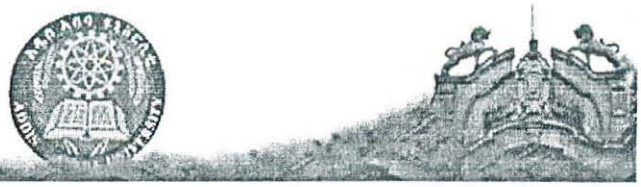

ADDIS ABABA UNIVERSITY

SCHOOL OF GRADUATE STUDIES

PERCEPTION ON SOCIO-ECONOMIC AND DEMOGRAPHIC CAUSES OF DEFORESTATION AND ITS CONSEQUENCES IN CHENA WOREDA: THE CASE OF KAFA ZONE, SNNPRS

BY

Tamirat Moges

June, 2010

Addis Ababa, Ethiopia

ADDIS ABABA UNIVERSITY
SCHOOL OF GRADUATE STUDIES

The Perception of Socio--economic and Demographic Causes of Deforestation and its Consequences in Chena Woreda: The Case of Kafa Zone, SNNPRS

By

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Institute of Population Studies
College of Development Studies

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Dr. Eshetu Gurmu Chairman, Department Graduate Committee	Signature
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TABLE OF CONTENT

List of contents **Page**

A. Acknowledgement----------I

B. Table of Content----------II

C. Acronyms----------V

D. List of Tables and Figures----------VI

E. Abstract----------VII

Chapter One

1. Introduction----------1

1.1. Statement of the problem----------1

1.2. Objectives of the study ----------3

1.3. Research Questions----------3

1.4. Significance of the study----------4

1.5. Conceptual Framework----------4

1.5.1. The relationship among study variables in the Conceptual Framework ----------5

1.6. Research Methodology----------7

1.6.1. Data Sources----------7

1.6.2. Sample Size Determination----------7

1.6.3. Method of Data collection----------8

1.6.4. Method of Data Analysis----------8

1.7. Limitations of the study----------8

1.8. Definitions of Terms----------9

Chapter Two

2.1. Review of Related Literature----------10

2.1.1. Demographic Factors----------12

2.1.2. Socio-economic Factors----------12

2.1.3. Institutional Factors---------- 13

2.1.4. Conversion of Forest land into Agricultural land---14

2.1.5. Fuel wood Consumption----------14

2.1.6. Consumption of Construction wood----------15

2.2. Impacts of Deforestation----------15

2.2.1. Shortage of Fuel wood and Charcoal----------16

2.2.2. Soil Erosion----------17

2.3.3. Climate Change----------18

2.3.4. Out-Migration of Wild Animals----------18

2.3.5. Reduction in Availability of Fodders for Livestock—18

Chapter Three

3. General Background of the study area ----------19

3.1. Physical Characteristics---------- 19

3.1.1. Location and size----------19

3.1.2. Relief and Drainage----------19

3.1.3. Climate----------21

3.1.4. Natural Vegetation Coverage----------22

3.2. Land use and land coverage----------23

3.3. Population size and density----------23

3.4. Ethnicity---------- 24

3.5. Economic activity----------24

Chapter Four

4. The nature and extent of deforestation in Chena Woreda----------26

4.1. Background of the study population----------26

4.2. Forest coverage of the study area---------- 29

4.3 Extent of deforestation ----------30

4.4. Factors for deforestation in the selected kebeles of

the study area----------30

4.4.1. Expansion of farmland---------- 31

4.4.2. Fire wood and making charcoal----------32

4.4.3. Wood for Furniture making----------33

4.4.4. Cutting of trees for construction----------33

4.4.5. Expansion of grazing land for animals----------33

4.4.6. Resettlement and inappropriate Investment program----------33

4.4.7. Soil erosion ----------34

Chapter Five

5. The Consequences of Deforestation----------35

5.1. Consequences of deforestation in the study area----------35

5.1.1. Local Climate variability ----------36

5.1.2. Shortage of firewood----------37

5.1.3. Shortage of water supply----------37

5.1.4. Wild life migration----------37

5.1.4. Shortage of animal fodder----------38

5.1.5. Shortage of water supply----------38

5.2. Awareness level and attitude of the local people towards deforestation----------38

5.3. Measures taken against deforestation in the area--------38

Chapter Six

6. Conclusions and Implications----------40

6.1. Conclusions----------40

6.2. Implications----------41

References----------43

Appendices A- C

Acronyms

CARDO Chena Woreda Agricultural and Rural Development Office

CSA Central Statistics Agency

CSE Conservation Strategy of Ethiopia

EFAP Ethiopian Forestry Action Program

EFDR Ethiopian Federal Democratic Republic

FAO World Food and Agricultural Organization

FGD Focus Group Discussion

Km Kilometer

Mm millimeter

MoA Ministry of Agriculture

NGO Non Governmental Organization

NMSA National Metrology Service Agency

SNNPRS Southern Nations, Nationalities and People Regional States

Temp. Temperature

WRI World Resource Institute

°C degree Celsius

List of Tables

Table 2.1 Annual wood consumption estimates in Ethiopia----------14

Table 2.2 Past, Current and projected demand for wood products----------16

Table 3.1 Agro-Climatic zones of Chena Woreda----------21

Table 3.2 Rainfall distribution in the study area----------22

Table3.3 Land use classification of Chena Woreda----------23

Table 3.4 Urban and Rural population of the Woreda----------23

Table 3.5 Economic activities in Chena Woreda----------25

Table 4.1 Ethnic background of sample respondents----------26

Table 4.2 Family size of the sample respondents----------27

Table 4.3 Educational status of respondents----------28

Table 4.4 Age structure of respondents----------29

Table 4.5 Causes of deforestation as listed by respondents----------31

Table 5.1 Major consequences of deforestation in the study area----------35

Table 5.2 Rainfall and Temperature data of 2004 and 2009 of the study area----------36

List of Figures and Maps

Figure 1.1 Conceptual frame work of the study----------4

Figure 3.1 Political maps of SNNPRS----------20

Abstract

Forests are essential natural resources that make an important contribution to the wealth of the country. They provide wood for fuel, poles and timber for construction, furnish cattle with shelter and fodder and protect the soil from erosion. On the other hand, destruction of forest leads human beings and the environment to various problems. Departing from this backdrop, the research focuses on the perception on socio-economic and demographic causes of deforestation and its consequences in Chena Woreda-The case of Kefa Zone, SNNPRS.

The study examines the relation between household size, level of education, social exclusion, land/forest tenure rights and deforestation and further assesses the consequences of deforestation and community perceptions of deforestation and its possible causes. Both primary and secondary data such as household surveys sources through questionnaire, key informants interview, Focus Group Discussions and literatures were used. The data were analyzed by descriptive way using percentage and frequency rank weight.

The major causes of deforestation in the study area were found to be rapid population growth, social exclusion, dependency on agriculture, resettlement and inappropriate investment program, among others the consequences of deforestation relate to local climate change, soil erosion, shortage of fuel wood, etc. It is suggested that creating community awareness to reduce fertility, strengthening the relation between Menjas and the majority Kefa people, providing substitute for wood and providing opportunities for the people to involve on other off-farming activities could be possible alternatives to overcome problems of deforestation.

Chapter One

Introduction

1.1. Statement of the problem

Forests are essential natural resources that make an important contribution to the wealth of a country. They provide wood for fuel, for poles and timber, for construction; furnish cattle with shelter and fodder, and protection soil from erosion. Besides, forests are used to regulate the climate and create better life. On the contrary destructing forests lead human beings and the environment as a whole to enormous problems. Deforestation is the cutting down of trees either to create space for farming or settlement, to use for fuel or for construction purposes (Waugh, 1994).

The size of natural forest coverage of the world is reducing from time to time because of the increasing use of forested lands for agriculture, pasture and settlements for the rapidly growing population (World Resource Institution, 1987). The primary causes of deforestation are clearing land for agriculture and the gatherings of wood fire are directly related to population growth (Peters 1989).In response to a growing population, there has been a change from less intensive to more intensive system of cropping in many parts of the world. Thus in some areas forest fallow has gradually changed to bush-fallow cultivation (Hornsby and Jones, 1982).

However, according to Kooten and Folmer (2004) denudations of forests occur by natural means (fires, diseases, and windfall) or as a result of human activities (harvest of timber, clearing of land). Human activities to cut trees for commercial wood products or to clear land for agriculture are some of the causes for the destruction of forests.

Population is continually growing in the developing countries. In Africa trees have been destructed by the growing population for the fulfillment of their basic necessities (fuel, food and building materials). According to Waugh (1994) wood is used as fuel for cooking and heating by 80 percent of African families.

As many literatures confirm, early 20th century about 40 percent of the entire land was under dense forest cover in Ethiopia. The total natural forest of the country is being rapidly vanished and is confined only to 2.7 percent of its territory. Out of the remaining total 2.7 percent of Ethiopia's forest area a quarter is found in south western highlands of the country (Yihenew, 2005).

According to Ministry of Agriculture (1998) the annual rate of deforestation in the years 1970-1990 was between 150,000-200,000 hectares. If this rate of destructing forests continues, it was further estimated that in the near future the area covered by natural forest in Ethiopia might be reduced to minor stands (EFAP, 1994).

In 1989, 2.7 percent of the total land area was covered by high forest (EFAP, 1994).Because of such an extensive deforestation experience; the land has been exposed for wide scale soil erosion and declining of crop yields. Out of the remaining 2.7 percent of country's forest area, 45 percent is found under pressure from the expanding agriculture, increasing demand of energy and settlement (Shibru and Lemma, 1998).

In Ethiopia, the size of population is increasing rapidly and the problem of deforesting is becoming critical problem. Due to the growth of population, the rate of deforestation is also increasing from time to time (EFAP, 1992). In order to satisfy the growing demands of population, humans have begun to destruct forests to expand their farmland. The need for fire wood and constructional purpose also increase.

The rate of deforestation has been high in northern regions of Ethiopia. Although the remotest and inaccessible areas of southern and south western parts of Ethiopia have solely maintained the remaining forest resources of the country, and it is disappearing highly at present time.

Kefa is one of the zones found in the Southern Nations, Nationalities and People's Regional State, located in the south western part of Ethiopia, which has major forest area in the country. And Chena Woreda, is one of the ten Woredas found in Kefa zone. However, forest resource is used to supply a variety of products and services including non-timber forest products such as fuel wood, charcoal, timber, grazing and agricultural production. The forest coverage in the area has been declining mainly due to clearing land for cultivation and cutting trees for sale.

Some of the prominent causes for deforestation in the area are rapid population growth and related economic activities which is mainly dependent on agriculture, low level of education, poverty, and social discrimination to some group of the society.

Besides rapid ongoing forest destruction in the Woreda primarily moist forests is still a national production asset. A large proportion of population lives close to forest patches and

depends on forest products, particularly on non- timber products like honey, wild coffee, spices, fruits, etc. both for home consumption and as cash crop.

Kefa is one of the densely forested highlands of Ethiopia facing the problem of deforestation due to rapid population growth. In this regard the majority of Chena Woreda's population is clearing forests for expanding of agricultural land, for fuel wood, for constructional purpose, etc. On the other hand, a minority group of people named as "Menjas", which are assumed untouchable and are being discriminated both from the society and ownership of agricultural land, are destructing forests for sell. And this study attempts to investigate the perception on socio-economic and demographic causes of deforestation and its consequences in Chena Woreda of kefa zone with due emphasis on comparative analysis between the majority Kefa people and minority Menja community.

1.2. Objectives of the study

The general objective of the study is to examine the perception of social, economic and demographic causes of deforestation and its consequences in Chena Woreda.

The specific objectives of the study are:

a) To examine the relation between household size and deforestation;
b) To assess the effect of level of education on social exclusion and forest resources;
c) To explore the relation between land and/or forest tenure rights and deforestation;
d) To analyze the consequences of deforestation; and
e) To assess the perception of local people about the nature of deforestation and its possible causes.

1.3. Research Questions

This study is guided by the following fundamental research questions.

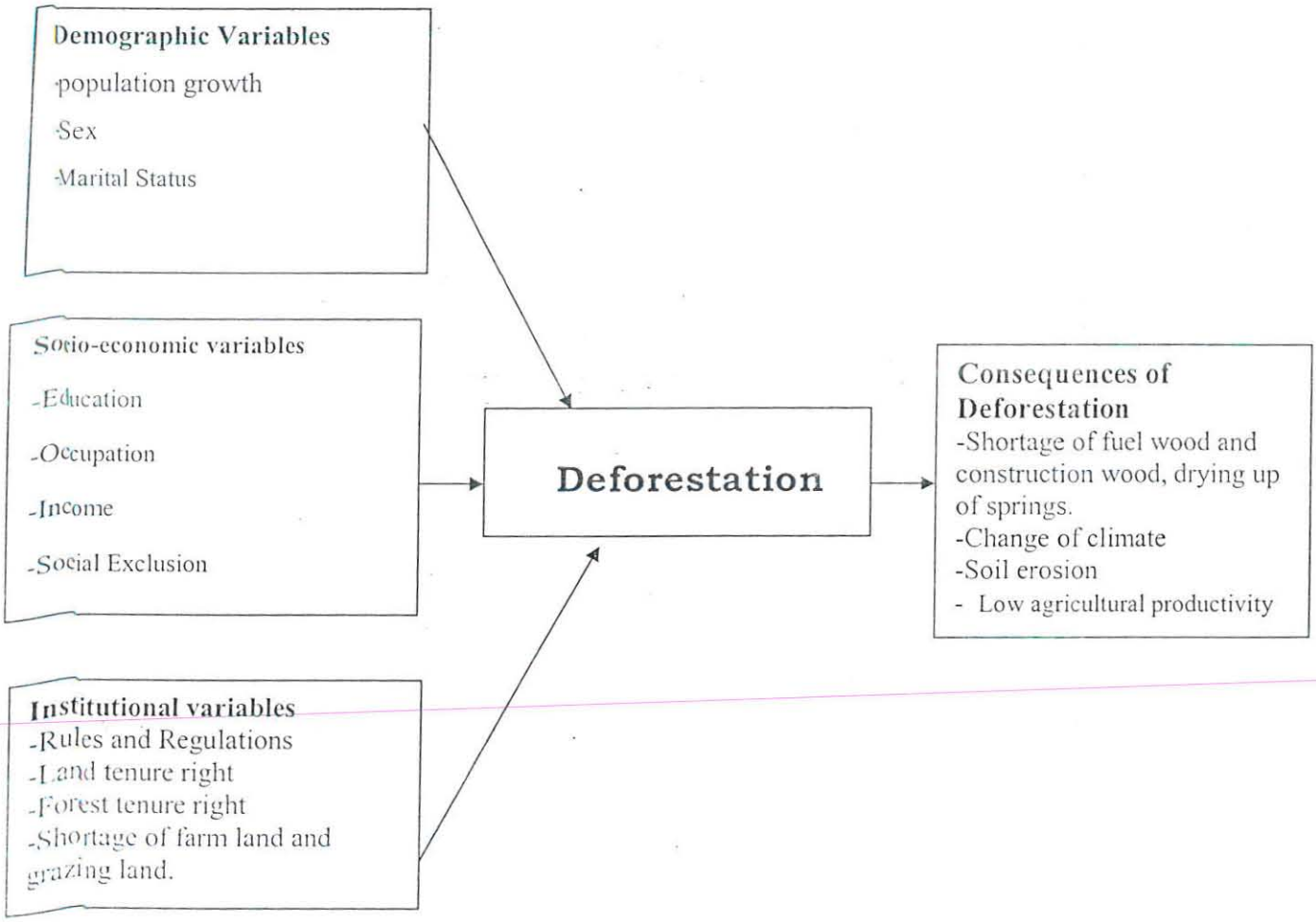
1. Do large household sizes and land and/or forest tenure rights affect forest resources?
2. To what extent has the level of education cause social exclusion and deforestation?
3. What are the consequences of deforestation for the local people?
4. How do local people and government agents perceive the causes and problems of forest destruction?

1.4. Significance of the Study

The findings of this research will:-

- Give valuable information for concerned bodies about the interrelation between social, economic and demographic factors and deforestation and its consequences.
- Raise the level of awareness to of government bodies working on Woreda agriculture and other offices on necessary measures to consider halting deforestation.
- Serve as a stepping stone for further research concerning on the correlation between population and deforestation.

1.5. Conceptual Framework



Source: Developed by the author on the basis literature (2010)

1.5.1. The Relationship among study variables in the conceptual framework

The analytical framework given above correlates independent variables with dependent variable (deforestation) and its consequences.

The people who are living in the study area are engaged in agriculture and while ''Menjas" are dependent on forest, i.e, by selling fuel wood and charcoal. This shows us the socio-economic and demographic characteristics of the kefa people generally and Menja communities who have a specific relation with deforestation (expanding the farmland and selling fuel wood and charcoal). The major factors influencing deforestation in the society are demographic, socio-economic and institutional in nature.

- **Demographic variables.**

In demographic characteristic, head of the household and number of children have their own effect on deforestation.

Sexes of head of the household-Those communities who are living in the study area are practicing polygamy. And women are responsible to raise children, and as a result women need to be self supporter and independent member of the society. This is mainly due to lack of leadership. Therefore, women have closer tie with the natural forest to sustain their life and family. Flintan (2003) showed that married women as compared to the unmarried ones are busy of activities like house keeping, raising families, cooking and other activities as a result of which they are less involved in the community based activities. This, therefore, has limited their knowledge of environmental conservation activities.

Rapid population growth

There is high rate of fertility in the area because of low level of education, inaccessibility of contraception and cultural condition and there was resettlement program held in the area during previous regime and with the present government. This increases the size of population rapidly which brought adverse effects on forest resources in the area.

- **Socio-economic variables**

Occupation Most people in the study area are involved on agriculture except Manja societies who are dependent on forests by selling fuel wood and charcoal. And with high rate of population growth, they need to expand farmlands by clearing forest.

Income

With the absence of sufficient income to sustain their life and their family, people are forced to expand farmland and grazing areas. On the other hand, Menja people who are discriminated from the society and have no land for agriculture are living by selling fuel wood and charcoal. And other products they produce have less value, since they are unacceptable by the surrounding community. These reasons make the society disadvantageous to generate enough income and dependent on forest resources.

Education

Education as a socio-economic variable is a powerful factor which affects forest resources. Education has direct influence on forest conservation. That is, lack of education leads to lack of knowledge and awareness on conservation of forest resources. On the other hand, the greater educational attainment of the community the wiser use of natural resources.

- **Institutional variables**

According to the Ethiopian Federal Democratic Republic (EFDR) Constitution Article 40(3) the right to ownership of rural and urban land as well as of all natural resources is exclusively vested in the state and in the peoples of Ethiopia. State-property regimes are those where ownership and control over natural resource use and management rest in the hands of the state through various government agencies. Individuals and groups may use the natural resources, but only with the approval of the administrative agency responsible for carrying out the wishes of the larger political community. National forests, national parks, and military reservations are examples of state-property regimes. The state may both directly manage and control the use of state-owned natural resources through government agencies, or it may lease the natural resource to groups or individuals who are given usufruct rights for a specified period of time. That is, state-property regimes remove most discretion from the user, and generally do not convey long-term expectations to the immediate users (Bromley, 1991). In this regard, generally in Ethiopia and particularly in the study area the body that could conserve and utilize these resources is not well organized. On the other hand, the majority of kefa people own land for agriculture whereas the minority Menja do not own the land. This makes Menjas to be dependent on forest resources.

1.6. Research Methodology

1.6.1. Data sources

The data are collected from both primary sources and secondary sources. The primary sources of information include sample households using questionnaires and interviews, discussions with the Woreda agro-forestry experts, health officer working on family planning in the area and Focus Group Discussion (FGD) with local elders. Secondary sources are obtained from the documents of Woreda agricultural and health offices and other sources like books, journals, magazines, etc.

1.6.2. Sample Size Determination

Based on Dixon and Leach's (1978) sample size is determined as on the basis of the following formula.

$N= P(1-p)Z^2/E^2$ + 5% contingency

Where, N- sample size

P= the target population in study area, since no research has been done in the study area so far 50% of the target group is taken. Therefore P= 0.5

Z= the standard normal value corresponding to the desired level of confidence (i.e., 95%)

E= Acceptable error is 5% which is 0.05

Therefore, $N= 0.5 (1-0.5) * (1.96)^2 / (0.05)^2$ + 5% contingency

= 0.25 * 1536.64 + 5% contingency

= 384.16+ 5% contingency

= 403

After the sample size has been determined based on the above formula, three kebeles (Beko, Agaro and Kutashoira) are selected purposely due to high destruction of forests compared with other kebeles in the Woreda. And the sample households are selected from each Kebele based on the proportion of households. Accordingly, out of 539, 638 and 493 households in Agaro, Kutashoira and Beko kebele administrations, respectively 403 sample respondents were selected using proportional allocation formula:-

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$\frac{Ni}{N} \times n$ where Ni- the total household heads in each Kebele

N- the sum of all household heads in the sample Kebele

n- Sample size of household heads in the study area

- Agaro-539/1670 x403=130
- Kutashoira-638/1670 x403=154
- Beko-493/1670 x403=119

1.6.3. Method of data collection

Primary data are collected through questionnaire, which is the main data collecting instrument from selected sample households. It was done by five well trained data collectors. In addition to this, interviews are held with key informants such as elderly people from the community, government officials like the Woreda's agricultural expert and health officer working on family planning, on the basis of structured and unstructured questions to make the research reliable and valuable.

The researcher also employed three FGD groups from the majority Kefa people and Menja community and observation to gather additional data. The three FGD groups were selected through each independent group from majority Kefa people and Menja group and one from both in combination. On the other hand secondary data document such as statistical reports, abstracts, reports, journals and related books are reviewed and analyzed.

1.6.4. Method of Data Analysis

The collected primary data from sample farmers through questionnaire, FGD as well as discussion and interview held with elders, exports of Woreda agricultural office, health official working on family planning are analyzed and interpreted by using qualitative method are present with simple statistics like percentages in table and charts. Similarly, secondary sources obtained from written materials (books, magazines, journals, etc) are also presented together with the primary data in the form of description.

1.7. Limitations of the Study

Some of the factors are assumed to limit the study include absence of well documented and organized information in the Woreda agriculture, health and administration offices, shortage of money and time, and respondents' reluctantancy to give information; are the major once.

1.8. Definitions of Terms

- Deforestation is the destruction of forest for construction, fuel wood, expansion of farmland, etc(Waugh, 1994).
- Menja is the name referring to the minority group of Kefa people.
- Social exclusion is the tendency that people are ignoring the other people socially.
- Out migration is the departing of people or animals from their original place of residence to other area.
- Property regime is the system of possessing properties (Bromley, 1991).

Chapter Two

Review of Related literature

2.1. Literature on Deforestation

Deforestation is the destruction of forests for farms and cities (World Book of Encyclopedia, 1994) .It also means the cutting down of trees either to create space for farming or settlement, to use for fuel or for construction purposes (Waugh, 1994). The environmental outcomes of population growth have included extensive forest destruction, entailing both land degradation and watershed deterioration (Caldwell et *al.*1989).

As population has increased there has been a change from less intensive to more intensive system of cropping in many parts of the world. Thus in some areas forest fallow has gradually changed to bush fallow cultivation (Horn by and Jones, 1982).The increase in the world's population over the centuries has brought about a concomitant decrease in frosted areas. Trees have been cut down for a variety of purposes such as home building and fire wood. The primary cause of deforestation, clearing land for agriculture, and the gathering of wood for fires are directly related to population growth (Peters, 1989).

The struggle for greater productivity to meet the raising demands and aspiration of growing population led to activities that intensified degradation and destruction of the already scare but fundamental resources (Ghosho, 1984). In addition to natural increase of population resettlement schemes are also the causes for deforestation (Grainger, 1986).

Population growth has been the major cause of environmental problems in recent years. The relationship between population growth, human welfare and the natural environment continue to be widely debatable (Livernash *et al*, 1998). Malthus argued that with the growing of population, resource depletion will accelerate resulting in widespread deforestation, overgrazing, biodiversity loss, etc., the ultimate destination of which is poverty and starvation. Therefore, the core of Malthusian theory may be best captured by the dependent role assigned to population growth to the independent factor of environment and technology (Marquette, 1997). On the other hand, Boserupian theory similarly focused on the relationship between those variables such as population, environment and technology. Boserup focused her attention on exploring the role of population as independent variable that influences both the development of agricultural technology which, in turn, shapes the productive capital of the resource. That is, as Marquette further shows a threshold dynamic

density of population that will support the necessary division of labour and more efficient production.

The rapid growth of population in developing countries where agriculture is the backbone of the national economy, there is less availability of land for cultivation. In other words the combined effect of population growth with the dependence of national economy on agriculture has resulted in land hunger. As a result, farmers colonize new areas at the expense of forest and wood lands (Mekete, 1999).

According to the World Bank (1994) the world has lost about half of its forest cover and continues to loss some 15 million hectares of forest every year. Deforestation over the period 1980-1990 reached 8.2 percent of the total forest area in Asia, 6.1 percent in Latin America and 4.8 percent in Africa.

Fuel wood and charcoal are among the important sources of energy in developing countries. According to Waugh (1996) around 1.5 to 2 billion people (30 to 40 percent of the world's population) rely mainly on wood for warmth and cooking food. They also added that wood is used as fuel for cooking and heating by 80 percent of African families.

The factor contributing for deforestation in Ethiopia like other developing countries is high population growth. Ethiopia with a population of 63.3 million is the third populous country in Africa (MEDAC, 1998). According to the 2007 population and housing census, the size of population in Ethiopia reached around 77 million (CSA, 2008). This high population growth in the country resulted in high demand for fuel wood. And the increasing demand for fuel wood in turn is the main cause for the loss of forest resources (EFAP, 1992).

Rapid population growths together with migration of people lead to land use conflict between agriculture and wild life (Amare, 1996). As a result of large scale human pressure on forest there is a shift from large numbers to very low numbers of animal and plant communities (Gichohi *et. al,* 1996)

In Ethiopia due to rapid population growth, there is high consumption of wood to construct traditional houses, buildings, fences, house furniture, etc. when the numbers of people consuming construction wood increases then the demand for it also increase (EFAP, 1992).

There are various and interconnected factors of deforestation according to Grainger (1986). Some of the causes of deforestation are: - rapid population growth and re settlement schemes

resulted in expanding of farmland, ranching and pasture development, fuel wood and charcoal timber trade, shifting cultivation and logging.

Deforestation or forest depletion is not only the removal of trees and change of land cover or land use. It is also a social phenomenon grounded in historical events, political choices and economic decisions by different actors in the society (Melaku, 2003).

2.1.1. Demographic Factors

According to FAO (1998), between 1980 and 1990 forest cover decreased at an average of 0.8 percent per year in developing countries of the topics. This figure represents the loss of 154 million hectares over a ten year period. Particularly, there is a growing concern that much of the sub-Saharan Africa national resource base and ecological environment are deteriorating mainly due to high population growth combined with unsuitable energy consumption patterns.

The annual growth rate of population in Ethiopia based on the 2007 population and housing census is 2.6 percent and the growth rate of Southern Nation, Nationality and Peoples State is 2.9 percent, which is the highest in the country (CSA, 2008). This high population growth rate resulted from high fertility rate. And this causes rapid destruction of forest resources in the country.

On the other hand in a polygamous population, it is the women who are responsible to take care of the household and also bring their children. This shows women have a very close relation with the natural forest resource to support their life and their family. This forced them to depend on natural resources found on the surrounding environment, mainly on forest resources. This shows women have a very close relation with the natural forest resource to support their life and their family.

2.1.2. Socio-economic Factors

One of the major socio-economic factors to conserve forest resources is education. An educated society is aware of their environment and hence conserve in a good manner. Especially educating woman is the major issue to conserve the forest resources of an area. This is due to their role in the household and in the community is very high.

The economic activity most of the people involve in a country has also an impact on deforestation. For instance, according to the 2005 Ethiopian National Labour Force Survey,

75 percent of women and 84.3 percent of men are engaged in agriculture, hunting and forestry related activities (2005). So based on individual's economic activity, the destruction of forces also determine to be high or low. Therefore, in Ethiopia the largest proportion of population are engaged in agriculture and with high rate of population growth farmland is expand.

Social exclusion is the other socio-economic cause for deforestation. In the study areas, Menja community is excluded from the Kefa people. According to Farm Africa (2002), the Menja community was neglected by other communities in the Kefa zone because of their cultural, religion and socially 'unacceptable' norms. Because of this the other communities are not willing to have social and economic relationship with Menjas. And this people are not only discriminated socially but also from agriculture. Menjas are earning their livelihood from selling fuel wood and charcoal.

2.1.3. Institutional Factor

According to Bromley (1991) there are four broad types of resource management regimes. These are state, private, common and non-property or open-access property regimes.

Moreover, Bromley indicated that open-access regimes are devoid of control mechanisms and represent situations of unowned resources allowing individuals or groups to make use of scarce resources as needed. The forest resources which are found in the study area can be considered an open-access property regime causing deforestation due to lack of a responsible body that protects and conserves the resource. On the other hand, based on Bromley, most of the environmental problems can be traced to property regimes. The laws of the country on resource ownership are one of the causes of forest destruction.

In Ethiopia during the imperial regime, the forest resources of Bonga areas remained under state control. The state, nonetheless, was unable to implement a management system that would have permitted resources sustainability. The military regime introduced some form of centralized management resulting in the alienation of some communities like Menja, one of the minorities in Kefa zone, who are exclusively depends on the forest resources for their livelihood (Farm Africa, 2002).

2.1.4. Conversion of Forest Land in to Agricultural Land

In developing countries like Ethiopia where population is growing fast and agriculture is the backbone of the national economy, there is less availability of land for cultivation. A combined effect of population growth with the dependence of national economy on agriculture results in land hunger. As a result, farmers colonize new areas at the expense of forest and wood lands (Mekete, 1999).

In most parts of Ethiopia, there is moderate climate and adequate rainfall (the high lands) which is conducive for agricultural activity. It is believed that it was this part of the country that had high forest coverage before human settlement increased to high land. At present, this part of the country holds the majority of population and at the same time suffered from forest destruction.

2.1.5. Fuel wood Consumption

Fuel wood consumption is considered to be the major cause of tree cutting in most African countries (Heldon, 1987). Similar to many African countries fuel wood is the main source of household supply in Ethiopia energy.

Table2.1. Annual wood consumption estimates in Ethiopia.

Wood use	% total volume	Volume utilized ('000' m^3)
Construction	4.21	1,000
Poles	4.21	1,000
Charcoal	6.74	1,600
Fuel wood	84.21	20,000
Others	0.63	150
Total	*100.00*	*23,750*

Source: EFAP (1992)

As it is clearly indicated in the above table more than 90 percent of the energy in the country is obtained from wood. This figure shows that to what extent forest resources are being threatened due to the high demand for fuel wood.

Generally, high population growth in the country results in high demand for fuel wood. And the increasing demand for fuel wood in turn causes for the loss of forest resources in the country.

2.1.6. Consumption of Construction Wood

EFAP (1992) estimated that out of the total 23.75 million cubic meters of annually consumed wood, around 1 million (4.21%) cubic meters is consumed for constructional purposes. Thus high consumption of wood for constructing traditional houses, buildings, fences, house furniture, etc. are caused by rapid growth of the population.

As to the 1993 estimation of EFAP, the annual demand for construction and wood was about 2.1 million cubic meters while the expected supply being merely 1.2 million cubic meters and therefore, only 57.1% of the demand was expected to have been met.

It is clear that such amount of demand for construction wood has a great impact on forests. Therefore, the increasing demand for construction wood is one of the causes threatening forest resources.

2.2. Impacts of Deforestation

Deforestation has several and related potential impacts on 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.

These effects are briefly explained separately in the subsequent paragraphs.

2.2.1 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).

On the other hand, EFAP estimated the demand for wood and its products as shown in the following table.

Table 2.2 past, current and projected demand for wood products (Million m^3)

year	Industrial wood	Construction wood	Fuel wood	Total
1992	0.4	2.1	44.9	47.4
2000	0.7	2.7	58.4	61.8
2005	0.9	3.2	68.4	72.5
2010	1.3	3.8	79.5	84.6
2014	1.6	4.3	88.9	94.8

Source: EFAP (1994)

The annual increment yield of Ethiopia's forest resource is estimated at about 13.8 million m^3. The deficit in fuel wood for example, is estimated at about 32.5 million m^3 per year (EFAP, 1994). The deficit was met by over cutting and use of cow dung and crop residues. The country has not been able to increase its wood resources by planting trees and using existing resources in a more sustainable manner to close the supply and demand gap (Melaku, 2003).

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.

In the Southern Nations, Nationalities and Peoples Regional State the average fuel wood consumption around the high forest area is about 1200 kg per annum per household. It was also projected by the year 2015 about 89,293 hectares of forest coverage will be cleared for agricultural expansion purpose (RCS of SNNPR, 2003).

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.

2.2.2. 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 basically attributed to their intercepting and anchorage functions. They decrease the direct force of rain droplets and they also 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 tones 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).

2.2.3 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, 1994).

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. But the failure of rains means low crop production that could result in famine (Bruce, 1992).

2.2.4. 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, 1994). But 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.

2.2.5 Reduce Availability of Fodder for Livestock

Many forests in dry areas have widely spaced trees with heavy growth of grass and shrubs in between. Farmers who have small woodlands in such areas often let their livestock graze over there. Because of the destruction of forests, however, the habitants of many living creatures are destroyed and as a result, the problem of fodder may occur (World Book of Encyclopedia, 1994). This condition has been happening in the pastoral nomads of Ethiopia.

Chapter Three

General Background of the Study Area

3.1 Physical Characteristics

3.1.1 Location and size

Chena Woreda is one of the ten Woredas found in Kefa zone, Southern Nations, Nationalities and People's Regional State. It is found at the southwestern part of the zone. The total area of the Woreda is 951.51 km^2 (CAO, 2010).

Geographically, the Woreda lies between 7^0 02'00" North to $7^0$22'00"North latitude and $35^0$33'00' East to $35^0$54'00' East longitude. It has a common boundary with Gewata Woreda in the north, Geimbo Woreda in the northeast, Decha Woreda in the East, Bitta Woreda and Sheka zone in the west as well as Bench- Maji zone in the south. Since the Woreda is situated around the equator, it contains huge forest resources with various species of trees.

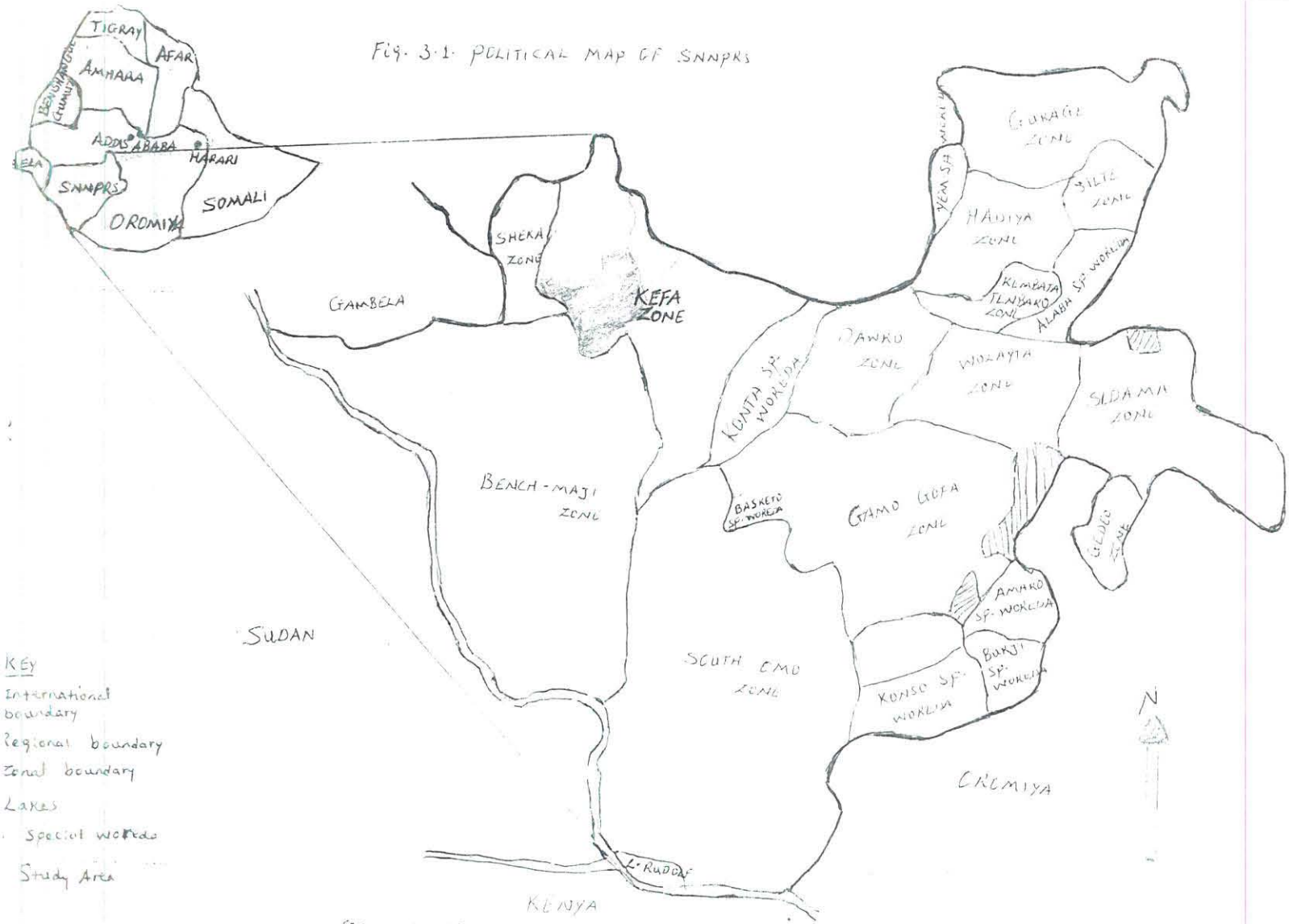
Wacha, which is the center of the Woreda is found at 73 km from the center of Kefa zone i.e, Bonga, the selected study areas such as Agaro, Kuta shoira and Beko kebele Administration are found 15 km 16.5 km and 15.5 kms away from Wacha town, respectively.

3.1.2. Relief and Drainage

According to the Woreda Agricultural and Rural Development office, the physical features of Chena Woreda include valleys, gorges, plains, plateaus and its major parts are highland area. Attitudinally the Woreda varies from 1050m to 2320 m above the sea level. The highest elevation of the Woreda i.e, 2320 m above the sea level is found at Gopa, where as the lowest elevation i.e, 1050m above the sea level is found at Shingir.

Regarding drainage system, Chena Woreda is the source of several permanent and seasonal rivers. Some of these rivers are Meni, Beko, Kenech, Bella and Shonga. Most of the rivers are flowing towards the south and southeastern direction and join Gojeb River. Generally, Chena Woreda contains moderately elevated land and several perennial and seasonal rivers.

Fig. 3.1. POLITICAL MAP OF SNNPRS



KEY

- International boundary
- Regional boundary
- Zonal boundary
- Lakes
- Special woreda
- Study Area

SOURCE - CHENA WOREDA ADMINISTRATION OFFICE (2010)

Scale - 1: 2,500,000

3.1.3. Climate

Chena Woreda, with the variation of elevation between 1050-2320 m above sea level, is stratified by three agro-climatic zones following the traditional zonation as shown in the table below.

Table 3.1 Agro-Climatic Zones of Chena Woreda

Altitude in meters above the sea level	Agro-climatic Zonation	Percentage of land coverage	Description
2300-2320	Dega	5.62	From slightly warm to cool highland
1500-2300	Weina dega	70.14	Warm to slightly warm wet, mid altitude
500-1500	Qolla	24.24	Warm, wet and lowland.

Source- CARDO (2010)

According to CADO, from the total agro-climatic zonation of the Woreda, most of the Chena Woreda falls under Weinadega (70.14%) followed by Qolla and Dega, which account for 24.24 percent and 5.62 percent, respectively. Based on the local climatic zonation system, the specific study areas fall under Weinadega climatic zone. Moreover, the areas are found at somewhat depressed land with most of their parts surrounded by highlands. The study areas have similar rainfall distribution with the highland areas found around them. But there is a difference of temperature because of variation in altitude. The temperature is higher in the areas compared with the surrounding highlands.

In the Woreda in general and in the study area in particular, rainfall occurs for eight months (March to October), followed by dry season. As documented at Shishinda meteorological station, the study areas very near to the station have annual rainfall of 1037 mm in 2009.

Table 3.2 Rainfall distribution on the study area

	J	F	M	A	M	J	J	A	S	O	N	D
Rain fall in(mm)	06	62	89	113	98	126	157	160	95	79	41	11
Mean monthly temp in (^{o}c)	23	23	25	26	27	25	23	22	23	24	23	21

Source: Shishinda Meteorological Station (2010)

In terms of temperature, the study areas generally are warmer than the surrounding highlands. Days are hot though; temperature drops during night times. According to the information obtained form CARDO, maximum temperature in a year occurs in May while the minimum temperature occurs in December. In addition, the maximum and minimum mean monthly temperature of the area is 27^{0}c and 21^{o}c, respectively. The presence of favorable climate in the area (i.e, high rainfall and temperature) is favorable for the growth of jungle forest.

3.1.4. Natural vegetation coverage

It is clear that most of the forest coverage of Ethiopia is found in some inaccessible areas including the southwestern part of the country. Chena Woreda, which located in SNNPRS in Kefa zone, southwestern part of Ethiopia, contains the largest coverage of forests with rich biodiversity. Forestland in Chena Woreda distributed over 40,895 hectares accounts for 42.92 percent of the total areas of the Woredas.

According to CARDO (2010), vegetation distribution in Chena Woreda varies with altitude in the following areas.

1. Hagenia-Juniperus forest- distributed with the elevation above 2300 in eastern part of the wereda
2. Bamboo forest- found in wet Weinadega and Dega agro-climatic zones between altitudes 1850 -2320m in the southern and western part of the Woreda.
3. Deciduous forest- covers the northern and northeastern part of the Woreda.
4. Broad-leaf Evergreen forest-dominantly found wet Weinadega and Qolla agro-climatic Zonation of the Chena Woreda.

3.2 Land Use and land coverage

Forests and bushes account for the largest share (42.98 percent) of the total land coverage of Chena Woreda. Cultivated lands hold the second largest share (28.45) of land use types. Social institutions, grazing lands and swampy areas account for 3.88 percent, 1.58 percent and 0.96 percent of the total land areas of the Woredas, respectively. The remaining 22.14 percent of the land from the total area is uncultivated but they could be cultivated.

Table 3.3 land use classification of Chana Woreda

Land use	Area Hectares	Percentage
Cultivated land	27,069	28.45
Grazing land	1,504	1.58
Forests and bushes	40,895	42.98
Social institutions	3,699	3.89
Swampy area	912	0.96
Uncultivated land	21,072	22.14
Total	*95,151*	*100*

Source: CARDO (2010)

3.3 Population size and density

According to the population and housing census of 2007 the total population size of the Woreda distributed over 952. 51 km^2 was 161,292. As a result, the crude population density was 169.5 persons per km^2 with annual growth rate 2.9 percent.

Table 3.4 Urban and Rural total Population of Chena Woreda by 2007.

Area	Male	Percentage	Female	Percentage	Total	percentage
Urban	7010	48.42	7466	51.58	14,476	8.98
Rural	72.504	49.38	74,312	50.62	146,816	91.02
Total	*79,514*	*49.30*	*81778*	*50.70*	*161,292*	*100*

Source: Central Statistics Agency (2008)

From the above table what we can observe is 91.02 percent of the population in the Woreda is found in rural areas and the remaining 8.98 percent found in urban areas. In addition to this, the sex ratio of the population in the Woreda is 97.24 percent. This shows that, the female population of the Woreda is slightly greater than male population. According to the Administration office of Chena Woreda, the specific study areas (Agaro, Kutashoira and Beko kebele Administrative) contain a population size of 11,095, 13,953 and 10,788, respectively.

Therefore, high growth rate of the population (2.9%) in the study area led to fast destruction of jungle forests, which is considered as "Lung of the country". The reasons were being to expand farmlands, to obtain wood for fir wood, constructional materials, and expand settlements, etc.

3.4 Ethnicity

The major ethnic group in the Woreda is the Kefa people followed by Amhara and Oromo. The Kafa people inhabited the "Dega" and "Weina dega' agro-climatic zone, where the areas are favorable for the production of coffee and enset. Where as the Amhara and Oromo people inhabited the "Weina dega" and "Qolla" areas where cereal crops such as teff, wheat, sorghum, etc. and cash crops can be produced to some extent.

"Menjas" are part of the Kefa people, but they are minority and mariginalized or excluded strictly. This group of people mainly led their livelihood by selling firewood and charcoal. Moreover, they own no farmland. This makes them to be dependent on the natural vegetation found in the area.

3.5 Economic Activity

More than 95 percent of the people in Chena Woreda are engaged in agriculture and thus it is the most important economic activity. The major type of agriculture practiced in the Woreda is mixed farming. Crop production is one of the farming practices carried out in the Woreda mainly in Weinadega agro-climatic zone, where both rainfall and temperature are moderate and conducive for the growing of crops.

People who are engaged in crop production in the Woreda account for 25 percent of the total population. The major crops grown in the area are maize, teff, wheat, enset, beans and peas. Cash crops such as coffee, spices and chat are also produced in large scale. In addition, fruits

and vegetables like banana, papaya, sugarcane, cabbage, potatoes, etc. are among some of the income generating products for the people.

Although people are not predominantly engaged in pastoral way of life, involved in rearing of animals together with crop production is a common practice with about 60 percent of the Woreda population. According to CARDO (2010), the number of cattle in the Woreda is 118,411. The animals and their products are used to generate income for the people.

In addition, based on the information obtained from the Woreda agricultural and rural development office, crop production and trade accounts for 9 percent and trade by itself occupies 2 percent of the population. The remaining 3 percent is covered by the peoples who are engaged in selling of firewood and charcoal as well as other activities like crafts. In the specific study areas crop production and cash crop productions such as coffee, fruits and vegetables are important income generating agricultural practices. Livestock rearing and the production of honey supplemented these activities.

Table 3.5 Economic activities in Chena Woreda

Economic Activity	Percentage
Crop pròduction	25
Crop Production and rearing of animals	60
Trade	2
Crop production and trade	9
Others	3
Total	*100*

Source: CARDO (2010)

As it is shown on the above table, the main economic activity in the Woreda is crop production and rearing of animals. In addition to the growth of population in the Woreda through time, increasing agricultural production by expanding farmlands at the expense of forests has become a routine practice.

Chapter Four

The Nature and Extent of Deforestation in Chena Woreda

4.1 Background of the Study population

Most of the people living in the study areas are the Kefa people. From the total sample respondents selected by randomly the Kefa people account for about 72.70 percent, whereas the remaining 14.64 percent and 12.66 of the sample respondents are the Amhara and Oromo people, respectively.

Table 4.1 Ethnic background of sample respondents

Kebele Administrations	Ethnic Groups						Total	%
	Kefa	%	Amhara	%	Oromo	%		
Agaro	90	69.23	24	18.46	16	12.31	130	32.26
Kutashoira	121	78.57	13	8.44	20	12.99	154	38.21
Beko	82	68.91	22	18.49	15	12.60	119	29.53
Total	*293*	*72.70*	*59*	*14.64*	*51*	*12.66*	*403*	*100*

Source: Field survey (2010)

Most of the sample respondents have a large family size. According to the informant from Shishinda health center, this is because of low level of using family planning method, lack of education, considering children as an asset, that the people believe they would support them later during their retirement ages as well as in the present day-to –day domestic and farm activities.

Table 4.2 Family size of the sample farmers

Kebele Administrations	Family size						Total
	1-3	%	4-7	%	8 and above	%	
Agaro	38	29.23	71	54.62	21	16.15	130
Kutashoira	63	40.91	69	44.81	22	14.28	154
Beko	35	29.41	73	61.34	11	9.25	119
Total	*136*	*33.75*	*213*	*52.85*	*54*	*13.40*	*403*

Source- Field survey (2010)

As shown in the above table, 66.25 percent of the total sample respondents have a family size of four and above. The average family size of sample respondents is six. The maximum family size is 12. Obtaining large family size in the area enabled the researcher to believe that the growth of population has the contribution to deforestation.

On the other hand, one of the most important thing which is inseparable for the social, cultural, economic, political and environment development of a given society is education. According to the information collected form sample respondents, educational level of the people is low.

Table 4.3 Educational status of respondents

Educational background	Kebele Administration							
	Agaro	%	Kutashoira	%	Beko	%	Total	%
Do not able to write and read	78	60.00	93	60.39	66	55.46	237	58.81
Adult Education	27	20.77	55	35.71	24	20.17	106	26.30
Grade 1-6	19	14.62	3	1.95	19	15.97	41	10.17
Grade 7-12	6	4.61	3	1.95	10	8.40	19	4.72
Total	*130*	*32.26*	*154*	*38.21*	*119*	*29.53*	*403*	*100*

Source: Field survey (2010)

As indicated in the above table only 14.89 percent of the sample respondents have attended different level of formal education. It is clear that about 10.17 percent attended primary education and 4.72 percent attended secondary education. However, the remaining 58.81 percent are illiterate and 26.50 percent are with adult education.

Although indigenous knowledge has a great role to conserve the environment and resource in one area, formal education has also irreplaceable contribution. Therefore, the low level of educational status of the sample respondents has its own impact on the destruction of forests and enables the researcher to assess the perception of people on the short as well as long-term problems of deforestation and ways of conserving forests.

Moreover, the level of education also shows the level of social exclusion. Low educational status of the sample respondents has a tendency of high social exclusion. On the other hand, as the level of education increases the level of exclusion will decrease mainly to the secondary education and above.

Regarding age structure of the sample respondents, the dominant age group is found between 41-55 years, which accounts 44.91 percent of the total sample respondents followed by age group between 26-40 and 56-70 years, accounting for 41.19 percent and 12.90 percent, respectively. The remaining respondents, whose age is above 70 years, account only 1

percent. The age structure of the sample respondents enable to compare and contrast the coverage of forest in the area in the previous and at present time.

Table 4.4 Age structure of sample respondents

Age Group in year	Keble Administrations						Total	%
	Agaro	%	kutashoira	%	Beko	%		
26-40	69	53.08	60	38.96	37	31.09	166	41.19
41-55	46	35.38	59	38.31	76	63.87	181	44.91
56-70	13	10.00	33	21.43	6	5.04	52	12.90
Above 70 year	2	1.54	2	1.30	-	-	4	1.00
Total	*130*	*32.26*	*154*	*38.21*	*119*	*29.53*	*403*	*100*

Source: Field survey (2010)

4.2 Forest coverage of the study area

The information obtained form key informants of elderly people in the area revealed that before 1950 there were no permanent settlements in the three-kebele administrations such as Agaro, Kutashoira and Beko. The areas were totally covered by forests containing different indigenous trees.

As the researcher observed and information obtained from agricultural and rural development expert of the Woreda, the dominant trees of the area are: kosso (Hagenia Abyssinia), Yabesha Tid (Juniperus Procera), Wanza (Cordial Africana), Tikur Inchet (Prunus Africanus), Zigba (Podocurpus Falcatus), Damot Woira (Cuspidate), Birbira (Milletia Ferniginea), Kerero (Aningeria Adolfi-Friederici) and different kinds of shrubs. This accounts for about 42.97 percent of the Woreda's total area.

Since recent times, however, these indigenous trees have been reduced from time to time because of human activity. The remaining forests found in the kebele administrations are located along the main side of road from Addis Ababa to Mizan as well as along the river valleys of Meni, Kenech and Shonga.

4.3 Extent of Deforestation

In general, as widely discussed in the previous sections, the different causes of deforestation in the study area include cutting of trees for the expansion of farmland, for fire wood and charcoal making, furniture making, wood for construction purpose, etc. These activities are directly related to the rapid growth of population. In addition the level of education that enable to conserve resources, social exclusion as well as the land/forest tenure rights are some of the causes.

FAO (1998) estimates between 1980 and 1990 forest cover decreased at an average of 0.8 percent per year in the developing countries of the tropics. For instance, Ethiopia loses about 141,000 hectares of natural forest each year due to firewood, conversion to farmland, overgrazing and uses of forest wood for building material.

Therefore, according to informant form CARDO (2010) working on natural resource conservation, the extent of the destruction of forests in the study area has estimated as between 15-20 hectares per year. If this reduction of forest coverage continues, there will not be a single hectare of land covered with trees in an area in the near future, unless immediate measures are put into practice.

4.4 Factors causing deforestation in selected Kebeles of the study area.

The loss of forest resources in the study area is directly or indirectly associated with the rapid growth of population there. That means, as the size of population in the area increases, the annual rate of deforestation also increase to satisfy the need of a growing population for various purposes.

Based on the field survey and information obtained form sample respondents, destruction of forest in the area took place for the expansion of farmland, the need for fire wood and making of charcoal, for construction purpose and for making household furniture. This is summarized in descending order in the following table 4.5.

Table 4.5 Causes of deforestation as listed by sample respondents.

Causes of deforestation	Rank Frequencies				Total Score	Rank order
	1	2	3	4		
Expansion of farmland	916	483	-	-	1399	1
Fire wood and making of charcoal	412	471	162	-	1045	2
Making of furniture	160	147	260	36	603	3
Wood for construction purpose	124	108	188	58	478	4

Source: Filed Survey (2010)

The result of the above table comes by multiplying the frequency with the weighting value of four, three, two and one for the rank of one, two, three and four respectively.

In addition to the above causes, resettlement program for expansion of grazing land and inappropriate investment practice are also identified as the factors for the destruction of forests in the study area.

4.4.1. Expansion of Farmland

According to sample respondents, which are indicated on Table 4.5, the destruction of forest in the study area is taking place due to the presence of more need for farmland. The rapid growth of population is one of the major problems for the degradation of natural resources in developing countries including Ethiopia. As population grows the need for food, also increase. In the study area, unlike other rural parts of Ethiopia, the growth of population is very high. Based on the key informant from Shishinda health center, the prevalence of contraceptive in the area is very low leading to high rate of fertility. As it is explained in the previous section, the growth of population for the country was 2.6 where as for SNNPRS was 2.9(CSA, 2008). This shows that it is high to the regional level.

From the information obtained from majority Kefa group FGD to the effect of population growth on vegetation in relation to family size, explained as

The size of population in the study area is increasing at alarming rate, but farmland is neither increasing nor decreasing. Therefore, the farmlands that have been under plough give small amount of production, which cannot satisfy the need of large family. So in order to feed their family, the only available alternative is expanding farmlands at the expense of forests found in the surrounding areas.

From the total sample respondents almost all pointed out that they need more farmland. This shows that population growth is the most important cause for the destruction of vegetation. Moreover, this was resulted in out migration of population. Mainly the younger generations were migrating to other urban areas like Tepi, Bebeka and even Jimma to search job.

On the other hand, resettlement programs that had been taking place during the previous time is also one of the factors for deforestation. The program has been taken place without conducting a prior research environmental impact assessment rather than the need and command of politicians. According to the information obtained from respondents settlers destruct vegetation to construct houses, for grazing land and for other purposes.

Generally, the people who have destructed forests for the purpose of expanding farmland are the majority Kafa groups and other ethnic groups. However, the minority Kefa people, the Menjas are cutting trees only for sell not to expand farmland, since from the beginning they have no farmland and have not involved in agricultural practices.

4.4.2 Fire wood and of Charcoal making

Fire wood and charcoal making is the second cause of deforestation in the study area. According to sample respondents and information obtained from all groups of FGD participants, the only source of energy for the people in the area is wood. In addition, the growth of population is responsible for an increasing of cutting trees for the purpose of firewood.

Based on the FGD informants of Menja group, due to lack of trees in their surrounding, mainly women and children are forced to go far distance (at least spending on about 2-3 hours on average per day) to collect firewood. Moreover, they are worried for their future that if this condition continues, they may face a problem of obtaining trees around their village.

In this regard, people who involve in the destruction of trees for firewood and of charcoal making are the Menjas. They are the only people who are providing firewood and charcoal

for the nearby town, Shishinda. This shows that, the Menja people's livelihood is dependent on selling of firewood and charcoal. In addition, the charcoal produced by Menjas was transported to the other urban areas like Bonga, Jimma and Addis Ababa. This became an incentive for these people to increase their income.

4.4.3. Wood for Furniture making

The third major cause of deforestation in Chena Woreda is the high demand of wood to making household furniture (table, chair, box, bed, etc.). Based on the information collected from sample respondents, there are people who engage illegally in the making of furniture from timber taken from forests found in the near by town of Shishinda. And this people cut trees for making of timber illegally to increase their income. The Menja peoples thus play a great role in destructing forests to produce lumber.

4.4.4 Cutting of trees for construction

Like other rural areas of Ethiopia, the most important material used to construct houses, fences, bridges, etc. in Chena Woreda is wood. According to the information obtained from all group of FGD and informant from CARDO because of the relatively high durability and resistance of termites in the area, most people prefer Woira and Kerero as a source of wood for different purposes of construction. These trees are indigenious and need more time to replace. Nowadays, the need for wood for construction is high not only in the specific study areas but also in the neighboring town resulting from emerging demand of urbanization

4.4.5 Expansion of Grazing Land

As explained in the majority Kefa group FGD and key informants from CARDO, most of the people in the area use forests as grazing land. Since the cattle use the leaves of trees as fodder and the trees serve as an umbrella for animals protecting from sun light. Hence, grazing in the forest area has negative effect on the trees because animals may break the youngest trees and hinder the pocket of regeneration the future. On the other hand, the number of animals found in the area and the land used for grazing do not match. Therefore, to have sufficient amount of fodder for animals, people expand grazing land by destructing the forests in the area.

4.4.6 Resettlement and inappropriate investment programs

Resettlement programs that had been taking place during the previous time is also one of the factors for deforestation. The program has been taken place without conducting a prior

research environmental impact assessment rather than the need and command of politicians. It was held since the time of Haile Silassie and continued during the Derg regime and even at present time. According to the information obtained from respondents settlers destruct vegetation to construct houses, for grazing land and for other purposes.

According to sample informants, one of the causes for deforestation in the area is the cutting of trees for the purpose of investment. One of the key informants from FGD with an age of 64 criticized the practice as:

He is always upset with the activity of government, which gives forest land for investment rather than giving other land uncovered by forests.

In the study area there is a plantation called "Green Coffee plantation" which was established before ten years. The land occupied by the plantation given by regional state meant for investment that was totally covered by forests. The owner of the plantation destroyed forests in the plantation area. The 64 years old informant ironically explained the situation as:

The government was preventing the local community not to cut trees while it granted the same forestland for investor legalizing the destruction of forest.

Besides, one of the key informants from CARDO added that preventing the society not to cut trees from their surrounding and at the same time giving forestland for investment purpose by regional government created conflict between the local community and the agricultural development workers. Moreover, because of this, the workers have no good relation with the society and are not accepted to carryout activities related to conserving forest resources.

4.4.7 Soil Erosion

On of the other consequences of deforestation in the area was the soil erosion. The major causes of land degradation in Ethiopia are the rapid population growth increase, deforestation, low vegetative cover and unbalanced crop and livestock production (Girma, 2001). As sample respondents and FGD discussants of the majority Kefa people, explained as the productivity of their land was decreased mainly because of soil degradation. The erosion of soil occurs in the area due to the destruction of forest resources.

Chapter Five

The Consequences of Deforestation

The loss and reduction of forest cover has major effects on other resource uses and economic sectors specifically on agriculture, water resources and biodiversity are serious effects. In addition, it is by conserving the forests that the local climate is made better for life, i.e, one of the uses of forests is the improvement of the climatic conditions of a given area.

5.1. Consequences of Deforestation in the study area

Due to the destruction of natural vegetations, different problems exist in the study area. The major problems that resulted after deforestation include the variability of the local climate, shortage of firewood, shortage of water supply, migration of wildlife, and so on. Table 5.1 below summarizes the magnitude of the consequences of deforestation in descending order.

Table 5.1 Consequences of deforestation in the study Area (Per the perception of local people).

Consequences of deforestation	Rank Frequencies				Total Score	Rank order
	1	2	3	4		
Changing in local climate	788	525	54	-	1367	1
Shortage of firewood	368	579	184	13	1144	2
Shortage of water supply	272	99	252	63	686	3
Out migration of wild animals	132	6	162	152	452	4
Shortage of animal fodder	52	-	134	92	278	5

Source: Field survey (2010)

The above table was done by rank frequency weighting method that each first rank will have a value of four, the second rank with three values, and the third with two and the fourth with one value.

5.1.1. Local Climate Variability

In fact, climate change is a global phenomenon at present time. This is because of the emission of large quantity of carbon in the atmosphere and other reasons. Forests have the purpose of moderating the local climate of an area. They minimize the negative effects of the direct reach of solar radiation to earth by their leaves that cause evaporation, i.e, if the radiation of sun reaches earth directly without any barrier, and then it will reduce the moisture content of the soil and make it less productive.

As it is shown on Table 5.1, local climate change is ranked as the first problems observed in the area due to deforestation and according to the sample respondents, the present amount of rainfall in an area have shown a marked decrease as compared to the previous time. The weather condition of an area is disturbed and the rainfall has dropped and being unreliable. Similarly, the temperature has increased. It is known fact that the study area has high amount of rainfall throughout the year. However, at present time because of the decrease and frequently unreliable or erratic nature of rainfall, producing cereal crops is becoming difficult.

The researcher has tried to indicate the meteorological data of the study area by comparing the 2009 records with 2004 records of Shishinda meteorological station.

Table 5.2 Rainfall and temperature data of 2004 and 2009 of the study area.

Year		J	F	M	A	M	J	J	A	S	O	N	D	Total/Average
2004	Mean Monthly temp.(^{0}c)	22	24	24	24.5	25.5	23	23	22	23	24	23	23	23.4
2009	Mean Monthly temp.(oc)	23	23	25	26	27	25	23	22	23	24	23	21	23.75
2004	Rainfall (mm)	13	81	75	94	82	169	201	163	105	71	38	17	1109
2009	Rainfall (mm)	06	62	89	113	98	126	157	160	95	79	41	11	1037

Source: Shishinda Meteorological Station (2010)

As it is shown from the climatic records at Shishinda meteorological station, 1109mm of rainfall was recorded in 2004 whereas; 1037mm of rainfall was recorded in 2009. Regarding to temperature the average annual temperature of 2004 was 23.4°c, but in 2009, it became 23.75°c. In addition to this, the range of temperature of 2004 was 3.5°c while in 2009 it became 6°c. This indicates the disturbance and unreliable condition of the local climate. Moreover, the reason for such problem is caused by the destruction of forest in the area.

Based on the key informant from Shishinda health center, in the past two years some people from the surrounding areas came to the health center with malaria. It is a new phenomenon for the area that the area is not known with this disease before.

5.1.2 Shortage of Firewood

Because of lack of alternatives to use other means of fuel, people who are living in the study area use almost wood as a source of energy. Hence, the sample respondents have pointed out fire wood shortage as the second problem resulted from deforestation. In consequence, because of the lack of firewood, people are forced to go far distance in order to collect one load of wood. In this case, the women and children are forced to spend a minimum of 2-3 hours per day, which presumably affect other activities in their home.

On the other hand, one of a Menja woman informant explained as, before now she was collecting firewood from her village and sell to it in Shishinda town twice a day. Now she is going to Shishinda to sell firewood may be only one time per day. Moreover, this led to increment its price of one load of firewood from 2-3 Birr to more than 10 Birr.

5.1.3 Shortage of Water Supply

According to the information obtained form almost all FGD groups, nowadays small springs found around their village and provide water for drinking in the study area are being seasonal. In addition, the water, which is found in their compound, is drying in the winter season. That is they are dried up and used only during rainy season. This led them to go far from their home to fetch water for consumption.

5.1.4 Wild life Migration

Table 5.1 shows that the migration of wild animals is listed as the fourth significant consequence of deforestation observed in the study area. According to sample respondents and CARDO expert, there are different wild animals found in the study areas including

hyena, lion, pigs, monkeys, apes, Columbus monkeys, as well as various species of birds. However, at present time because of deforestation, these wild animals are migrating out to other areas. Moreover, some wild animals, for instance, lions are disturbing the peaceful life of the people by frequently attacking human beings and domestic animals in the study area.

5.1.5 Shortage of Animal Fodder

The other consequence of deforestation mentioned by respondents is the shortage of animal fodder. Because of the absence of sufficient grazing land in their surrounding, people are obliged to go far distance from their village mainly to Qolla areas. In addition, to mitigate this problem, the people have begun using leaves of enset, banana and crop residues as a source of animal fodder.

5.2 Awareness Level and Attitude of the local people Towards Deforestation

Although the awareness level of sample respondents on deforestation varies based on their level of education, most of the respondents have the knowledge of the consequences of deforestation on their environment. During FGD all group participants pointed out that, the destruction of forests have resulted in irregularity of rainy season, lack of firewood, migration of animals, soil erosion, etc. and this in turn resulted on the reduction of crop production.

What the sample respondents explained is the fact that they have not stopped cutting trees even though they have awareness on the problems of destructing forests because of lack of other alternative that substitutes the use of wood. They have confirmed that they are doing wrong, but due to the growth of population, land shortage is a prominent problem for them. From this it is possible to conclude that despite their awareness about the influences of deforestation they are forced to do it, to increase land under cultivation to increase production which seems a question of survival, based on their attitude.

5.3 Measures Taken Against Deforestation in the Area

The measures that have been taken so far by concerned bodies mainly by CARDO in order to mitigate the destruction of forests, is discussed below. To begin with, agricultural development agents and other officials have given education about the purpose of forests and impacts of deforestation to their environment in different meetings for the people living in the study areas.

Secondly, attempts have been made by planting indigenous trees in areas permanently occupied by forests although this afforestation and reforestation programs are not matching with the amount of destructed land. Lack of money to duplicate and plant seedlings is the major problem faced by the CADO- that is explained by the key informant.

Thirdly, some activities are done in controlling the illegal cutting of trees by assigning one guard for each kebele administration by coordinating with the Woreda police force. However, the number of these guards is not enough to control all areas from illegal cutting of trees, since they are working in some specific areas and during day times.

Chapter Six

Conclusions and Implications

6.1 Conclusion

Forests are the most important resources for the economic development of a community by making the environment better for life. It prevents the soil form erosion, useful as a shelter of wildlife, for medicinal purpose, etc. Unless this resource is wisely and sustainably used, different problems emerge. Deforestation has its own impact on development of human beings and degradation of the environment.

According to the information obtained from sample respondents, FGDs and key informants on the cause and consequences of deforestation, the extent and nature of deforestation, farmers' perception on deforestation and the measures taken to conserve the forest resources by concerned bodies with different level of educational background, economic activity and social exclusion in Agaro, Kutashoria and Beko Kebele administrations the following summary can be made:-

- The major cause of deforestation identified in the study area was for the expansion of farmland. As most of the people living in the area are engaged in agricultural activities with an increase of population and the need to increase production they were forced to destruct forests found around their farm land. That is they were involve on extensive farming rather than intensive farming .This was because of their low level of educational status. In addition, resettlement program that resulted in the increase of population had also a great role in the destruction of forests.

- The result also indicated that gathering of wood for fuel was the second major reason for deforestation. Menja people whose livelihood depends on the cutting of trees and selling of firewood and charcoal for the nearly town are the causes of reduction of forest coverage. Respondents spend most of their time to collect one load of wood, as it was the only source energy as well as income.
- The demands for wood to make furniture and construct houses were found as other causes for deforestation. Some groups of people in the area were involved in cutting of trees for the production of timber to increase their income.
- Giving of forested land for investment was another cause for the destruction of forests in the study area. According to sample respondents, although there was non-forested fertile

land in the area, the regional government gave the forested land for plantation purpose in the pretext of investment. In addition, lack of grazing land was also identified as the cause for deforestation.

The extent of deforestation was high in the study area, because of the above causes. But the trees replaced in the area compared with the destruction were very low. According to CARDO (2010) key informant, the annual rate of deforestation was ranging between 15-20 hectares; whereas the rate of planting seedlings was not more than three hectares.

Regarding the consequences of deforestation, the result of the study indicated that variability in local climate, shortage of firewood, wildlife out migration, shortage of livestock fodder, shortage of water supply, etc, were mentioned as the major ones in the study areas.

Though the attitude of sample respondents in the study area towards deforestation seems positive, since they have already understood the effect of deforestation, they have not yet stopped cutting of trees. According to sample respondents, it was because of lack of alternatives to generate income, increase agricultural productions as well as firewood, which resulted in deforestation.

Attempts were therefore made by CARDO to mitigate the problems of deforestation through creating awareness for the farmers about the use of forests and problems resulted from deforestation in different meetings. Moreover, planting of new seedling in the areas which were not covered by trees are some of the activities practiced in the study area.

6.2. Implications

Based on the findings of the study the following implications are suggested.

1. Most of the causes of deforestation in the study area directly or indirectly relate to the growth of population. Therefore, to minimize deforestation, the growth of population in the area should decrease. This is through reducing the rate of fertility. Therefore, education on family planning to the people has to be provided along with the important of contraceptive delivery services.

2. All concerned bodies require working hard to strengthen the relations between the minority Kefa community (the Menjas) and other people by creating awareness. In

addition, the government should make the Menjas parts of different decision-making process of the area.

3. Expanding modern methods of farming and agricultural techniques as well as providing agricultural inputs for the people to increase productivity on available land is necessary rather than expanding land under cultivation, i.e., changing the extensive way of farming to intensive methods.
4. Educating the people and providing firewood saving stoves is the other mechanism to minimize deforestation. On the other hand, all concerned bodies need to search for materials that can substitute wood for fuel, like biogas, electricity, etc.
5. The Use of plastics, metals, stones and other materials to make furniture and construct houses have to be considered. is advisable.
6. CARDO and NGOs have to give more attention in practicing of afforestation and reforestation programs in the area by allocating sufficient budget and participating all community members.
7. Creating and increasing the awareness level of people through training to involve in other means of income generating activities like off-farming activities like, weaving, pottery, etc.
8. 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. On the other hand, the government needs to consider guarantying rights over the land, by issuing ownership certificate, which could initiate the people to invest in tree planting.

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Appendix A

Addis Ababa University

College of development studies

Institute of population studies

Household survey questionnaire

- **Objective of the questionnaire**: this data collection instrument is designed for the sake of gathering information pertaining socio-economic and demographic causes for deforestation including its consequences in Chena Woreda. So you are kindly requested to provide us accurate information as much as possible. The final result that will be produced based on the information you provide will be used by different development actors that needs to conserve the forest resources in the area. Your response would be treated with the highest confidential possible.

General direction:

A. Please, answer by circling the number before the alternatives or write the necessary responses in the space provided if the responses are out of the alternatives.
B. Respondent should be household head (representative of household heads)

Questionnaires to Sample Respondents

I. Respondents Personal Information

1. Age_____
2. Sex a) Male b) Female
3. Occupation a) agriculture b) non-agriculture
4. Level of education_____
5. Marital status a) married b) unmarried c) divorce d) widowed
6. Sex of the house hold head a) male b)female
7. Family size_____
8. Number of years lived in the area_____
9. Nationality_____

II. Questions on Deforestation

10. How is today's availability of natural forest resources in your kebele compared to the condition before 10 years?
    a) increased b) decreased c) no change
11. Have you farm land?
    a) Yes b) no
12. Your answer for question number 11 is ''yes'' how do you get it?
    a) From government b) from your family c) by rent d) share with other farmers
13. Do you need supplementary land?
    a) Yes b) no
14. If your answer for the above question is ''yes'' Why?_____
15. Can you obtain fire wood in your village?
    a) Yes b) no
16. How much time do you spend to collect fire wood at present time?
17. Do you think that resettlement program has its own contribution to the clearance of the local forest?
    a) Yes b) no
18. Do you think that the growth of population has any effect on forest coverage?
    a) Yes b) no

19. If your answer for the above question is ''yes' how?_____

20. What are the major causes of deforestation in your locality?(Put in descending order)

a) For constructional purpose
b) For making furniture
c) For expansion of farm land
d) For fire wood and making charcoal
e) For expansion of grazing land
f) If any others , specify_____

21. Do people in your locality have awareness about the causes and consequences of deforestation?

a) Yes b) no

22. What are the major consequences of deforestation in your locality? (Put in descending order).

a) Lack of wood for constructional purpose
b) Lack of fire wood
c) Drying up of spring water in the area
d) Climate change
e) Migration of wild animals
f) Decline of crop production
g) If any other,
specify_____

23. How much is the different measures which is taken to conserve and protect forests from destruction?

i. By kebele administrative A) low B) medium C) high
ii. By the community A) low B) medium C) high
iii. By the woreda ARDO A) low B) medium C) high
iv. Others specify

24. Have you a practice of planting trees in your surrounding?

A. Yes B. No

25. Who will be the immediate victim of deforestation?

a. The woreda ARDO
b. The local community
c. NGOs
d. The government

26. Whom do you think that the body responsible to replace the cleared trees in the area?

A. Government
B. Each individual
C. Agricultural personals
D. The community
E. NGOs
F. If others specify

27. What are the different mechanisms which enable to prevent the forest from destruction? _____

_____

APPENDIX B

Questions for FGD

1. How can you compare the forest coverage of an area in the past five years with the present?
2. Why forest resources in this area are decreasing?
3. What are the major reasons that Menja people are socially excluded by the society in the area?
4. It is believed that Menja people's livelihood is depending on fuel wood selling. What is the cause for this?
5. Do you think that the land and forest tenure rights may have an effect on the destruction of forests?
6. What are the major problems observing at present time in the area due to deforestation?
7. How much is the knowledge, attitude and skill of the people in the area to conserve the forest resources?

APPENDIX C

QUESTIONS FOR KEY INFORMANTS FROM WOREDA AGRICULTURE OFFICE

1. How much is the coverage of forests in the woreda?
2. How much is the rate of deforestation in the area?
3. What are the major causes of deforestation in the area?
4. What are the activities doing by concerned bodies to mitigate the destruction of forests in the area?
5. How Menja people affect the forest resources of the area?
6. What are the consequences of deforestation to the area?

QUESTIONS FOR KEY INFORMANTS FROM HEALTH CENTER

1. What are the major diseases observed in the previous years in the area?
2. May the diseases intensified in the area in the past years have a relation with deforestation?
3. How much is the coverage of contraceptive method in the area?

Declaration

The thesis is my original work, has not been presented for a degree in any other university and that all sources of material used for the thesis have been duly acknowledged.

Tamirat Mogee		21/07/2010
Student	Signature	Date

I confirm that this thesis has been submitted with my approval as the supervisor of the same.

Yesuf Dejefa		21/07/2010
Advisor	Signature	Date

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