areas. Since some decades of the past, the forest resource of the country fallen to rapid and exhaustive degradation of forest resources. The rapid population growth; increased crop cultivation in marginal areas and increased livestock grazing pressure; soil erosion and poor agricultural practices have resulted in wide speared and intense forest degradation (Badege 2001; Belay 2016; Feyera, 2007).

Exhaustive deforestation jointly with other factors has brought great consequence on the soil degradation and soil nutrients depletion which caused to sharp declining of agricultural productivity in Ethiopia. Soil erosion as a result of deforestation remains one of the most critical and far ranging environmental issues that affect the country. Related to this, studies have shown that Ethiopia has lost fertile top soil at an estimated rate of one billion cubic meters per year (Badege, 2001); which greatly affects agricultural productivity and production. In addition, loss of biodiversity, climate change, unexpected devastating flood and high runoff and shortage of wood for different purposes are the other adverse consequences of deforestation in Ethiopia (Fekadu, 2015 and Habtamu, *et al*, 2017).

There are different economic, demographic and socio-political factors that act as a root cause for degradation of forest resource in Ethiopia. Land use conversion from forest to agricultural land is the main factor of deforestation (Yechale and Solomon ,2011).The decline of forest capacity both at global and national level is a great problem that currently affect the livelihoods in different ways (Asfaw and Fekadu,2018). The same as in Shabe Sombo woredas, there was high rate of agricultural expansion , overgrazing, settlement, fuelwood collection, logging and land fragmentations. Study has not been conducted before on key drivers of deforestation and community perception on the impact of deforestation and has necessitated the qualitative and quantitative assessment of key drivers of deforestation and community perception on the impact of deforestation in the study areas.

Therefore, this study was focused on key drivers of deforestation, how the deforestation can affect socioeconomic and environment and what look like the community perception regarding to the impact of deforestation are important questions to be addressed in the study areas.

1.2. Statement of the Problem

The historic loss of forest is closely related to demographic expansion and conversion of forests to other land uses (UN.2005). Major direct causes of forest degradation brought on by humans include overharvesting of industrial wood, the expansion of agricultural land, the extraction of fuel wood and other forest products, and overgrazing. The indirect causes are economic factors, policy and institutional factors, social factors, population growth (UNEP, 2006). According to Robleds *et al.* (2008), at global level, land use changes and deforestation is estimated to account for 18.2% of greenhouse gas emissions. This accounts for 1.6 billion tons of carbon emissions annually.

The increasing pressure from a growing population and expanding agricultural activities in Ethiopia is inevitably leading to heightened utilization of forest resources. Consequently, various forms of unsustainable forest usage such as fires, encroachment, logging, cultivation, and urbanization are expected to occur in the foreseeable future, ultimately resulting in widespread forest depletion. Much of required land for agricultural expansion will come at the expense of forested areas (Mulugeta and Zenebe, 2011). Consequently, deforestation and forest degradation emerge as critical environmental challenges in Ethiopia, significantly contributing to declining agricultural productivity.

Ethiopia, primarily reliant on agriculture and renewable natural resources, faces challenges due to the absence of adequate forest management and benefit-sharing mechanisms. This has led forest-dependent communities to excessively exploit forest resources, leading to irreversible damage. The underlying causes of deforestation and degradation based on a framework analysis were identified as population growth, insecure land tenure, and poor law enforcement (Stern, 2006). The decline of forest capacity at the global and national level is a great problem that currently affects the livelihoods of people in different ways also reported by Asfaw and Fekadu (2018). The same as in Shabe Sombo Woreda, there was high rate of agricultural expansion observed, especially in mountainous area which leads to deforestation and sparsely diversified trees due to over population, logging, settlement, fuelwood collection, over grazing and charcoal production and land fragmentations. Study has not been conducted before on key drivers of deforestation and community perception on the impact of deforestation Shabe Sombo district and has necessitated the qualitative and quantitative assessment. of the Woreda.

Thus, it is important to identify drivers of deforestation and farmers perception on deforestation and its impacts in the study area. Additionally, understanding the local community's perception on deforestation and its is crucial, as their knowledge plays a vital role in mitigating deforestation rates. Therefore, this study aims to investigate the key drivers of deforestation and local community's perception of its impacts in the case of Shabe Sombo District, Jimma Zone, Southwest Ethiopia.

1.3. Objective

1.3.1. General objective

To investigate key drivers of deforestation and community perception on impact of deforestation in the case of Shabe sombo district, Jimma zone, south west Ethiopia

1.3.2. Specific objectives

- To identify the key drivers of deforestation in the study areas
- To identify the socioeconomic and environmental effects of deforestation
- To examine the farmers perception of deforestation in the study areas

1.4. Research question

1. What are the key drivers of deforestation in the study areas?
2. What are the socio-economic and environmental effects of deforestation?
3. What is the perception of the community regarding the impact of deforestation?

1.5. The Scope of the Study

The aim of the study was to find out and know keydrivers of deforestation and community perception on the impact of deforestation Shabe sombo district, Jimma zone, south west Ethiopia. Due to time, money, and labor constraints, it was too tedious and out of the reach to include all kebeles in the Woredas. Thus, the study was done on four kebeles from the rural area of the district. The scope of this study was also delimited to the problem related to key drivers of deforestation and community perception on impact of deforestation. In particular, the study was carried out as to shabe sombo district, south west Ethiopia. The topic at hand is much interesting in analyzing the key drivers of deforestation and perception of farmers on the impacts of deforestation on woody plant species diversity in study areas.

1.6. Significance of the Study

The study was provide valuable information about key drivers of deforestation and community perception of impact of deforestation. Environmental problems like deforestation and soil erosion are the major problems facing Ethiopia. The acquisition of these report sets also gives baseline information for drawing up overall woody plant species conservation policies or making sound conservation and management recommendations how to minimize deforestation. Therefore, by assessing farmers' perceptions of the problem of deforestation, the survey is hoped to provide a valuable source of information for all organizations claiming to have an interest in addressing the issue. Moreover, the information generated from this study is important for policy and decision-makers, communities, public and private sector plantation managers, development institutions, research and training organizations, and Non-Governmental Organizations (NGOs).

2. LITERATURE REVIEW

2.1 Concept and Definition of Deforestation

Deforestation is the conversion of forest to alternative permanent non-forest land such as agriculture, grazing and settlement. It is also defined as the process of by which forest areas are cut down, usually to make room for agricultural development or settlement .The reduction of trees prevents the consumption of carbon dioxide and pollutants from the air, affects soil conditions, groundwater and climate in the area" (Aviss and David, 2004). Deforestation defined broadly can include not only conversion to non-forest, but also degradation that reduces forest quality, density and structure of the trees, the ecological services supplied, the biomass of plants and animals, the species diversity and the genetic diversity (FAO, 2005).

Small holder agricultural expansion is a further cause of deforestation, although the extent of this remains controversial, especially in terms of the role of cyclical cultivation systems. In an often quoted meta-analysis of 152 sub-national case studies, Geist and Lambin (2002) concluded that, while shifting cultivation certainly played a role, it had been exaggerated as the sole direct driver of deforestation. Their study further questioned the role of population growth as a driver of deforestation except in terms of population dynamics, such as in-migration in connection with forest colonization (Kanninen, 2007). Instead, that pointed out the need to consider such factors as a long side several other local causes of deforestation, which are in turn, related to widely indirect economic and institutional drivers. Logging as a cause of deforestation refers to clear-cut or selective logging forest trees. This may be caused by both legal and illegal practices. World Bank data from 2006 found that illegal logging constituted as much as 80-90% of total forest production in some countries, and further indicated that illegal logging cuts across tropical countries, regardless of levels of economic development (World Bank, 2006).

As Skutsch (2008a) has pointed out, illegal logging may still be "governed" in the sense that it takes place as a result of rent-seeking and a lack of accountability and transparency. Logging is not therefore necessarily the result of an absence of governance but of poor governance. Logging as a cause of deforestation tends to be particularly prevalent in areas where regulations and forest tenure are not enforced, and where local forest rights are not secure (Kanninen, 2007). Infrastructure development is another issues often underestimated as a cause of deforestation. A

part from the effects that mining, hydropower construction and road development may have in terms of direct land clearing, infrastructure development typically serves as a trigger that provides access and opportunities for other forms of deforestation and degradation (Kanninen, 2007).

The total amount of carbon stored in forest biomass, deadwood, soils and litter amounts to almost 50% more than the carbon in the atmosphere (FAO, 2005). A recent study suggested that 18% of emissions from fossil fuels are currently recaptured by primary forests (Lewis, 2009). Emissions of Co2 from deforestation are primarily caused by the burning and clearing of tropical forests and their vegetation, as well as the burning of forest for fuel wood and the decomposition of trees harvested for lumber.

2.2 Deforestation in Ethiopia

Land degradation which manifested in Ethiopia in soil erosion, and nutrient depletion and deforestation are the most serious environmental problem to this country. A lot of literature indicated that during the past few decades, Ethiopia has experienced a massive environmental degradation due to population pressure, unwise use of natural recourse because of preference for short term benefits and over cultivation. But currently this environmental degradation that is deforestation and soil erosion are increasing alarmingly due to population pressure that has been growing at a faster rate. As a result of this circumstance, the environment is reaching to the level of irrecoverable stage (Biell *et al.,* 2001; Gedion, 2003).

Forest have a multiple benefits to human kind since they are source of food, medicine, fuel, lumber, paper and living for variety of life form. In addition to this, they help to protect soil erosion and are grazing for livestock during the dry season. Beyond this, forests play a big role in regulating climate change by taking in carbon dioxide. In the context of our country forest are extensively used for construction purpose and as source of energy for 85 percent of the population who live in rural area. In Ethiopia deforestation has been a continuous process but what is special is that its rate and extent is much higher today than in the past. The main causes for this problem to happen is the combined force of poverty, population growth, the rugged topography of the environment and poor economic growth(Demel, 2003and 2005).

2.3 Extent of Deforestation in Ethiopia

As to the extent of deforestation, there is not vivid and commonly agreed explanation since several authors reported differently. Goreki and Tesfaye, (1993) have cited that an estimated 200,000 hectares of forest and woodland are destroyed each year in the southern area of Ethiopia through clearing for cultivation, commercial purposes and for fire. Another study also revealed that deforestation in the southern highlands of the country was severe and attained alarming rate in which it destroys 75,000 hectares per year (Demel *et al.*, 2003, both in Gedion, 2003). They argued that, although there are ongoing controversies about the extent of past forest cover in Ethiopia, there seems consensus in the fact that high forest might have once covered a large proportion of the land mass of Ethiopia. But today the surface cover remains is only with 2.7%.

This increasing rate and extent of deforestation is more common in the southwest part of Ethiopia particularly in Jimma, Wellega and Illubaborareas (Alicia, 2008; Demel, 2005). Moreover, Goreki and Tesfaye, (1993) pointed out that in Sothern Ethiopia only about 0.6% of the total area is now forested. The extent of deforestation another study also showed that between 1990 and 2005 the country actually lost 14% percent or 21,000km) of its forest, which means that deforestation increased by 10.4% from 1990 to 2005.

2.4 Drivers Of Deforestation In Ethiopia

Farm land expansion, forest fire, fuel wood or charcoal production and unsustainable wood harvesting for construction are the main causes of forest area loss in Ethiopia (Bekele et al.,2015) Currently in Ethiopia, the natural vegetation is highly affected by several factors such as, agricultural expansion, settlement, deforestation, land degradation, and increment in invasive species occurrence and logging practice which seriously damages the structure and composition of natural woody plant species and leading to the declining of forest biodiversity and agricultural yield in Ethiopia (Mohammed, 2011; Khumalo et al., 2012; Ariti et al., 2015; Gashaw and Dinkayoh, 2015; Bessie et al., 2016; Negasi et al., 2018) .

According to Stern (2006) the underlying causes of deforestation and degradation based on a framework analysis were identified as population growth, insecure land tenure, and poor law enforcement. The decline of forest capacity at the global and national level is a great problem that currently affects the livelihoods of people in different ways also reported by Asfaw and Fekadu (2018). Geographic properties, socio-polotical change, population growth, insecurity

land tenure,agricultural development and improving transport capacities are the main drivers of deforestation in Ethiopia (Gessesse Dessie, 2007). Agricultural expansion,development activities including road networks and megadevelopment projects such as hydroelectric dams, population growth, government settlement programs relocating peoples to forest areas, increasing extraction of wood and other products, forest fire, overgrazing and poor incentives for local communities for sustainable forest use and weak forest protection are the main drivers of forest cover change in Ethiopia (FDRE,2011).

2.5 Direct and Indirect Causes of Deforestation

The causes for deforestation accompanied by the loss of biodiversity can be explained on two different levels: the local level and the global one. The local level includes destruction of forests caused by local inhabitants. The rural poor living around forests heavily depend on biodiversity to satisfy their basic needs such as food, water, housing and social services. The economic dependency of the people on the forest, which offers firewood, and area that can be converted to agricultural land is one of the main reasons for deforestation. The global level of deforestation is formed by the worldwide demand for natural resources (e.g. timber, soil, gas, oil). In this context mining and industrial digging cause high damage to forests. Another aspect that has a negative impact on the ecological value of forests is conventional tourism.

According to the United Nations, “waste treatment and disposal are often major, long-term environmental problems in the tourism industry” of concerned countries (UNEP, 2006). Extensive conversion of forest land for agriculture started with the beginning of agricultural activity in the highlands of Ethiopia around 5000 years BP (Anonymous, 2010). The early development of agriculture in this area is attributed to the favourable climatic and ecological conditions, sufficient rainfall, moderate temperature and well-developed soils (Hurni, 1993).

As the human population increased, the demand for arable land was inevitable and, gradually, agricultural activity started to dominate vast areas from gentle slope to the steeper slopes of the high mountains. The conversion of land to agriculture had also extended into the flat swampy plains of the plateau. Hence, through several millennia, vast areas of forest land were converted to agricultural lands. Moreover, through the influence of humans, most of the high forests in the country, particularly the dry evergreen Montana forests and highland grassland as well as most

of the moist evergreen Montana forests, have changed to farmlands and grasslands (Hurni, 1993).

In his findings, (Bekure, 1996) stated that the increasing demand for croplands, grazing land, construction poles and fuel wood including charcoal production are the main reason for the forest cover change in Ethiopia. In addition, forests are cleared to acquire constructional materials, to provide source of energy, to make space for grazing, farming, and building and layout infrastructure networks and to supplement raw materials such as an input for agricultural production and livestock grazing (Mesfin, 1991).

2.6 Consequences of Deforestation

Deforestation has many far-reaching consequences. The environmental functions and services of the forest ecosystem are reduced or even lost, depending on the extent of deforestation (Sponsel *et al.*, 1996). Forests contain numerous species of flora and fauna and protect the soils from heavy rainfall and its effects on erosion. Deforestation reduces biological diversity and increases soil erosion and the siltation of rivers and streams and can endanger hydroelectric dams, agricultural irrigation systems, and other technological and economic facilities (Bruijnzeel, 1991). Moreover, deforestation also means the loss of renewable natural resources such as valuable non-timber forest products and ecotourism value of the area.

In its natural condition, forest trees and other natural vegetation cover land. The leaf litters enrich the soil fertility by providing organic matters. Trees leaves control the speed of the raindrops and allow them to go down to the land surface slowly. It helps water to infiltrate into lower part of soil surface. After the soil is saturated, plants growing on it can utilize the excess water. The excess water is leached to the inner part of soil and supports to originate natural well and streams in the lower areas. It also helps make the water table high. Such natural conditions will be favourable for the growth of plants and microorganisms in the soil (Karpagam, 1991).

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2.7 Impacts of Deforestation

Deforestation has several and related potential influences the environment. If affects environment through changes in atmospheric carbon dioxide concentration, changes in reflectivity of terrain, effect on the hydrological cycle (precipitation, evaporation and run off),

loss of forest products, increase of soil erosion and generally through loss of biodiversity (Maunder, 1994).

The activities of human beings in clearing forest trees have many impacts on the environment, such as:

a. Decreasing air moisture because of low evapotranspiration that results from little forest cover.
b. Reducing water retention of soil because of prolonged and excessive run off which results from less interception of rain droplets by trees.

c. Decreasing species diversity. Since forests are homes for wild animals, loss in forest cover results in the migration of animals. Besides loss of plant species is inevitable.

d. Resulting in loss of forests products such as fuel wood, food medicine and construction wood. Generally, all of these problems intensify-soil degradation, climatic change, shortage of forest products leading to the expansion of desertification.

2.7.1. Shortage of Fuel Wood and Charcoal

As more and more trees are cut down, scarcity of wood for fuel gradually occurs. It is due to this fact that in some rural areas (northern, eastern and central parts of Ethiopia), where severe deforestation had occurred, people are forced to use dung and plant residues. Similarly many people shifted to use petroleum, liquid gas and electricity to satisfy their energy need in urban areas (EFAP, 1992). Due to the decline in the availability of fuel wood from time to time, the demand for dung and crop residues is increasing. Trees are almost non-existent near villages. People are forces to go further distance to collect fuel wood. According to the estimate of EFAP (1992), on average four hours are required to collect on donkey load of wood by traveling 5 to 12 kms distance. All of the conditions make fuel wood collection more tiresome task for women and children who are traditionally responsible for searching and collecting fuel wood. This is because of the fact that trees have already disappeared from nearby villages.

2.7.2. Soil Erosion

The main causes of soil erosion are the rapidly increasing human population, the limited area of fertile soils on flat lands, deforestation, and excessive livestock population (Hurni, 1987). It is a known fact that trees are used to conserve and protect soil from erosion, which is attributed to

their intercepting and anchorage functions. They decrease the direct force of rain droplets and they hold soil by their roots not to be washed by flood.

When trees disappear, raindrops hit the ground with their full force. Thus, soil particles become smaller and prepare the topsoil for removal by sheet wash or over land flow. Beside, when trees are removed, the nutrient cycle is disrupted and existing nutrients are rapidly washed out (Waugh, 1995).

In Ethiopia, the problem of land degradation has already become a serious problem. According to CSE (1999), Ethiopia losses 2-3 billion tones of soil annually due to soil erosion. The highland area of the country is losing an amount of 46 tons of soil per hectare per year. This is 10-30 times more than the rate of soil formation in the area. As a result, some parts of the country have been recurrently facing the problem of drought and famine. One of the most important factors to such problem is associated with land degradation, which is the result of soil erosion in turn resulting from deforestation. Generally speaking, deforestation that results in soil erosion has an important implication to crop productivity. It can decrease agricultural production by reducing soil's ability of retaining water thus decreasing the amount of soil nutrients, degrading the physical properties of soil such as its porosity, and causing uneven soil loss makes crop management such as fertilizer application, less efficient (Bender and Smith, 1997).

2.7.3. Climate change

Forests play a vital role in absorbing much of the incoming radiation. They also protect the underground growth from direct sunlight effect through their canopy. In addition, forests contribute for the existence of heavy rain due to high evaporation (Waugh, 1995). However, loss of forests would diminish the contribution mentioned above for local climate. Without trees there could be a decrease in evapotranspiration, this will result on a decrease of rainfall and increase of temperature. This in turn will reduce the total amount of rainfall and could turn the area in to desert (Waugh, 1995). Furthermore, loss of forest resource may indirectly affect agricultural production, which has a strong relationship with weather conditions. That is a favorable rainy season means a good production of crops and healthy economy. However, the failure of rains means low crop production that could result in famine (Bruce, 1992).

2.7.4. Out-Migration of Wild Animals

There have been countless birds, insects, reptiles and mammals, which secure their food and shelter in the forest, together with numerous species of trees (Waugh, 1995). However, high population growth together with migration of people lead to land use conflicts between agriculture and wild life (Amare, 1996). As a result of large scale human pressure on forest, there is a decline in the size of animal and plant communities (Gichohi et al 1996). Therefore, rapid clearance of forest cover affects the number and kind of plant and animal species that would have existed in the area.

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3 .MATERIALS AND METHODS

3.1. Description of the study area

3.1.1. Location of the study area

The research was conducted in the Shabe Sombo district, situated in the Jimma Zone of southwest Ethiopia. Geographically, it lies between 7°17' to 7°44' North latitude and 36°17' to 36°52' East longitude within the Jimma Zone. Positioned along the Jimma-Bonga main road, it is approximately 50 kilometers away from Jimma town. Shabe Sombo shares its borders with Seka Chokorsa to the North and Northeast, the Kefa Zone in the South and Southeast, and Gera Woreda to the West and Southwest. Located in the southern part of the Jimma Zone, this district's geographic coordinates were referenced from the Shabe Sombo Woreda Rural Land and Environmental Protection Office Plan of 2015.

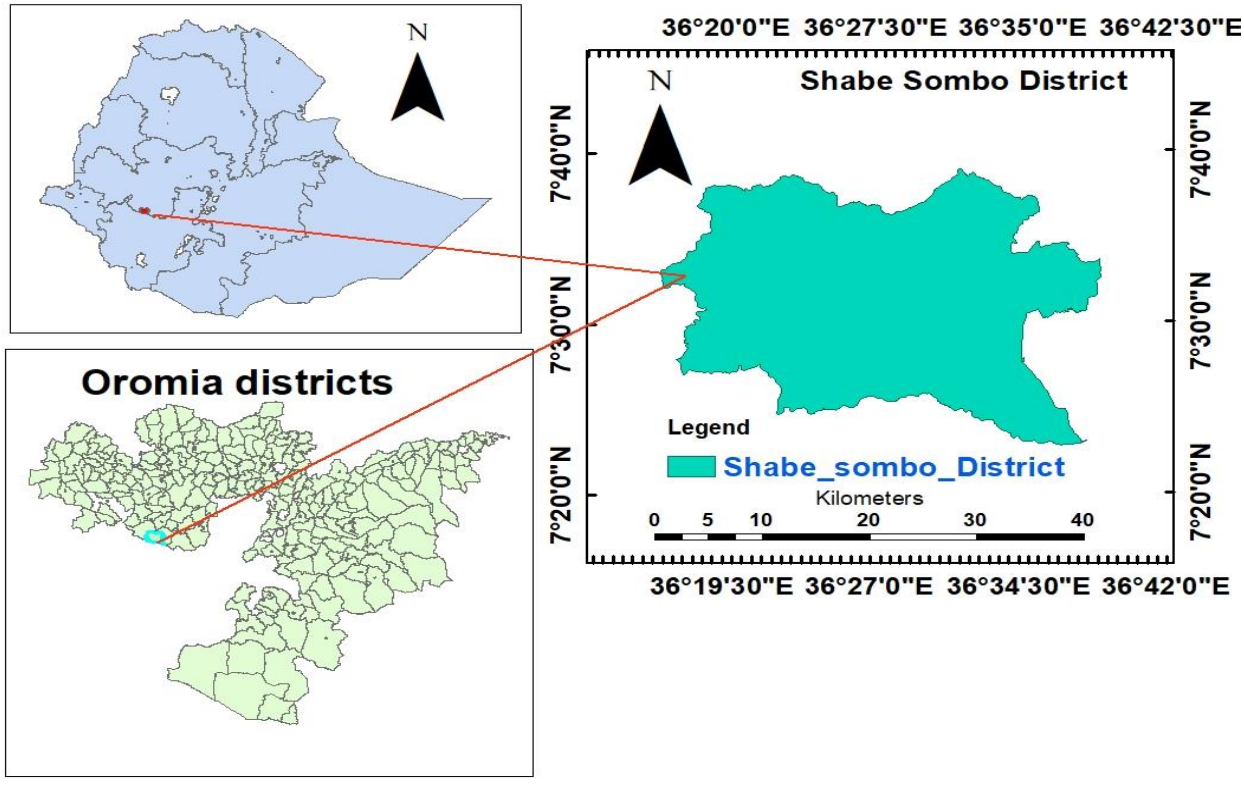

Figure 1: Map of the study area

3.1.2. Soil

The pattern of Shabe Sombo soil is clear indication of the relationship which exists between climates, the geological structure and vegetation cover on the other hand, among that type of soils which include some of the best agricultural soils are: Red-brown (35 percent), black soils (45 percent) and grey arid brown soils of heavy texture accounts 20 percent. All these type of soils have good agricultural potentialities except sandy soil. Loam soil and sandy soil respectively also exist in the woreda that they can be used as the row materials for construction (Shabe Sombo Woreda Agriculture Office Plan 2015).

3.1.3. Climate and drainage

The total area of the woreda is fall in the Gojeb river of Gibe river basin; Gojeb, Anja, Gurati and the smaller Anja are the major perennial rivers that drain to Gibe River. Their major uses are being to traditional irrigation and to wash red coffee. It is observed that the woreda does not have lakes. When we come to climatic condition, most part of the woreda belongs to subtropical (Badda Daree) and cool (Baddaa) agro-climates. These two climates do respectively constitute 40 and 60 percent of the woreda areas. The western parts do have (cool) Agro-climates with the mean annual temperature ranges between 17- 20° C .While, the West part of the woreda does classified to subtropical climate with mean annual temperature ranges between 20-23° C. The rainfall of the woreda is weakly bi- modal with spring a small rainy season during the months of April and May while summer along rainy season during the months of June, July and August. The vast area of the Woreda annual rainfall varies between 1,400mm and 1,900mm (Shabe Sombo Woreda Agriculture Office Plan 2015).

3.1.4. Vegetation covers

The district is rich in its natural forest coverage. The natural forest coverage of the is around 35,000 hectare and man-made forest covers about 10,000 hectares. Out of the total natural forest area of the woreda about 25,597.94 hectares is under participatory forest management (Takahashi and Todo 2011). Participatory Forest Management is operational in 14 Kebeles of the Woreda. There are 44 forest management associations organized on Belete-Gera Regional Forest Priority Area under PFM approach in the aforementioned Kebeles. Thus, these forest management association units entitled to manage 25,597.94 hectares of forest in the Woreda (Shabe Sombo Woreda Agriculture Office Report 2014). The forest is dominated by trees like *Syzigium guineense, Olea welwitschii*, *Prunus africana* and *Pouteria adolfi-friederici*. This forest

is among the forests that are rich in biodiversity (Schmitt et al., 2010). As a result, it has a great importance for biodiversity conservation and socioeconomic contribution.

3.1.5. Population

According to CSA (2013), the total population of the woreda is projected to be 141,037 of which 71,150 are male and 69,887 are Female. In terms of area of residence, 132,935 people live in the rural areas while 8,102 people live in the urban centers. In terms of age, 70,776 are adult population between 15-64 ages whereas 43,565 are children from 0-14 age and 24,988 are elderly above 64 years old. The woreda has high adult population i.e., people whom their age ranges between 15-64 years old.

3.2. Methods

3.2.1. Types and sources of data

The primary source of data was generated from key informant interview, household questionnaire, focus group discussion (FGD)

3.2.2. Sampling Techniques and Sample Size

The cross-sectional survey designs with the application of both qualitative and quantitative approaches were employed. The strategy used to identify the study area and sampling procedures involved the following steps. Firstly, Shabe Sombo district was purposively selected, due to the expansion of agricultural land, illegal logging and high rate of resettlements. Secondly *four kebeles; Atiro Gefare, Mirgano Baso, Yanga Dogoma, and Sombo Daru* were selected by using simple random sampling from shabe sombo district after the discussion was held with Shabe Agricultural and Rural Development Office experts of natural resource management. Thirdly, the sample household has been taken proportionally from each kebeles from the total households in those kebeles. Therefore, **187** households was selected for data collection using sample determination formula developed yemane 1967).

$$n = \frac{N}{1+N(e^2)} \text{---------------} equ(1)$$

Where: - n = the sample size N = the population size e = is the level of precision (±7%).

$$n = \frac{2176}{1+2176(0.07)^2} = 187$$

No	Kebeles Name	Household No_	Sample size proportion
1	Atiro Gefare	540	46
2	Mirgano Daso	567	49
3	Yanga Dogoma	499	43
4	Sombo Daru	570	49

Table 1: Sampling size per kebeles

3.3. Method of Data Collection

In order to collect both quantitative and qualitative data, questionnaire, focus group discussion, and non-participant observation were used. The quantitative data collections involve structured questionnaire developed and pre-tested consistency and applicability of the objectives of the study and the qualitative data collections use focus group discussion, structured interview and non-participant observation with randomly selected household heads.

3.3.1. Household Survey questionnaire

Household survey questionnaire provides structured numerical data. Socioeconomic information were collected from all the total sample size **187** households. During preparing and collecting the questionnaire, much emphasis was given to the household demographic characteristics, household socio-economic characteristics, issues related to deforestation, effects of deforestation on socioeconomic and environmental effects, and possible recommendation. In order to get a reliable data from respondents both close ended and open-ended questionnaires are prepared and administered to the target households.

Figure 2: Structural interview with respondents

3.3.2. Key Informant interview

The selection of Key informant interview at each kebeles was selected purposively. Key informant are individuals who are knowledgeable and elderly persons who lived in the area for more than 25 years and experts. The names of all households (HHs) residing in the kebeles were obtained from the kebele's office and cross-checked with the key informants. Eight key informants were selected from the four kebeles, with two key informants per kebeles. These key informants, ordinary farmers who are knowledgeable and experienced about the area, were selected using the snowball method (Nirmalya *et al.*, 2017).

Figure 3 :Key Informant interview in the study areas

3.3.4. Focus group discussion

Discussion were conducted in each selected kebeles with groups of people of different sex to understand the about deforestation, causes and impacts of deforestation and perception of farmer' on the impact of deforestation which are applied by the local community. The emphasis and convincing was especially given for the selection of farmers with relatively long practices and knowledge on the diversity and utilization of woody plants. It was discussed about the cause and impact of deforestation in the study areas. Data collect from the stakeholders about their experience through the focus groups discusses the problems of deforestation and possible recommendation measures to be taken to sustain the practices and related issues. Each group represented with numbers of ten to eight participants and each lasting about two to three hours. The results of focus group discussion was analyzed with the objective line of the study.

3.4. Method of data analysis

The data collection and screening steps were followed in data analysis. Majority of the data collected through survey questionnaires were analyzed quantitatively through application of descriptive statistics by using SPSS (version, 24) software and Microsoft Excel 2010. The data collected by interview and FGDs were analyzed qualitatively with key event approach or thematic description. Family size, educational level, land holding size and income, Population growth, Agricultural land expansion, Fuel wood, Charcoal production, Urbanization and

infrastructure development and logging are the socioeconomic variable. Therefore, table, chart and graph have been applied for data presentation.

4. RESULTS AND DISCUSSION

4.1. Socio-economic Profile of Sampled Respondents

The results revealed that among the total sampled household heads, 87.5% were male-headed, while 12.5% were female-headed. This gender disproportionality was notable in our survey, indicating a higher number of male respondents compared to females. Moreover, 96.88% of respondents were reported as married, with only 3.13% being unmarried in the study areas. Regarding educational attainment, participants exhibited diverse levels of education: approximately 27.08% were illiterate, 60.42% possessed basic reading and writing skills, and around 12.5% had received formal education. A significant proportion of respondents fell within the age range of 41 to 50 years, with the majority reporting a farm size of 38.54% (Table 2). The prevalence of both older and younger individuals in this survey highlights a concerning trend of neglect toward agriculture, posing a substantial challenge to food security. Many individuals heavily rely on subsistence farming, often employing outdated and environmentally harmful techniques, exacerbating issues such as deforestation and soil degradation. These practices, including conservation tillage, contour plowing to mitigate erosion, and the adoption of intensive farming methods over extensive ones to combat deforestation, may not be readily accessible or comprehensible to the surveyed population. Thus, there is a awareness aimed at promoting sustainable farming practices and addressing environmental concerns within the community.

Table 2: Socioeconomic Profile of Sampled Respondents

Variables	Categories	Number of respondents	Percent (%)
Sex	Male	164	87.50
	Female	23	12.50
	Total	187	100.00
Marital status	Married	181	96.88
	Unmarried	6	3.13
	Total	187	100.00
	Educated	23	12.50

Education level	Read and write	113	60.42
	Illiterate	51	27.08
	Total	187	100.00
Age	20-30	16	8.33
	31-40	60	32.29
	41-50	70	37.50
	51-60	25	13.54
	61-70	10	5.21
	>70	6	3.13
	Total	187	100.00
Farm size in (ha)	<1ha	23	12.50
	1-2.5ha	62	33.33
	2.6-3.5ha	72	38.54
	>3.5ha	30	15.625
	Total	187	100.00

4.2. The key drivers of deforestation in the study areas

4.2.1 Direct cause of deforestation

4.2.2 4.2.1.1 Agricultural expansion

Accordingly, agricultural expansion was cited by the majority of respondents (94.79%) as the primary threat to deforestation in the area (Figure, 8). It is undeniable that land serves as a crucial natural resource for agricultural production, income generation, house construction, and settlement in Shabe Sombo Woreda. Discussions with key informants revealed that the local community predominantly relies on agriculture for livelihoods. Farmers in the area engage in mixed agriculture, involving both crop farming and livestock rearing. According to a report from the Shabe Sombo Woreda Office (2022), households typically possess small land holdings, ranging from 0.67 to 1.25 hectares. Consequently, some informants noted that due to the limited size of land holdings, crop yields often fail to meet the needs of farming households. Similar findings from various parts of Ethiopia have identified the expansion of agricultural land into forested areas as a major cause of deforestation and disruption to forest ecosystems. This aligns

with previous studies by Bielli et al. (2000) and Dessie and Kleman (2007), which emphasized agricultural encroachment as a significant contributor to forest loss in Ethiopia.

According to the informants, several factors contribute to low agricultural production in the area, including inappropriate land use systems, limited awareness about modern farming practices, and the high cost of inorganic fertilizers. Consequently, farmers often resort to expanding their cultivated land into forests and woodlands. Some farmers have organized at the micro level to acquire additional land for growing cash crops such as chat, and eucalyptus trees in the study areas. This ongoing encroachment of crop cultivation into surrounding forests has led to further degradation of the forested areas. Farmers have observed a significant expansion of cultivated land at the expense of forested areas, highlighting the extent of this issue.

Figure 4: Agricultural expansion in the study areas

4.2.1.1. Fuel wood and charcoal production

The results of the present study revealed the negative impacts of fuel wood consumption on forest resources, and consequently on biodiversity and human livelihoods in the study area. Accordingly, about (85.42%) of the respondents deal fuel wood and charcoal production was one of the cause of the driving forces of forest cover change in the study (Figure, 8). The majority of the participants of the focus group discussion pointed out that charcoal making has been practiced for generating household income. Discussion with the focus group confirmed that firewood collection was the major destructive activity, because, the local people depend on the

natural forest as a source of fuel energy for household consumption and sale. In addition, the discussants bitterly objected to the destined robbery of the forest timber products as destructive activity. In general, in the name of fuelwood collection, complicated abuse of forest resources continued to be a serious problem for forest-based livelihoods of the community as well as environmental sustainability.

Figure 5: Fuel wood and charcoal production in the study areas

4.2.1.2. Settlement expansion

Settlement expansion is also the most frequently reported activities causing forest conversion of the study area. Accordingly, about (96.88%) of the respondents deal with settlement and resettlement expansion was one of the extremist of the driving forces of forest cover change in the study (Figure, 8). The result is similar to the study reported that settlement areas with permanent housing increased and results for woody vegetation decreased (Elias *et al*., 2015). According to the key informants, it was better to encourage urbanization because it contributes to change the socio- economic status of people of the study area. The informants said that urbanization has played key role in changing the study area by facilitating infrastructure development for creating employment opportunities for the local people. One of the key informants said that large number of local people and some of qualified people hired. Urbanization assures the socio-economic status of the majority of local people in the study area in one way but it aggravated environmental degradation on the other hand.

Figure 6: Settlement expansion in the study areas

4.2.1.3. Grazing land expansion

The results indicate that a significant portion of respondents (62.5%) agreed that the expansion of grazing lands is another cause of deforestation (Figure, 8). According to Tariq *et al.* (2014), livestock grazing is identified as one of the main drivers of deforestation. In Ethiopia, natural small vegetation serves as the primary source for livestock grazing. Approximately 10% and 60% of livestock feed during the wet and dry seasons, respectively, is derived from fodder obtained from forested areas (Ewnetu, 2021). Livestock impact forests in two ways: firstly, by consuming vegetation as fodder, and secondly, by trampling and crushing small vegetation due to the large numbers of cattle and herds. Consequently, overgrazing and trampling by livestock contribute to deforestation and have adverse effects on forests in Ethiopia. According to the FAO (2016) report, the strongest link between deforestation and cattle ranching is observed.

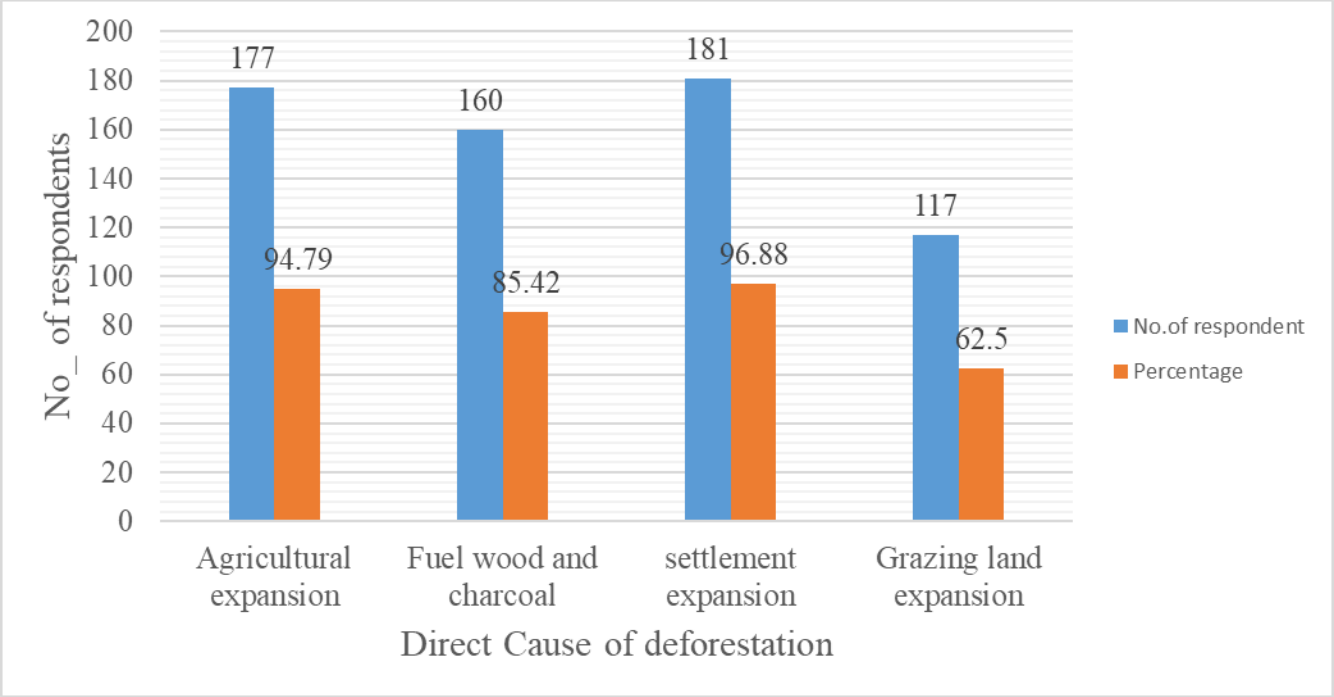

Figure 7: Direct cause of deforestation in the study areas

4.2.2. Indirect cause of deforestation

4.2.2.1. Economic factors

Economic factor was also found as one of the causes of forest cover change as peoples were using the forests for economic purposes. Accordingly, about 93% of the sampled households were using the forests for economic purposes during such condition (Figure, 8). The action of using forest for this purpose during such condition was also led to a gradual decrease in forest cover change . When the demand forests were increased in the market, they were cutting and selling the forest and forest products to generate the income used for their livelihood. Likewise, when the price of the crop was increased in the market, they also start to sell the forests to buy food crop for their family. This study is similar with reports indicated that economic factors are major forces of causing tropical deforestation Geist *et al.*, (2002).

4.2.2.2. Policy and institutional factors

The study had shown policy and institutional factors as one of the major factors causing forest cover change and land use land cover change. In this case, about 83.33% of the sampled respondents agreed with the subject (Figure, 9). These, policy failures such as corruption or mismanagement in the forestry sector and weak PFM were the important drivers of forest cover change of the study area. Institutional factors also drive many cases of deforestation in tropical

deforestation, which was similar to this finding Geist *et al.*, (2002). Another study also stated that the uncertain land tenure system, leading to lower investment by the people and lack of ownership stimulates illegal logging and the so called tragedy of commons (Assefa and Bork , 2014. Thus, weak policy implementation of land use, low capacity of forest institutions, land use conflict and policy discrepancy are aggravating forest losses. Additionally, implementation of investment and settlement policies without assessing environmental impact is also a major problem (Moges, 2010). In a similar manner, another study also indicated that, changes in policies that govern natural resources have influenced the land use change and the expansion of cultivation (Elias, 2015).

4.2.2.3. Socio-cultural factors

Social-cultural factors were also found as one of the drivers changing forest cover of the study area. Public attitudes such as unconcern for forests due to low morale and frontier mentalities and other unconcern or lack of basic psychological; values such as disregard for nature and to a lesser degree; beliefs or disregards about the environment are associated to factors causing forest cover change/deforestation. Accordingly, about 63.54% of the responded that forest cover change is due to changes in public factors (Figure, 9). This is due to attitudes of public unconcern towards forest environments.

4.2.2.4. Population growth

Population growth was reported to be one of the main driving factors of forest and land use land cover change of the study area. This was most probably related to anthropocentric factors causing forest cover change. As a result, immigration, population growth and density were causing forest cover change and most of the respondents (96.88%) agree that population growth was a potential driver of forest cover change (Figure, 9). Several researches were reported that demographic related factors like: population growth and density were the major factors causing forest cover change.

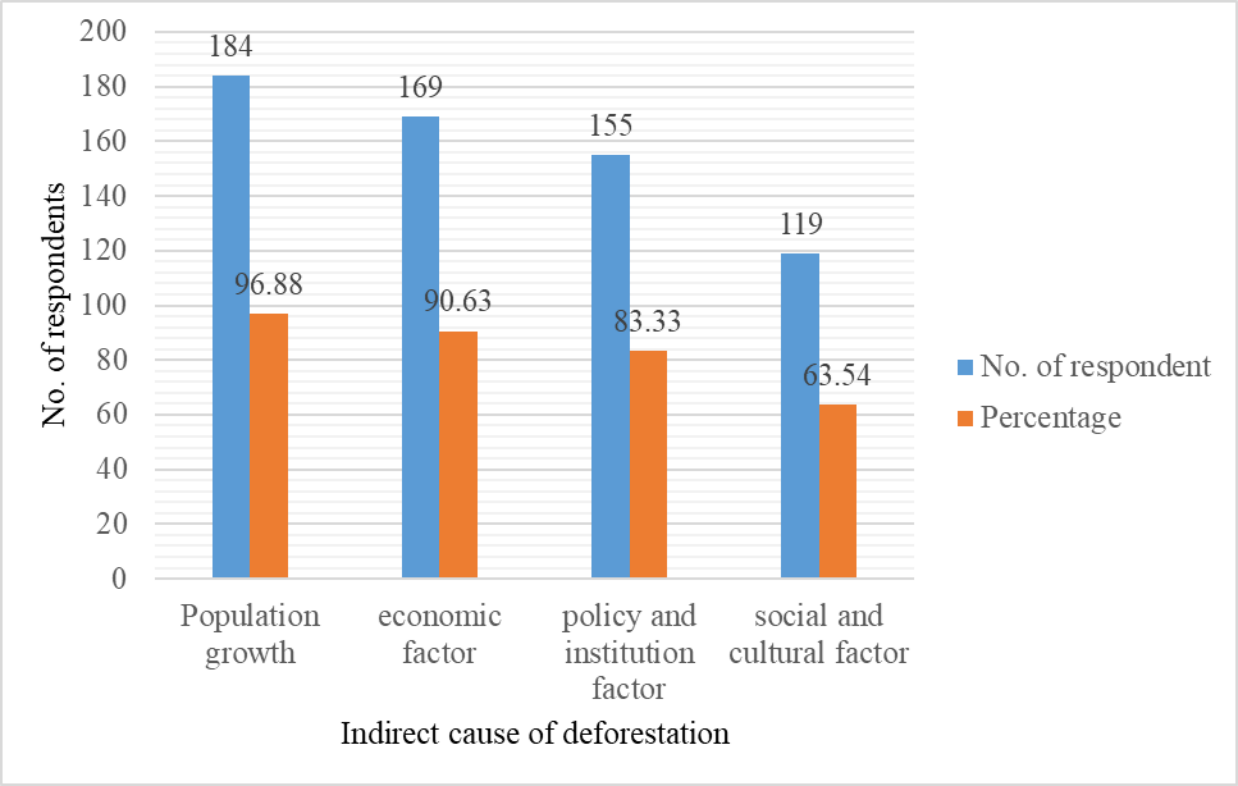

Figure 8: Indirect cause of deforestation in the study areas

4.3. Socio-economic and environmental effects of deforestation

The results indicate that a substantial majority (95.83%) of the respondents agreed that deforestation directly impacts their livelihood incomes (Table 3). Deforestation is a dynamic process that significantly alters the hydrological aspects of watersheds, impacting water resources and the environment at both local and global scales (Batra, 2007). This alteration in land use and land cover patterns, such as deforestation followed by cultivation, can lead to a reduction in the infiltration rate and percolation of rainwater, thereby affecting the recharge of streams, springs, and underground water sources. Consistent with this, a significant proportion of respondents (92.7%) acknowledged that the depletion of forest resources for various purposes has resulted in a decline in surface water volume over time.

However, information obtained from interviews with focus groups, and elders confirmed that the volume of water from these streams and rivers and their flow patterns have decreased over time. As indicated in (Table 5) majorities (97.91%) of respondents perceive that de-forestation has increased local temperature. Similarly, most (90.62%) number of the respondents agreed that rainfall is decreasing over time with the declining of forest cover in the area. Local farmers, and

particularly elders in the study catchment, underlined the observations of the changes in climate over time. A number of physical/ecological and socio-economic indicators verified the climate change. The physical indicators expressed by farmers included: the drying up of the wetland and its conversion to cropland; livestock diseases, probably linked to vector borne diseases; a decrease in the growing period from six to four months; the cultivation of short-matured crops, mainly in higher, cool altitudes; the decrease in stream volume; and the duration and amount of rainfall. The socio-economic factors considered climate change indicators include the long distance people need to travel to fetch water and drinking water for animals. From data gathered through open ended question it is understood that, the geographical setting of the study area has a diverse ecological condition that has resulted a wide range of altitude and relatively high amount of rainfall. As a result of this diverse ecological condition the area was originally the land of many indigenous tree species such as *Syzigium guineense, Olea welwitschii, Prunus africana* and *Pouteria adolfi-friederici* and other valuable tree species. However, the exploitation of these indigenous forests through settlement and agriculture expansion has greatly affected the ecology and biological diversity of the area.

Generally, the growing human population created and still is creating pressure on the remaining forests. According to respondents view the impacts of deforestation are complex and widespread. More critically, it threatens the livelihoods, traditions of rural, and forest dwelling people across the district. Many people rely directly on forests, through harvesting forest products and medicinal uses. According to their view forest resource destruction or clearing over time attributed to forest communities to travel further distances to access to forest products that sustain their socio economic wellbeing. According to the opinion of most (93.75%) respondents, the destruction of forest resource has attributed to the prevalence of erosion in the district (Table 5). Most of majority of the perception of the interviewed respondents pointed out that soil erosion was a critical problem. As perceived by Local land users, sheet erosion was the most common form of soil erosion in the cultivated lands of the study district. This soil erosion has been a significant contributor to the worsening of soil fertility in their area.

Table 3: Socio-economic and environmental effects of deforestation

Parameter	Agree	Disagree	Undecided

	F	%	F	%	F	%
Affect livelihood incomes	92	95.83	1	1.04	3	3.12
Decrease of the amount of surface water volume	89	92.7	2	2.08	5	5.21
Increase local temperature	94	97.91	1	1.04	1	1.04
Affect variability of rainfall	87	90.62	4	4.16	5	5.21
High erosion prevalence	90	93.75	4	4.16	2	2.08
High loss of habitat of animals and plants	93	96.87	1	1.04	2	2.08
Increase of forest products price	90	93.75	2	2.08	4	4.16

4.4. Farmers' perception on deforestation in shabe sombo Woreda

In this study, questions were raised to sample households about whether deforestation is a real problem in Shabe sombo district, and on how they perceive (understand) deforestation process (problem) in their locality. About 97.92% of the households confirmed that deforestation is a real problem in the study area (Table 6). On the other hand, deforestation in the Shabe sombo area is perceived as "the clearance of forest for different purpose by 32.29% of the house hold", "logging and burning of forest" The clearance of forest for different purposes by 43.75% of the households. Again the problem (deforestation) is understood as the "the permanent clearing of forest for crop farming" by about 23.96% of the respondents (Table 4).

The respondents were requested to express their perception about "whether deforestation is a critical problem "in Shabe Sombo Woreda. In this regard, about 90.62% of the farm households indicated that deforestation is a critical problem in the study area. Based on the study it is possible to say that deforestation is not only a real problem in shabe sombo Woreda but also it is also a critical challenge in the area because of this Woreda is surrounding by Belete forest. In connection with this, it is necessary to recognize the extent level of deforestation based on perception of the local people.

In fact, the problem of deforestation in Shabe sombo Woreda cannot be different from the overall experience of Ethiopian. This is because forest cover of Ethiopia showed declining trend throughout the 20 century (Alemu and Kidane, 2014). For instance, the extent cover of the country in the first half of the 20 century was about two-fifth (40%); forest area was indicated to

have declined to about 16% in the 1960s and to about 2.5% in the last decade of the 20 century. However, forest cover of Ethiopia have shown on improvement to about 9% (Alemu and Kidane, 2014). Deforestation can be defined as indiscriminate, clearance of forest and woodland resources. It is a critical problem in developing countries. However, the magnitude and rate of deforestation varies from country (place) to country (place). Destruction of forest (deforestation) is also a significant problem in Ethiopia.

Table 4: Farmer's perception on deforestation in shabe sombo Woreda

Parameter	**Response option**	**frequency**	**Percent**
Do you know the impacts of deforestation in your area	Yes	183	97.92
	No	4	2.08
	Total	187	100
it is a critical problem	Yes	169	90.62
	No	18	9.38
	Total	187	100
How deforestation is perceived by the local people	The clearance of forest	61	32.29
	The logging and burning of forest	82	43.75
	The permanent clearing of forest for crop farming	44	23.96
		187	100

5. CONCLUSION AND RECOMMENDATIONS

5.1. Conclusion

Indeed, deforestation arises from a combination of human activities and natural phenomena. However, this study specifically focused on human-induced factors within the designated areas. Consequently, both direct and indirect causes of deforestation were pinpointed. Agricultural expansion (94.79%), fuelwood collection (85.42%), settlement expansion (96.88%), and grazing land expansion (62.5%) were identified as primary drivers of deforestation in the study areas. Additionally, economic factors (90.63%), policy and institutional factors (83.33%), social and cultural factors (63.54%), and population growth (96.88%) emerged as indirect contributors to deforestation, consistent with trends observed across southwestern Ethiopia.

The deforestation is dynamic significantly effects of livelihood incomes, Decrease of the amount of surface water volume, Increase local temperature, Affect variability of rainfall, High erosion prevalence, High loss of habitat of animals and plants increase of forest products price in the study areas. Destruction of forest (deforestation) is also a significant problem in Ethiopia. On the other hand, deforestation in the Shabe Sombo area is perceived as the clearance of forest for different purpose by 32.29% of the house hold", logging and burning of forest, the clearance of forest for different purposes by 43.75% of the households. Again the problem (deforestation) is understood as the "the permanent clearing of forest for crop farming" by about 23.96% of the respondents. The possible recommendation for minimize deforestation is the critical importance for sustainability of forest. From the analysis of informants' suggestion as possible minimize of deforestation is awareness related to problem (97.92%) were major way to minimize the loss of plant diversity followed by reforestation (96.87%), afforestation (90.62%), controlling illegal cutting (78.12%) and using alternative energy (62.5%) in the community nearby to the forest. Awareness should be created at all levels on the negative effect of deforestation on the livelihood of farmers. Alternative energy sources should be considered and information disseminated at grass roots level to protect the remaining forests.

5.2. Recommendation

Based on the findings of the present study, the following recommendations are suggested.

- Design appropriate policies and strategies to achieve approach and technical change in sustainable natural resources conservation process in the study area and other similar areas of the zone and the region at large.
- Alternative energy sources should be considered and information disseminated at grass roots level to protect the remaining forests.
- Education on family planning to the people has to be provided along with the important of contraceptive delivery services.
- The concerned bodies should educate and give a responsibility for the people to use and conserve the forest resources found in their area. If people have a right to use forests properly and they can be accountable for its destruction and thus conserve this resource.

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Appendix

Household data

Questionnaire No: _____ Code: Region/Woreda/kebele/Got._____

Date of interview: _____

Enumerator name: _____

Part I. Area description

1. Name of locality: _____

2. Name of sub-kebeles/Got: _____

3. Name of Kebeles_____
4. Woreda name: _____

5. Region name: _____

6. Agro-ecological category _____
7. Altitude: _____m. a.s.l.

8. Latitude (N) _____decimal degrees

9. Longitude (E) _____ decimal degrees

Part II.Household information

1. Can you provide the following information?

A) Respondent

1. Name _____ 2. Mobile No. _____

B) Household head

1) Name:_____ 2) Sex: _____ 3) Age_____
4) Marital Status: 1. Single------ 2. Married---------3. Divorced--------- 4. Widowed-----
5) Educational status: 1. No education----- 2. Primary (grade 1 to 8)---------3. High school
4. Higher education----------

6) Religion_____
7) Family size _____

8) Land holding size _____

9) Income _____

Part III about deforestation and cause of deforestation

1. What are the major uses of forests in your area?

2. Do you think that deforestation is the major problem in your locality?

3. How is today's coverage of the forest when compared to the conditions before 2023?

A. Declined B. Increased C. No change

4. According to your knowledge, is severe and rapid forest cover change observed? A. yes B. No

5. If the answer to question number „5" is yes, what were/are the major causes of deforestation?

Rank the drivers; Population growth, Agricultural land expansion, Fuel wood, Charcoal production, Urbanization and infrastructure development and logging

6. What is your major source of income? A. Sale of cash crops B. Sale of wood and charcoal C. Other _____

8. What types of fuel do you use for household needs (List them in order).

9. On the basis of your knowledge, what are the impacts of deforestation/forest cover change in the area? (Put in order).

10. What do you think about the possible solution to alleviate the current problem of deforestation and to use forest resources in a sustainable manner?

11. What are the existing efforts to reduce deforestation and forest degradation in the study region?

12. What are the challenges in implementing the efforts to reduce deforestation and forest degradation in the study region/area.

12. How do you perceive deforestation?

A/the clearance of forests to improve their growing period

B/the clearance and naturally occurring forests by logging and burning

C/it is a permanent clearing and forests lands for agricultural use and settlement

D/ others

13. If deforestation is a real problem in your kebeles, how do you express/ rate of severity

of the problem

A/very high B/high C /moderately severe D/less sever E/difficult to judge.

14. Is forest resource degradation a critical problem in your kebele? A/yes B/no

15. What is the environmental problem in the local area A/climate change B/soil erosion mainly C/deforestation mainly D/shortage of forest product such as fire wood, construction material etc

What should be done to reduce deforestation

A/expanding area closure B/planting trees in farm lands and marked areas C/aware

communities about negative effect of deforestation D/planting trees in degraded areas

Questionnaires for focus group Discussion"FGD"

1. What are the main causes of deforestation?

2. How is the level (magnitude and rate) of deforestation? To what extent is the degree of

severity of deforestation problem?

3. What are the main direct cause of deforestation? What are the underlying or root

(indirect) cause of the problem in the study area?

4. How much is effective that the conservation measures are to be taken ?

5. What are the major adverse effect of deforestation?