



ADDIS ABABA UNIVERSITY
SCHOOL OF GRADUATE STUDIES
COLLEGE OF DEVELOPMENT STUDIES (CDS)

**The quest for conservation in the midst of deforestation,
resource degradation and unsustainable livelihood
practices in and around Mt. Zeqwala**

By: Hiruy Simie

June, 2007

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**A thesis Submitted to the school of Graduate Studies of Addis
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practices in and around Mt. Zeqwala**

**Resource Conservation for better Environment and
Development: the case of Mt. Zeqwala Natural Forest**

BY
Hiruy Simie Geberewold

DEVELOPMENT STUDIES

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Declaration

I, the undersigned student declare that this thesis is my original work and has not been presented for a degree in any other university and all the references used for the thesis have been fully acknowledged.

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Student's Name: _____

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Date of submission: _____

This thesis has been submitted for examination with my approval as a university advisor.

Advisor's Name: _____

Signature: _____

Date: _____

Acknowledgement

I would like to dedicate my praise to the lord my God and savior with his holy mother for the accomplishment of everything in my life. I can say with out any exaggeration that it is with the mercy of God and his holy mother that I seceded in finishing this paper.

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something impossible we went on looking for a samples for our inventory, interviewed key informants and finished that at about 10 in local time. On the down hill trip we deviated from the crooked path and interred into a steep slope that had been plowed this year. This made me lose my footing and I plugged down hill tumbling and was stopped by *A. albida*. The thorns I pulled out of my body are mementos for the rest of my life!

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Acronyms

EPA: - Environmental Protection Agency

FGD: - Focus group discussion

GIS: - Geographical Information System

Ha: - hectares

IUCN: - World Conservation Union

LDCs: - Least developed countries

m.a.s.l.: - meters above sea level

PFM: - participatory forest management

R BA: - Rapid biodiversity assessment

SPSS: - Software package for social scientists

ZNF: - Mount Zeqwala's natural forest

Abstract

This thesis has attempted to examine the various factors causing deforestation in and around Mt. Zeqwala. It further tries to identify the change that occurred in the diminishing area of the forest used to cover and the associated biodiversity loss. The study was conducted in east Showa Liben Chukala Woreda in particular on mount Zeqwala. Three *Kebeles* were selected purposively. In the course of the study, methodological pluralism was pursued to make a reasonable research. Hence, combinations of surveys, qualitative and quantitative data collection methods were employed.

There has been deforestation at mount Zeqwala for the last three decades. The mountain being one of the few cultural, historical and biodiversity centers and the tragic destruction occurring there has attracted national attention. Thus, the unique plant and animal life, historical ruins and cultural sites found on there calls for conservation from all concerned bodies.

The study showed that there were a number of factors that have aggravated the deforestation on the mountain. These are like charcoal making, clearings for farm land, fuel wood exploitation, plank making and animal grazing. Conflicts arose as the people living in and around the mountain engaged in blind exploitation of the forest, water and land resources with Abo Monastery. The result was a total collapse of reason and order as all people involved in the resource extraction went for satisfying their selfish interest. Environmental problems occurred immediately after the deforestation like drought, drying of springs, flooding, Gullies and land degradation. The socio- economic and local development backwardness of the *Woreda* has further contributed to the deforestation occurring on the mountain. Investment on rural development and establishing an organized sustainable benefit sharing mechanism is very important to reverse the existing problem.

Despite the existing problems there are some measures taken to improve the situation on the ground. These include area closure, patrolling and penalties. However, involving the surrounding community over resource conservation and use has been found to be of a paramount importance to reach at a successful end

Key words: Zeqwala's natural forest, Conservation, Deforestation, Biodiversity loss, Landuse, development and environment.

1. INTRODUCTION

1.1 Background to the Study

Altitude and topographic location have favored Ethiopia to have numerous or varying agro-climatic zones. This has given rise to the presence of a botanical treasure house containing 7000 different flowering plants in Ethiopia. Out of the 7000 flowering plants, 12% are probably endemic (FAO, 2007). These diverse floras are found in the natural forests, which have once covered 35% of the country's total land area. However, today the forest coverage has shrunk to an area of only 2.5% of the total land size. Currently, the area under forest cover is only 200,000 hectares (Desta, 2001).

Apparently, the diminishing size of both the man made and natural forest resource of the country poses an uncertain future for the resource. As population increases, the need for more farmlands will also increase (Yeraswork, 1995: 2). Moreover, expansion of agriculture in developing countries is achieved through the cultivation of new areas of land. This means the conversion of lands to cultivation which once used to be under forest cover (Alexanderos as cited in Wild, 2003:3). Agricultural expansion in turn, exposes soils to erosion hazards and decreases fertility unless modern systems of land management are applied (Wild, 2003:3). It will also mean the loss of tree cover, climate change and ecological imbalance (Huberty, 1959; Berhane and Agajie, 2006:52). Moreover, this situation creates a vicious circle, which hinders the attainment of sustainable development as well as an improvement in the environment of the country.

Hence, the role of trees in either improving or preserving farmlands (i.e. especially mountainous areas and valleys) from erosion can be seen when one looks at the degradation that follows after deforestation. Forests that had been conserved in some places bring favorable environment that increases production and soil fertility. As a result, conservation proves to be the only favorable outlet from an abject poverty.

The natural forests of Ethiopia comprise tree species classified as indigenous and endemic. The indigenous trees are those that can be found in Ethiopia and throughout the neighboring countries while the endemic ones are found only in Ethiopia. The latter have adapted to the ecological condition of the country through evolution and have natural

mechanisms to cope with the nature of the soil, climate and seasonality. Moreover, they are numerous in number and diversity. Most of them are located in Southern Region and in the highland plateaus of Kaffa, Illubabor, Wollega and Gamogofa. Although not much in terms of aerial coverage, Church forests or groves commonly known as “Athsed” are also major areas of natural forest cover in the central and northern highlands which have lost their former natural vegetation (Tsegaye, 2000: 37).

The justification for this research lies in the urgent need for the conservation of forest resources in the country. Since population pressure and diminishing land holdings of peasants are the problems in many developing countries, improving the farmland as well as enhancing the total cover of trees becomes a requirement if they opt to pursue rural development. In addition, important aspects of environmental protection such as, maintenance of soil fertility, combating erosion and bringing a sustainable agricultural practice can be addressed with conservation measures. Such environmental services can play a very significant role to a farming community living nearer to natural forests. Hence, the presence of trees growing on mountain slopes can trigger an interconnected reaction that can maintain a balance in the whole ecosystem. Hence the conservation of forests brings about panaceas answers to the problems of flooding, erosion, infertility and declines in crop yields.

In another dimension, the preservation of biodiversity, i.e. fauna and flora, is of paramount importance for the preservation of our natural heritage, protection of our environment and the maintenance of our resource base. This relies on the enhancement of our natural forest coverage. Therefore, studying Mount Zeqwala’s natural forest (ZNF) can contribute something in that direction. The study depicts a general picture of Zeqwala forest to assess its conditions and potentials for further decision making on conservation and protection.

Hence, studying the contribution of the natural forest in the context of the conservation of biodiversity; namely, unique fauna and flora, in maintaining ecological balance and in protecting the environment from both wind and water erosion is critically important. Therefore, an inquiry on aspects of the relationships between the forest and community in terms of resource use and conflict for ownership can illuminate the causes that led to its destruction and degradation.

1.2 Statement of the Problem

Agriculture in Ethiopia relies on traditional system of production basically for subsistence use. Ethiopia's age old traditional farming method has denuded the country's fertile land exposing it to severe erosion. The deforestation of forestlands for cultivation purposes had intensified the degradation of forests and the depletion of soils. It has created an environmental crisis in general. As a result, loss of vegetation has increased and the lands reserved for forests are decreasing. The consequence of this is, low productivity and inability to achieve food self sufficiency. Hence, the maintenance and increment of our tree cover is of a paramount importance in order to realize sustainable development through improved environmental husbandry.

Afforestation attempts in the past had not reversed the downward trend while constant increase in the size of farmlands and their degradation became the major problems in the land use aspects of farmers in Ethiopia. Hence, improving the fertility of farmlands to make them sustainable is a critical question needing immediate attention. Therefore, the benefits of maintaining natural forests in mountain agriculture side by side with crop yield increment, soil protection, climatic improvement, provision of fodder for farm animals and in general improvements in rural livelihood had to be investigated to avert the predicament.

In the case of the area under study, namely Mt. Zeqwala and its environs, the devastation of the natural forests on the mountain has been going on for some time. Charcoal making and illegal burning of trees have also occurred at the area (Forest genetic resources conservation project, 2004). Moreover, there are numerous streams that spring from the mountain ecosystems that are increasingly drying up. In the aftermath of deforestation in the area, there is a recent problem of erosion through excessive flooding during the rainy season. In addition, for quiet some time, towns like Wenber and Danissa have been badly affected through intense rainstorm flooding. In spite of the presence of

these problems, adequate explanations are missing on how the community destroyed the natural forests which had been preserved for ages. Why did that happen?

Lack of studies on the true status of these forests and the role they play in the protection of the environment and biodiversity preservation creates a gap for decision making. The contribution and significance of the tree resources must be studied to determine their role and take measures to further enhance the benefits that could be obtained from them. In another aspect, forests around the church have been well respected and protected from destruction by the monks, whose lives are intimately linked with the forest environment. Contrary to this, the surrounding communities are involved in the destruction of the natural forests through activities like charcoal making and tree cutting for fuel and other purposes. This situation points the problem at the area such as misuse of resources, lack of conservational outlook and conflict of interest in the attitude of the different groups. Thus, what mechanisms can work better to realize conservation and what are the real underlying problems that started the degradation? It is against these backdrops the study intends to assess the forest-community inter- relationship.

1.3 Objectives

General Objective

- Investigate the causes that led to the deforestation of the forest cover and the change in the biodiversity, land use and environment; in and around Mount Zeqwala and find out the means by which it could be conserved.

Specific Objectives

- A) To assess the major reason for land use changes affecting the natural forest on the slopes of mount Zeqwala.
- B) To gauge the trend in the decline of biodiversity (fauna and flora) due to deforestation and the change occurring on the environment.
- C) To understand the community's resource use and conflicts arising from it.

1.4 Research Questions

1. What are the major factors that led to land use changes affecting the natural forest on the slopes of Mount Zeqwala?

2. What is the extent of the loss in biodiversity due to deforestation?
3. What is the resource use pattern of the society and the conflict on resource ownership?
4. What changes occurred in the environment?

1.5 Research Methodology

1.5.1 Research Design

This research is carried out in and around Mount Zeqwala to assess the socio-economic and environmental impacts of deforestation on the natural forest. This will help in having clearer ideas for conducting conservation on the area. Therefore, aerial photos are used to show the changes that occurred in the area of the forest by converting them into land use maps. Both quantitative and qualitative methods of data collection have been employed. Surveys and inventory methods are used to collect the relevant data of biodiversity loss.

1.5.2 Sources and Methods of Data collection

Both primary and secondary data have been used in this research. The use of each data had been found to be relevant and important in the research process. Direct observation techniques have also been employed in addition to the aforementioned methods. Gaining the confidence of farmers and people directly involved in feulwood exploitation has enabled the researcher to identify groups who make charcoal by burning the forest and groups who through animosity engage in destructive behavior. As a result, it has enabled the researcher to assess and discover the major role players for the deforestation. This is thought as a critical finding of no mean significance because of its relevance for resolving the problem in the area. The methods of data collection included inventory, focus group discussion and household surveys. Each of them will be discussed hereunder.

(a) Inventory

Inventory has been conducted on the natural forests surrounding the monastery. This was done so as to understand the abundance, composition and loss of the biodiversity. During the forest inventory, a purposive sampling method was used. The sampling was conducted to generate a data on the composition of species and their diversity in the natural forest. Two sample plots with the area of 20m by 20m (in diverse species dominated forest the plot widens the standards are 5m by 5m) or one- fifth of a hectare was selected purposively. The justification for doing so lied in the fact that in natural forests some areas are colonized or dominated by single species. In order to avoid pure stands and get some composition of diverse species one must use a purposive sampling frame (Desta, 2001:238). Then, there will follow physical identification and recording the different trees and the number of their occurrence.

Rapid biodiversity assessment (RBA) has been conducted by making transect walk in ZNF to identify the different tree species. The monks of the monastery and some members of the community had been of big help in the identification of different tree species. The number of occurrence of tree species in the sample plot has been multiplied by the total hectares of land which had been covered by the forest before the current deforestation. The extent of the loss had been determined using a land use map that is drawn from aerial photographs of 1965 and 1971. The actual forest area multiplied with the result of the survey and inventory shows the current status.

(B) Aerial photos

The other primary data that are used in the study are; aerial photographs that are used to show differences in vegetation cover, shrinkage of the lake water, land degradation, and settlement growth on the mountain slopes. All of them are interlinked in one way or another with the deforestation on the Mountain.

Two Panchromatic black and white stereo air Photos for the years 1965 and 1971 on a scale 1:50,000 and converted by the researcher to land use maps had been used to show the changes that has occurred in the physical landscape of the study area. The extent of deforestation in the area can easily be assessed by creating a land use map for each category of land use, i.e. forestland, grazing, agriculture and settlement area.

The area of each land use was measured using a planimeter on the prepared land use map of the area. This served as a major means to establish the changes in forest cover on the mountain. The topographic map of the area with a scale of 1:50,000 provided the vertical and horizontal control points by which the aerial photos were marked. The original 1:50,000 maps drawn from the aerial photos were reduced to fit an A4 size paper at the scale of 1:60,000. The newly created land use maps are employed as primary sources of the study.

(c) Focus group discussion

Focus group discussion (FGD) was conducted to get relevant data for understanding the desires and perceptions of all concerned groups with or without an interest in the conservation of the natural forests. The data gathered focused on farmers who have settled on the mountain, *Woreda* administrators, development agents, concerned officials in the zonal agricultural office, development agents, monks, NGO's and key informants. The researcher personally interviewed all the groups above mentioned to gather relevant information.

Three Focus group discussions were conducted in the research process. The discussions were with group of farmers of wonber *Kebele*, with the Monks of Abo Monastery and with employees of the *Woreda's* natural resource conservation department. Groups formed for the discussion had both male and female composition with the exception of the monks who are all male.

Five **Key informants** were interviewed to get a clearer idea over the overall situation on the area. The interviewees were the Abbot of Abo monastery, the resource division head of the *Woreda*, forest guard militia leader and farmer, resource bureau head of Ada'a *Woreda* and the school Director of Wonber who had rich experience in the protection of the forest.

(d) Household survey

In order to assess the causes that brought about deforestation on the mountain, and its effect questionnaires had been designed and distributed to get an insight. The survey instruments that are used for collecting this data were structured and semi-structured

questionnaires. The survey data was filled in by three enumerators and the researcher. Knowledge of the language of the community, custom, and area were determining factors for selecting the enumerators. The questionnaires focused on issues related to policy, local measures of conservation, and livelihood interests of the different groups and the effect of the deforestation on the life of the farmers living on the mountain.

1.5.3. Secondary data

The research findings from the primary data had been supplemented by using secondary sources. By so doing, the research findings had been verified and contrasted with secondary sources such as published (books, Journals and periodicals) and unpublished materials (MAs, PhD, reports and studies) and researches done on the area, topographic maps and other relevant sources.

1.5.4. Sampling Procedures

There are seven *Kebeles* in the *Woreda* bordering the mountain and extending even to the slopes. The *Kebeles* of Wenber Mariam comprising currently 92 peasant households had been established on the mountain during Derg's period. Towns like Danissa and Adulala were established at the foot hills of the mountain. These measures created a situation for the beginning of exploitation of the resources of the mountain by the farming community and the residents of the towns. There are all in all seven *Kebeles* in and around the mountain. Four of these have farmers who have their farmlands away from the mountain.

A purposive sampling frame therefore, has been used to sort out only those farmers out of the seven *Kebeles* who are already settled on the mountain or engaged in either plowing or grazing their livestock on the slopes. The justification for using purposive sampling is based on the fact that four *Kebeles* have very few or no peasants either settled on the mountain or engaged in using the slopes for agriculture or grazing purposes. The seven *kebeles* in the *woreda* are Wonber, Illmo, (Ashufe Village) in Agemsa Rogecha, Dololo Jilla, Idele Miecha, Oda Jida and Gachi Daimo. The three *Kebeles* with farmers settled or encroaching on the mountain are Wonber, Illmo and Ashufe. The other *kebele's* farmers are settled far away and do not encroach on the mountain.

A purposive sampling frame was used selecting only the three *Kebeles* i.e Wonber, Illmo and Ashufe with farmers engaged on different land use patterns on the mountain. After that a list of names of all the farmers at each of the selected *Kebeles* was prepared to conduct a simple random sampling using lottery method specifically. From each of the purposely selected *Kebeles* sample households were selected proportionately. The sample households (HH) comprise 40% of the total households at each of the selected *Kebeles*. Therefore, sampled households are eighty. As a result eighty questionnaires have been distributed.

Table 1: Respective *Kebeles* of the Farming community, the total number of Households and sample Households.

Respective <i>Kebeles</i> of the Farming community	Total number of Households	Sample Households
Wonber	92	36
Illmo	60	24
A. Rogecha (Ashufe)	50	20
Total	170	80

Source: Based on field survey, 2008

1.5.5 Data Analysis

Data analysis has been conducted using descriptive statistics for most of the social aspects of the research employing Software package for social scientists (SPSS) of a computer program. Aerial photographs were used to draw a land use map employing a stereoscope. Satellite imagery must be used through a GIS program to show the current state of the forest. However, since there is no aerial photo on the area after 1971G.C. or any relevant satellite imagery for the research area at the Ethiopian Mapping Authority, it has become impossible to show recent developments in this research.

In the production of the land use map, effort has been made to obtain the necessary help from persons with expertise. This has facilitated the identification of land

use change, settlement pattern and vegetation cover and loss in the period's ranging between 1965 and 1971. In the process of doing this the degradation of the area has been expressed quantitatively. Further information obtained from focus group discussions, key informants and officials have been summarized and used in a qualitative form.

1.5.6 Significance of the study

The status of Ethiopia's natural forest coverage is in a desperate situation. The country faces 62,000 hectares of annual natural forest loss due to deforestation; 1,900 million metric tones of top soil loss due to erosion per year and a growing land hungry rural population (FAO, 1984). In the past, the aforementioned environmental crises and developmental challenges led to campaigns after campaigns calling for afforestation and conservation measures.

However, it had resulted in a failure. Therefore, finding the best possible successful solution is of great importance. It is easy to depict the denuded landscape of the whole country in need of rehabilitation. This research is expected to provide some of the reasons for the failure of national conservation policy and gives some clues for a successful implementation of such a policy in the study area. The study will hence, provide information and shares experience and lessons learnt so that all concerned groups engaged in the conservation endeavor will get some relevant information.

1.5.7 Delimitation

The research is conducted on the natural forests of Mount Zeqwala in Liben- Chukala Woreda. The study focused on investigating the major causes for the deforestation of mount Zeqwala's natural forest and find out the resulting impacts. A general analysis on the status of the natural forest and on the best possible solution for better conservation is the target of this study.

1.5.8 Limitation of the Study

The study focuses on the social aspects in particular. As in all studies it can not entertain all spheres and dimensions associated with the broad subjects of forestry and

natural resource conservation. The main constraint for this is the limited knowledge of the researcher and time and finance which has also its own impact. It is also true to say that the unavailability of necessary materials and lack of transportation service in the area acted as problems during the study.

Chapter Two

Literature Review

2.1 The Meaning and Views of Conservation

Whenever the topic of conservation is raised, it is usually related with preservation of natural forests. The reason why conservation is usually associated with forests is because of the generally accepted view that argues by saying ‘ecosystems which are little affected by the activities of man resemble dense forest lands’ (Adams and Mashane: 1992:6). Moreover, there is a firm belief that points that forests preserve all the other major resources like soil, water and wild animals. One can see this from the definition of a forest which has been stated as “a commodity of living trees and associated organisms utilizing sunshine, water and earthly materials to furnish mankind with indispensable products (Allen, 1955:125).” This indirectly means that forestlands have an intricate relation with the formation of springs, soil conservation, wild life protection, and climatic improvements. Hence, deforestation shatters and breaks the interconnections of an entire ecosystem.

The current definition of conservation, as established by the World Conservation Union (IUCN) is stated as, “the protection of the integrity and diversity of nature, while ensuring that any use of natural resources is equitable and ecologically sustainable” (Abramovitz et.al., 2001:23). Others define conservation as “using natural resources

beneficially with minimum waste” (Allen, 1955:16). These definitions and values emphasize the world view which aims to reconcile conserving an area of its pristine wilderness with the idea of ‘sustainable extraction of resources’ by the people who live in and around them. Such a view had created a dilemma for decision makers who believed in forcing the eviction of a rural community to save ‘Pristine’ areas. Such authorities have explained the interest of societies dependent on forest resources wrongly: ‘a group who selfishly strive to win only a livelihood by exploiting the resources from a conserved area’ (Cunningham and Saigo, 2005:317).

Hence, finding a mutual solution for the two seemingly contradictory issues like development and little affected environment (by the presence of man) are at the core of a successful conservation campaign. Today’s world needs conservation of resources, be it natural forest or wildlife carefully preserved from extinction. At the same time, it equally needs development or sustainable methods of generating livelihoods for rural communities.

There are currently, two major arguments on the need for conservation. They are known as ‘utilitarian’ and ‘ethical’. The utilitarian argument stresses the need for conservation by pointing that ecosystems are useful to mankind; while the ‘ethical’ side emphasizes that man should be guardian of the natural heritage which he has inherited (Cunningham and Saigo, 2005:316). The utilitarian argument supports its claims with evidence which states that it would be foolish to destroy what might prove to be of value. For instance, from the bark of the Cinchona tree, Quinine has been distilled to treat the disease of malaria worldwide. Hence, with the present rate of deforestation on natural forests globally, loss of useful plants and animals is bound to occur. This will be catastrophic to mankind in the long run. The ethical approach puts more value on the aesthetic beauty of nature and the duty of the present generation to pass this to the next. This view emphasizes the need to preserve an unspoiled nature for mankind which makes it a moral issue than an issue of gain.

2.2 Strategies for conservation in Ethiopia

Modern conservation effort in Ethiopia dates back to the times of Emperor Minelik. He was the first Ethiopian Emperor to pass a royal decree in the protection of natural forests and wild animals. However, During the Medieval period measures were

taken by Emperor Zar'a Yaeqob¹ in the creation of royal forests and afforestation of many parts of the country (Melaku, 2003:140). Modern and practical conservation measures that had been implemented on the ground came about after the Italian invasion in 1935. The Fascists issued regulations at all levels of their administrative chain of command emphasizing the forest resource of the country as the property of the Italian Empire and enforcing the acquisition of permission licenses from regional governors for any person to cut and exploit the forests (Melaku, 2003:1, 63).

1. Zar'a Yaeqob created in almost typical fashion of European kings of his times; royal forests protected by his command. 'Ye-Wof -Washa' natural forest is one example; he is also said to have afforested Menagesha Suba and the Yerer mountain chain.

This period saw a systematic and modern exploitation based on the business procedures of concessions and plantations. The Imperial Period focused more on identifying major forest areas and holding these as royal forests for the crown. The same policy continued during the military period with only a shift made by transferring the royal forests to state ownership.

Currently, Ethiopia has been able to formulate a Federal Policy of Conservation Strategy in 1995, to protect the environment and conserve the natural resources of the country. This is regarded as a major step in the pursuit of conservation. This conservation strategic plan of the country that had been drafted by the Environmental Protection Agency (EPA) after recognizing the existing situation and past drawbacks and explains the policy guideline direction as being able to bring about a better environment and sustainable development this time (EPA, 1997:24). The strategy clearly emphasizes that there could be a short term economic growth by unsustainable and exploitative use of natural resource with a serious consequence in the long run (EPA, 1997:2).

The past afforestation and conservation measures that were conducted through top-down approach have been recognized as measures that had marginalized. This strategy is seen as a cause that led the conservation efforts to total failures. As Melaku (2003:84) has clearly stated, "natural resources in Ethiopia had been commonly used and managed by communities before they were converted to state ownership." The 1975 land proclamation in particular, had resulted in alienating individuals and communities from a

resource, which they had been conserving and using without even an adequate “police” force to guard the forestlands that were made a public property. This had changed the resource ownership regime to an almost ‘open access’ resources use. This proclamation and other mismanagements brought about a drastic decline in the forest cover of the country in the post-1974 period.

After the land reform proclamation of 1975, a land ownership regime that made the resource to be regarded as open access emerged. The government’s inability to protect the resources cleared a path for an almost national deforestation. The demand of the surrounding communities living near these forests; to use the resource as they see fit, created conflict with local government officials at all the administration level. With poor capacity of government bureaus and absence of sustainable exploitation agreements, the situation culminated in a total deforestation (Melaku, 2003:112).

The current strategy has aimed to promote conservation through rural community participation. It had identified priority areas i.e. soil and natural forests protection, for conservation. The policy guideline calls for all concerned and affected groups to get engaged in conservation programs. It has as a result drafted the following major policy statements; (EPA, Conservation Strategy: 1997)

- A) Identify natural forest conservation with the principles of preservation, biodiversity protection and stimulation of regeneration.
- B) Checking uncontrolled expansion of the homesteads in protected areas and conservation of natural forests by stopping agriculture on steep slopes.
- C) The adoption of the principle of ‘user pays’ for the use of any natural resource.
- D) Promoting conservation efforts and expanding the existing networks of protected areas.

2.3 Natural forest Resource and its General benefit to Ethiopia

The resource potential of the natural forests in Ethiopia is not studied extensively. Currently, the undisturbed natural forest cover of the country is only 900,000 hectares.

Moreover, most of this forest cover escaped destruction mainly because of its inaccessibility (Desta, 2001). The situation therefore is extremely bleak with patches of forest here and there, covering only 2.5% of the whole surface area of the country.

This calls for genuine dedication on the part of all, to stop the trend of resource degradation and environmental destruction. This can be done when we realize the true value of our resources by installing proper policy, management practices, stewardship and conservation at all levels in our society. The existing literature, even though not extensive, clearly points that the net environmental effect and resource potential of the natural forests in Ethiopia is extremely rich, important and useful.

2.3.1 The environmental benefits of natural forests

The effect of trees on the environment is naturally positive. Therefore, trees provide diverse services to the environment, such as; increasing rainfall through evapotranspiration, carbon sequestration, protection of soil from erosion, adding nutrient to the soil, and water infiltration. Such an environmental service of trees plays a role of immense magnitude. As a result, some of the environmental benefits of natural forests have been discussed below.

The effect of natural forest on Ethiopia's climate and all over the globe is very significant. These can be subdivided further into the many components from the term climate encompasses. The foremost among the many components is rainfall. Broad-leaved deciduous trees of the tropics play a significant role in increasing rainfall through evapotranspiration (Huberty, 1959). This can be linked with the huge amount of rain the South-western part of the country receives. The case of Babaka Natural Forest illustrates this further. After clearing the natural forest and establishing coffee and tea plantation the rainfall decreased up to the points of scarcity in the region (Desta, 2001). As a result, natural forests play a significant role in this aspect.

The tropical rain forest hard wood trees naturally absorb and store carbon in their tissues (Waring and Schiesinger, 1985). This tree species therefore had great value in reducing the CO₂ concentration in the atmosphere. The Ethiopian natural forests have a significant role in carbon sequestration. Research points that the natural forest serves as a sink by absorbing 27,579 Gg carbon per annum. Ethiopia emits only 2,596 Gg carbon per

year. In other words 24,983 Gg of carbon is sequestered per year. Therefore, the service the natural forest dispenses plays huge environmental benefit for the globe (Institute of Biodiversity conservation and Research, 2007).

In another dimension the environmental role played by trees in protecting soil from wind and water erosion is significant. Ethiopia experience immense soil erosion rate of 1,900 million metric tones per year (FAO, 1984). Trees play a critical role in helping to reverse this disaster. The natural forest having different layers of cones makes the forest floor to be completely sheltered and covered with leaves giving less access for a high rain droplet to put an eroding impact on the top soil. The major factor that enhances erosion is vegetation loss. This can also create unimpeded runoff. The natural forests facilitate infiltration and most trees have leaf liter that decomposes and mix with the soil which helps absorb water. Soil improvement is an area that is needed for creating a better and sustainable environment. Natural forest tree species add in nutrient to the soil. Most acacia species are noted for this service (Desta, 2001).

Acacia, Species are leguminous trees. These trees are excellent nitrogen fixers in the soil which is an important soil nutrient needed by food crops. Natural forests provide shade and keep soil temperature remain at low level. This enables soil moisture to be preserved from loss. This again means that the water cycle will be normal and remains undisturbed.

Lands that are affected by wind-induced soil erosion can be protected by planting trees as shelter brakes. Environmental problems arising out of deforestation are various and devastating. In lands that had been made barren by deforestation, water infiltration will not occur. There will be flooding through the enhanced runoff. This makes the level of ground water to get low and streams to dry up. The general outcome will be desertification (Chojnacki, 1963:36). This is tantamount to say the negative environmental situations resulting from deforestation will reduce and hamper the development of the country.

2.3.2 The resource potentials of natural forests

Natural forests provide a number of valuable products. Some of the major products are; industrial timber, tannin and dye extraction, medicinal substances,

pharmaceutical products, non wood forest products (NWFP) and products from wild animals. Apart from these, natural forests are the only known sources of a rich gene pool and biodiversity.

Wood is one of the major raw material inputs in the sectors of modern industry. It is used as construction material, fuel, wood, poles and posts and paper production. Hence, the demand for timber is something that will continue for long. Unless, measures are taken to conserve and exploit our forest resources in sustainable manner, the current situation on the ground indicates exhaustion in the near future. Of all woody part used in the world, half of it goes as fuel out of which 80% of it is used as fuel by the less developed countries (FAO, 2007). Moreover, to satisfy the demand for fuelwood is a monumental task considering the level of technology we employ for domestic household consumption purposes. Thus the demand serves as a hidden force which further creates deforestation. The natural forests have supplied the Ethiopian community upto the present and to continue further is impossible. This resulted because of slow growing nature as well as low wood production of the natural forest trees per hectare.

However, 90% of all fuel wood still comes from the natural forest. Moreover, most of this comes out of the dry forest in the charcoal trade. By conserving our resource and putting more lands under forest cover, one can hope for a relatively better deficit resulting from the negative consumption and supply gap.

As Far back as the beginning of the 20th century, a German forester, by the name Georg Escherich, pointed that the lack of wood would be a serious handicap to the country's prospect of development (Chojnacki, 1963: 37). The introduction of Eucalyptus tree is also remembered with the imprisonment of a French man who introduced the tree and was accused by his government for strengthening the Abyssinians by solving their major problem of fuelwood. It was also the shortage of fuel wood that had created the shifting capitals and the general backwardness of the country.

The major trend currently employed today in natural Forest conservation and management is through encouraging and providing the necessary means for the local communities to extract non timber forest products (NTFP's) in a sustainable manner. For example, Tannin and dyes extraction, which has got an international trade of a grand 123.3 million USD in 1991 (Million, 2001). The same can be said about the potential of

the natural forest to provide distillable oils and extractable products such as cinnamon and sandal wood. The natural forest provides Gum incense, Myrrh, Resins and Oleoresins. In the current status of the country, incense had been sold in 1997 generating 93,778,589 birr (Million, 2001). The dry land natural forest provides these products. Still there is a huge potential in this respect if it was well conserved and managed. Spices are also part of this category and the world demand can help the conservation effort by enabling the tree to pay for its existence.

Ethiopia having a diverse flora enabled her to possess extensive stock in medicinal plants. Currently, there are more than 800 tree and shrub species identified for their medicinal use. Almost all of them are found in the natural forests of the country. This rich resource can generate a good amount of foreign exchange. The world trade in medicinal plants is of a magnitude of 171 million USD (Million, 2001).

The Natural forest has a positive value in providing food sources and security in three major counts. First, it provides wild fruits. Second and third, it can serve as a source of famine food and drought indicator. The country's natural forests have been recognized to yield wild food from trees like *Ficus vasta*, *Carissa edulis* and *Rosa abyssinica*. This proves the endowment Ethiopia has with vast numbers of edible fruit bearing trees. Moreover, in recent researches natural forests species also provide food in times of famine (Guinand and Dechasa, 2000). Thus, they serve local people as a means of survival during harsh times. These are species like *Bedena* or *Balanites aegyptiaca*.

There are also trees like *Dobera giabra*, which give abundant fruit and seed whenever the weather during the big rainy season gets drier. Hence, when the tree grows and fruits are in abundance it serves as a drought indicator to the people. This wisdom from indigenous knowledge helps people to get prepared for the up coming drought (Guinand and Dechasa, 2007).

The natural forests of Ethiopia play a significant role by providing flowering plants all year round. Therefore, the country is the 10th largest honey and the 4th largest beeswax producer. (FAO, 2007) The unlimited flowering period of the natural forest had maintained this production capacity. Hence, the net benefit of the natural forests in this regard is unquestionable.

The other major tree products that can be obtained from natural forests are wild animal products. The civet producing animal can be taken as a good example. Ethiopia gets birr 82,592 USD by exporting a small amount of civet (Million, 2001). In another dimension, wild animals could be found mostly in natural forests, which had given a net total gain in USD of 566,065 for hunting fee and 367,578 USD for the export of live wild animals (Million, 2001). This is another area where natural forest shows a significant importance.

2.3.3 The Natural Vegetation types on the Ethiopian Highlands

There are many different types of vegetations in Ethiopia. They are found throughout the varying agro-climatic zones starting from the desert to the lowland or 'Kola' and extending to the freezing afro alpine or 'worch'. However, attention so far has been given on forest types usually occurring on the highlands of Ethiopia. Hence the most common ones are Montane evergreen scrub and the temperate forest (Mooney, 1961). The Montane evergreen scrub occurs mainly along the top of the escarpment in Eritrea, Wollo and Harrar between 2,200-2,300 meters in a rainfall of 700- 800mm and consists species like *Acokanthera schimperi* (Kararo), *Cordia africana* (Wanza), *Croton macrostachys* (Bissana) and *Olea chrysophylla* (Weira) (Mooney,1961).

The temperate forest even though much reduced once covered the grater part of the central highlands and the northern plateaus. It has dominant or pure stands of valuable timber trees of Zigba (*Prodocrpus gracilior*) and Juniperus procera (Tid). The former occurs between 1500 to 2200 meters above sea level while the later occurs at 2200 and 3300 m.a.s.l. Both also require 700 to 1000mm of rainfall for best development. The associates of Tid and Zigba are *Olea Africana* (Woirra), *Eckebergia rueppelliana* (Sombo), *Pygeum africanum* (Tikur Inchet), *Apodytes dimidiate* (Donga), *Croton macrostachys* (Bisanna) (Moony, 1963).

2.3.4 Past and Present aspects of Natural forest Biodiversity loss and conservation efforts

Natural forests contain a rich gene pool resource. Moreover, they are disease resistant. Generally, natural forest tree species are adapted to the ecology of the country.

This had enabled the natural forests to resist animal attack and pest damages. The destruction of certain tree species can be associated with the demand the society generates and the preference bestowed on it. For instance, wild olive trees (*Olea africana*) are in great demand because of the low smoke and bright light, intense heat and fragrance they provide (Chojnacki, 1963: 35). Such a demand resulted in the decline of certain tree species drastically.

The loss of biodiversity that occurs through deforestation must be explained better than the common explanation which makes it a quantitative change. The true case however, is that of species rich natural forests being replaced by a single species (Barrow as cited in Melaku, 2003:12). As far back as the introduction of Eucalyptus and the dominance of its vigorous species, there has been felt a biodiversity loss resulting from the slow growing and poor coppicing power of the local trees.

Measures to protect and conserve the local flora was taken almost immediately which were on many occasions not more than royal proclamations and failed to achieve a marked change on the ground (Chojnacki, 1963:37). Emperor Minilike had passed an Imperial order in the protection of a certain tree species (like *Cordia africana* or wanza and *Janipurus procera* or Tid) which can be taken as the first measure taken to stop biodiversity loss. Another attempt after this initial effort came with the Italian occupation. The fascist administration of the Italian period had also made a biodiversity protection proclamation. It had therefore, selected some tree species as “noble” (trees like *podocarpus* (zigba) and Juniper (Tid)) and made a ban on cutting any.

The Imperial period of Emperor Hayle Selassie and the Military government, emphasized in the establishment of eucalyptus plantations, by putting aside the biodiversity loss problem occurring in the country (Melaku, 2003). Currently emphasis is put in the protection of selected tree species. This seems in a way a continuation of the policies followed by Emperor Minelik and those of the Italians. The 1995 proclamation of EPA states that forests with tree species like *Haygenia Abyssinica* and *Juniperus procera* are protected from any cutting with the penalty of four years of imprisonment in the case of breaking the law.

Wild life extinction is another main feature of biodiversity loss. Pankhurst, (1964) associates the ruthless hunting and extinction of wild animals with the introduction of

Fire arms in Ethiopia. However, as we compare that with the current situation the loss of habitats, i.e. Forest lands are by far the real cause for the destruction of wild animals in Ethiopia. Therefore, the loss of biodiversity should be seen from the angles of loss to both fauna and flora.

2.4 Common livelihood systems and a general account of Deforestation in Ethiopia

The general picture of the farmlands in the northern and central highlands of Ethiopia is a bare and broken land that resembles a desert at high altitude. There is a rugged topography, which is washed by torrential downpour of rain, almost zero vegetation cover, backward land use practices and visible and traceable erosion (Abegaz, 1995:5).

The cause for this had been designated as being the result of an almost national deforestation. Deforestation in Ethiopia occurs because of many and various reasons. These are uncontrolled cutting for consumption, arable land need by the peasant, fire and the creation of grazing lands and striping the barks of live trees for the construction of beehives and roofing (Moony as cited Melaku, 2003:83).

The most common type of land use pattern observable in most parts of Ethiopia is the animal traction dependant mono-cropping of Tef for subsistence use. This system is characterized with an over-cultivation culture which suppresses the natural mechanisms of regeneration. The agricultural system is bedridden with food security in its production of annual mono-crop. This form of traditional agriculture, which is employed mostly in the north and central parts of the country contributed to the deforestation and depletion of the forest resources. Moreover, it is designated as a cause and associated with the population expansion from north to the southern part of the country (Melaku, 2003:4). The uneconomical and shortsighted way of using timber by the farmers of the north led to a shortage of Wood which opened the ground for the exploitation of tress growing on inaccessible steep slopes which are marginal agricultural lands. The exposure of the hills and mountains in this manner to torrential showers which are characteristic to Ethiopia led to the degradation of the land by severe erosion (Chojnacki, 1963: 32).

Moreover, the practice of slash and burn is cited as being the major factor of deorestation in comparison to almost all land use systems. Burning down the vegetation in traditional agriculture is conducted for various reasons. These are like, preventing the rapid growth of bushes, the creation of grassland and to destroy rats, moles and insect pests. It can even go further; as some traditionalists proclaim as a potent mechanism for prevention of epidemics. Ruppell's travel account as cited by Pankhurest, 1964:215) has left a vivid glimpse of this practice as;

It was by no means unusual at night to see the 'splendid sight' of as many as twenty huge fires, some of which might take an hour to pass on mule back. Such fires are lit all over the country at about the same time of the year. If on hills or mountains sometimes these had the appearance of erupting volcanoes.

A decisive comment was made by Dr. Merab, who is quoted by Chojnacki, (1963:34) while explaining the process of deforestation said:

"The farmers have an unfortunate habit of cutting down all the trees in a forest with out discrimination. They either burn the remaining or feed their cattle with it preventing the young sprouts from growing and rising into trees. Traditional farming is a great enemy to the forest."

However there are other land use patterns and livelihood strategies apart from this dominant form still practiced in Ethiopia. These are the Enset growing and hoe cultivation culture of the southwest and the Livestock husbandry of the rift valley and south eastern lowlands. The South West is also known for its agro-forestry livelihood system and is the only traditionally vibrant area that cultivates many cash and food crops at the same time. This land use System had preserved a great part of the remaining forest, even when it is highly disturbed in Ethiopia (Tadese and Masresha, 2007). The other one is the pastoralist land use pattern of the eastern and Great Rift Valley low lands. This system affects the environment at a minimum scale, as long as the pastoralists refrain from using fire to initiate fresh growth of grass.

2.5 The challenges of conservation from Environmental and developmental angles

Deforestation generally leads to the degradation of natural resources. Since a well maintained natural resource is a key factor in any development effort, its loss will mean underdevelopment. For most development activity, information is required on the condition of natural resources, their potential and the distribution of people and livestock (Abegaz, 1995:10). Therefore, harmonizing the human component and the condition of the environment are prerequisites to bring about sustainable development.

However, in developing countries conservation can be carried out only (in its traditional sense of preservation) at the expense of the rural communities. When local people are unsupportive, avoided and not treated as partners or not recognized as stake holders it will result, in a failure of conservation attempts.

This creates a clash of interest between the utilitarian and preservationist approach of conservation. The preservationist approach, advocates that areas should be protected from the presence and activities of man and subsistence needs of people living in and around such areas (Furze et.al., 1997).

Therefore, today, there is awareness on the part of people involved with conservation that there is a strong linear relationship with the issues of conserving the environment and development of rural communities. Hence, a successful and sustainable conservation becomes a reality when the objectives of the rural communities are met. This creates a positive involvement of the local communities in the conservation of wilderness areas. The meaning of the term development does not imply here the modernization level achieved by western countries. A comprehensive definition for development puts its meaning as “the achievement of the desired, social, political and economic goals of a society” (Furze et.al., 1997).

Therefore, to conduct a successful conservation one must be able to understand the role rural communities play in preservation. A solution to the dilemma encompasses designing a plan that shows and empowers rural community’s ways for sustainable extraction.

2.6 The Driving factors for Deforestation in Ethiopia

The reasons cited as the real causes of natural resource degradation in Ethiopia are numerous. Some of these include land use type, population growth, overgrazing, over

cultivation, backward agriculture tradition and others. One explanation identifies the continuous increasing fuel wood use and demand of the society as a leading cause for forest degradation (Mooney, 1959:8). Ethiopians are heavily dependant on a woody biomass for the various needs of energy at household level. According to the research by the Ethiopian energy committee, 94.5% of the total energy came from biomass source in 1986. The excess demand has created scarcity in 75% of the regions in the country. (Azene, 1993:p1)

The second factor is desperate poverty, which is an outcome of unsustainable production system. This factor is further linked with the previous factor. Deforestation creates a vicious cycle of poverty by worsening the means of subsistence, reducing land fertility and lessening the opportunity of livelihoods of the farmer (Yeraswork, 1995:1). The worsening living standard of the rural poor forces them to engage in unsustainable extraction of natural resources. This has created a clash of interest between the conservationist and the peasant. To the peasant, a deforested land is seen as a desirable opportunity which can be used for grazing his livestock and for cultivating some crop (Yeraswork, 1995).

The third factor is population growth. As observed by Wild (2003) population increase in the developing world leads to, crop production on less suitable land, overgrazing, increased demand for fuel and timber, fallows are replaced by continuous cultivation, steep slopes will be brought into cultivation and extreme nutrient mining that leads to degradation. The last factor that paves the ground for deforestation is a wrong national policy and less attendant political commitment of government officials.

2.7 Conceptual framework

In this study, the environmental degradation and the impact of that on development will be analyzed in the frame work of Mt. Zequala by surveying the biodiversity loss of the fauna and flora. The social factors and reasons that triggered the deforestation of the forest will also be studied. The role of the forest in maintaining ecological balances as well as environmental protection will be analyzed by comparatively looking at some of the major problems occurring in the area.

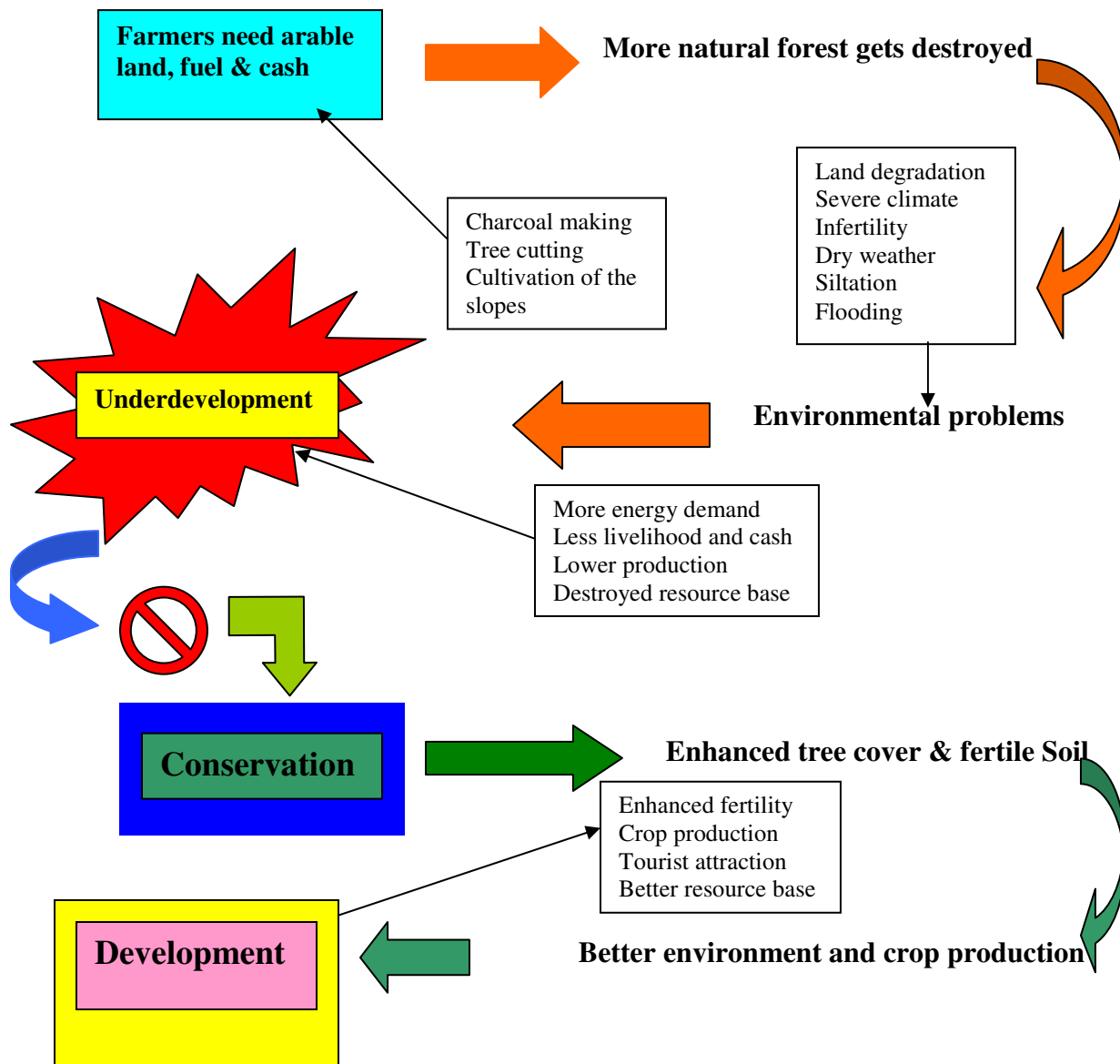
The concept behind the figure found immediately below (Figure1) is that farmers in Ethiopia are always in need of more arable land as they abandon their degraded farmlands. They also look for fuelwood since the rural community is still dependent on wood for household fuel consumption. The farming community also engages in livelihoods such as charcoal making mainly to get cash and increase their household income. This driving force leads to an intense deforestation.

The deforestation created will lead to environmental crisis such as land degradation as the soil becomes exposed to erosion, siltation and flooding. There will also occur a decline in soil fertility and severe climatic conditions. The chain reaction that unfolds will make the rural community to exert more energy to grow crops, get fuel and cash. This creates a further problem on their livelihood. The unavailability of fuel will lead to the usage of crop residue and animal manure for fuel which in the long run means degradation of the farmland and lower crop production (Chojnacki, 1963:35). The sum total of such a trend is underdevelopment at national level which is linked with a destroyed resource base resulting from unsustainable resource use (Wild, 2003).

Such livelihood and rural agricultural systems leading to underdevelopment must stop. Conservation of our natural resources with environmental husbandry and careful extraction must be given a high priority. If such an effort is conducted, there will be an enhancement in forest coverage at national level.

The direct consequence of this is enhancement in fertility resulting from soil protected from erosion. There will be cheap availability of wood biome for fuel. Hence, crop residue and animal manure will be used as natural fertilizers. With the return of natural fertilizer there will be a sustainable fertility that guarantees crop growth. This results in good crop production and food security. In general, less energy requirement for farming and for other socio- economic activities will occur. The betterment in the environment coupled with a stable and maintained resource base creates a greater opportunity for development. This conceptual frame work is explained in figure one explicitly showing the interconnected dynamics of conservation for development and better environment.

Figure 1: schematic representation of the conceptual framework



Source: Prepared by the author, 2008

Chapter Three

The study Area

3.1 Location

The study area is located in Oromiya region, Eastern Showa Zone at Liben-Chukala *Wereda* or district. The mountain has been recognized from early times and is spelled and pronounced as Zuquala, Chukala and Zeqwala. The name Zeqwala refers to a

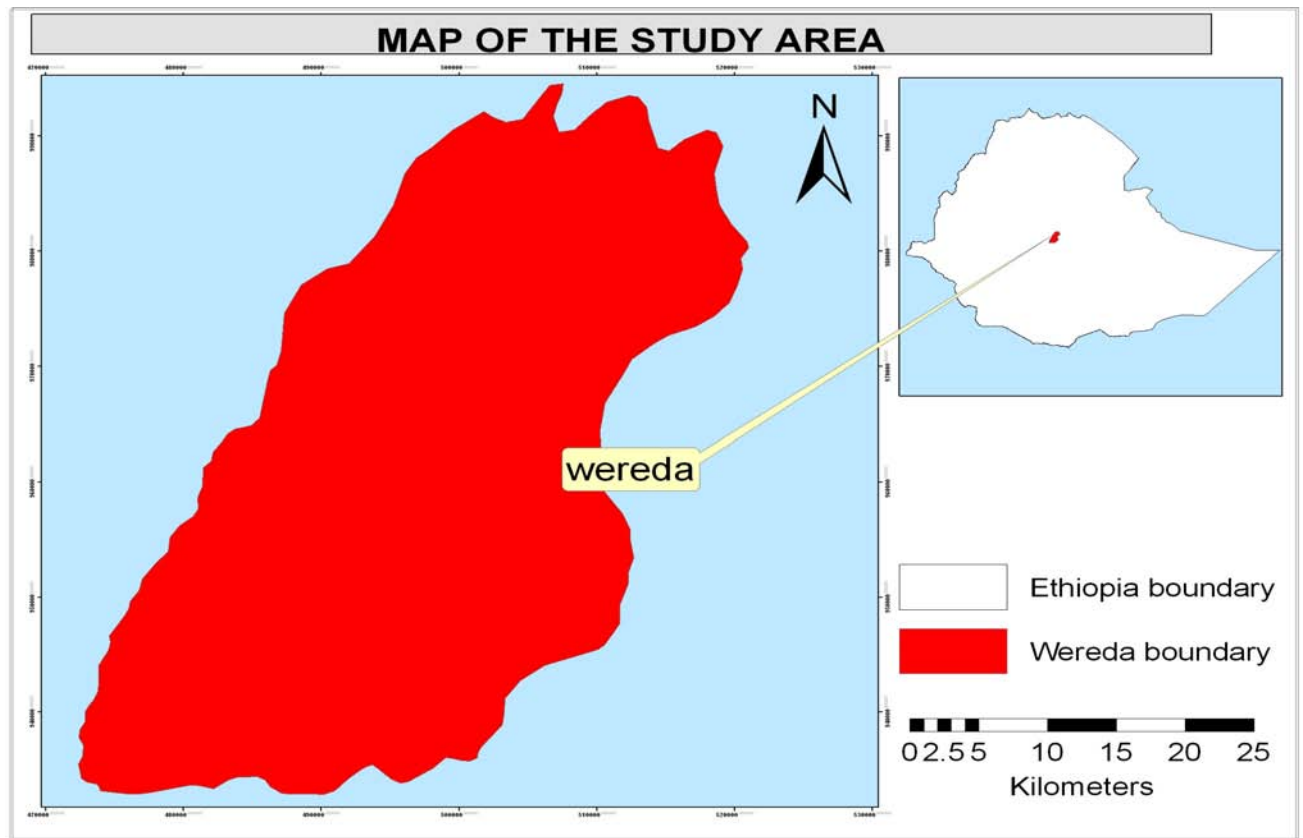
shallow hole or a hot place derived from Ge'ez. The mountain is located specifically at 38° 51' N longitude and at 08° 33' E latitude. The total land reserved as forest priority area is 9629 hectares in East Showa zone (Berhanu et al, 1998). In the Woreda, there are 19 *Kebeles* out of which only three *Kebeles* are found in and around Mt. Zeqwala. The Woreda's capital is the small town of Adulala. On top of the mountain there is Abo Gedam or Monastery with a holy crater lake. The altitude of the mountain is recorded as 2989 m.a.s.l in a topographic map specifically prepared for it. However, since the map takes the ground of the church as the highest ground and since there are high places on top of the mountain it is safe to say that the altitude is about 3000 m.a.s.l.

Mount Zeqwala It is found at 89 Km south east of Addis Ababa. The mountain is covered by afro-mountain forest. This area (land surrounding the crater lake) has densely wooded vegetation at the top. The natural forest area is about 100 hectares. Zeqwala's natural forest (ZNF) has numerous species of plants growing together. The dominant tree stands is however, *Juniperous procera*. The forest also serves as a habitat for wild life (Forest genetic resources conservation project, 2004).

Physical infrastructures on the mountain and its surrounding are still at an insignificant scale of development. Considering the early date they had been constructed and the nearness of the area to the capital, such infrastructures are still very deprived by even Ethiopia's standards. A dirt road constructed in 1954 links Hamus Gebeya or Wonber town at the base with the monastery (Solomon, 2005). This road is badly affected by the flood and erosion occurring on the mountain in the aftermath of the deforestation. Currently, it is almost impossible to use it for car transportation. An all weather road has been constructed only as far as the small town of Dire found few km. outside Debere Zeit.

There is no clean pipe water supply on top and even at Wonber. There is no electricity supply and only the monastery gets electricity through its own generator. Telephone service has been installed on the place many times in the past but due to failure to repair and supervision it currently doesn't function.

Map 1: Liben-Chukala *Woreda* which is one part of East Showa zone.



Source: Ethiopian Mapping Authority, 2005

3.2 Climate and Temperature

Most of the *Wereda* (i.e. about 94 %) is a Weina Dega agro-climatic zone (Forest genetic resources conservation project, 2004). However, one can find the three traditional agro-climatic zones on the mountain. These are the Kola, Weyna Dega and the Dega agro-climatic zones. The plain surrounding the mountain is 1720 m.a.s.l. Most of the

mountain however, lies in the Weina Dega agro-climatic zone and only a small tip of the top of the mountain lies in the Dega agro-climatic zones.

The base of the mountain where the town of Adulala is found is 1720 m.a.s.l. Since, the Kola agro- climatic zone ranges between 1000 and extends to 1800 m.a.s.l, the base of the mountain and its lower part is in the upper kola agro-climatic Zone. Most of the steep slope part of the mountain is lies in the Weina dega (1800 m.a.s.l -2400 m.a.s.l) agro climatic zones. One can observe starting from 2400 m. a. s. l up to 3000 m.a.s.l the dega agro- climatic zone extending right up to the top. The slope of the mountain is 32% which is classified as very steep and has been designated as a land which can be used with only bench terracing (FDRE Rural Administration and land use proclamation no.456/2005). Thus, all the three major agro-climatic zones are found on the mountain.

Temperature at the top of Mount Zeqwala is cold and receives a higher rainfall at some parts of the year. Rainfall is highly erratic but is relatively higher on mountain top. The annual average rainfall is 808 mm. The highest amount of rainfall occurs between the months of July and August. The forest area receives 731.3mm on average (Forest genetic resources conservation project, 2004). The annual average maximum and minimum temperature is of 18⁰c and 6⁰c respectively. The current situation of deforested landscape had brought about excessive siltation in lands found below the slopes (Forest genetic resources conservation project, 2004). This happened since the rain that falls on top of the mountain fails to infiltrate due to the loss of a dense vegetation cover.

3.3 Physical Features

Mt. Zequala has height as well as immensity with a solid cone type structure. Its unique physical feature makes it the ideal extinct volcano for referencing by any geologist in the world. Such are the deep gorges the lava flow has created and observable even today. Lands found at the base are rolling plains with few low lying hills scattered on it. Mt. Zeqwala has also a well preserved crater lake being an extinct volcano cone of quaternary era. Its diameter is about 1k.m. while its depth is about 60 meters (Solomon, 2005). The current situation of deforested landscape had brought about siltation and excessive flooding in lands found below the slopes.

There are five rivers in the *Woreda*. Deforestation and bare vegetation cover have exacerbated the siltation problem in the area. The rivers are Awash, Modjo, Akaki, Belbela, and Wedecha (Forest genetic resources conservation project, 2004). The soil types of the mountain and the plain is black, red, brownish and gray in color. Each soil type is found in 63.7%, 3%, 9% and 24.3% out of the total respectively. The bed rock is a deposit from a volcanic ash and the lava flow had made the soil to be rich in nutrient content (Forest genetic resources conservation project, 2004).

3.4 Zeqwala's natural forest Ecology

The mountain used to be covered by montain forest at the top and extending up to the limits of Weina Dega agro-climatic zone. The temperature at the top is usually cold which had lent the formation of lichens in the vegetation. However, the current situation shows only the presence of such forest at only the surrounding of the Crater Lake. The area covered by forest on the top is currently about 100 hectares. The altitudinal difference ranging from 1720 m.a.s.l to 2989 m.a.s.l has given rise to the formation and occurrence of a rich biodiversity. There is a wide grassland that surrounds the lake. Even though, there used to be numerous springs in the past the current scenario is a trend of drying up.

Research done to make an inventory on the biodiversity of the natural forest shows the presence of many useful tree species. One such research indicated the presence of 217 tree species (Hylander, 1991).The forest also serves as a habitat to wild life. The common ones are hyenas, leopards, bush pigs, wart hogs, bush buck, red dicker, apes and foxes at present. According to the hagiography of Saint Gebre Menfes kidus, during medieval period 60 lions and tigers used to live in the forest with him (Forest genetic resources conservation project, 2004). As recent as the1970's, the locals remember the presence of lions in Zeqwala's natural forest.

3.5 Socio- Economic Characteristics of the *Woreda*

3.5.1 Demographic condition

The total population living in the *Woreda* is estimated at 109,290 out of which 87,416 are males while the remaining are females. On mount Zeqwala there are about 300 monks and nuns living in the monastery. Out of the population specified above the farming communities living on the mountain have a share in the number (Forest genetic resources conservation project, 2004). Out of this total the majority live in rural areas while only few are expected to dwell in towns.

Liben-chukala *Woreda* went through integration in the past with Ada *Woreda* and a separation just two years ago. It assumed a full status as a *Woreda* in March 2007 G.C. Available information about the *Woreda* points that the area has been settled by the Oromo clans of Liben and Jida in the 17th century. The other ethnic group found in the area is the Amhara.

3.5.2 Economic characteristics

The population of the *Woreda* almost completely depends on agriculture. The main form of agriculture is ox- drawn plowing system. However, usage of a hoe like implement for agricultural is practiced by the “Tikur Ras”¹ or the settled people of Zeqwala. A limited form of vegetable farming and sell from agroforestry is also practiced by the people of the area. Farming has intensified after the change of government in 1974 and 1991. There is also evidence that indicates starting at the beginning of the second half of the 20th century on the mountain.

The overall agricultural land in the *Woreda* from previously surveyed data is only 161,056 hectares of land 74.2% is used as agricultural land while the forest lands are only 8.2 % (Forest genetic resources conservation project, 2004). The land use pattern in the area differs greatly. There are farmers who use the mountain slopes for farming, others practice animal husbandry by using the slopes for grazing.

¹ This people found settled besides the monastery are descendants of former slaves given by Emperor Minelik to the monastery so that they help the monks and fight the forest fires of the area when he was building the present functioning Church of the monastery.

Some individuals around the mountain use the natural forest illegally for charcoal production. There is also an engagement in the planting of vegetables and partial dependence on agro- forestry.

The major crops grown in the area are tef, barley and wheat. The agro- forestry products include Gesho (*Rhamnus Prinoides*), cabbages, 'tenadam', split wood of *Olea africana* and others. Domestic animals such as cattle, sheep, goats, donkeys, mules and poultry are raised by the peasants. Apiculture and honey production is also practiced by some of the farmers.

3.6 General Historical background of Settlement and deforestation

The area of Mt. Zequala is a product of intense volcanic activity during a quaternary period. The cooling age produced a well reserved cone form of the volcanic eruption. The vent formed after the cooling of the eruption was filled by rain to become a huge crater lake. Written Church sources came to mention the place after the coming of his holiness Abune Gebre Menfes Kidus and his founding of the monastery that is still dedicated to him in 1167A.D. St. Gebre Menfes Kidus lived on the mountain for 252 years after establishing his Monastery. The place was also an important traditional worship before the founding of the Monastery (Forest genetic resources conservation project, 2004).

Plate.1 Mountain Zeqwala as in the aerial photograph taken at 2006



Source: Retrieved at Dec14, 2007 from <http://www.flickr.com/photos/,2006>

Emperor Minilik is said to have built the present church and dedicated his effort to preserve the forest. In that effort, he gave fives to monastery and a tax collecting right. Observing the forest fires on the area he is said to have given the monks and priests who serve the monastery thirty slaves whose sole duty was to stop forest fires, bury the dead monks and serve the monastery in manual labor. The present people of Zequala are descendants of these faithful individuals.

The well preserved and intact nature of the mountain natural forest, crater lake, wild life be it mammals or birds is still remembered by elders up to the beginning of the second half of the 20th century. The reverse trend started to happen with the land proclamation of 1975. This policy has its own effect at the local level by creating a power vacuum in the area. The monastery was an administrative organ on its own right in pre-1975 period and has the authoritative rights to collect tax and represent governmental functions of judiciary and imposition of penalties using the police force in the area. The gap of chaos and anarchy that had been created enabled the community referred in those days as “Ye Tikur Ras” to expand and start agriculture side by side with deforestation.

The then military government took measures by taking all the area apart from the top of the mountain as public property. However, it recognized the place to be a forest priority area (Solomon, 2005). It attempted therefore to establish a forest guard unit employing the farmers living on the area by giving them some of the forest lands as farm lands. The problem was not solved immediately since during that time the forest was burnt down three times.

The Derg’s government also established villages at Wenber and Danissa through villagization program. This paved the road for settlement, illegal tree cutting, and all other aspects for deforestation and land degradation (Forest genetic resources conservation project, 2004: 3, 5).

The harsh catastrophe came during the transition period following the defeat of the Derg, when the policing and other administrative aspects were abandoned on the area. In 1992 the forest fire that started in the natural forest found on the steep slope raged for one week and was stopped by the effort of people coming from even far away places. Shortly after that, illegal settlers began farming on the fire devastated area and started

cutting trees. Thus, expanding farmlands became the order of the day. Between 1999 and 2001 many forest fires occurred and the loss of forest coverage became a very serious problem. The natural forest with its various species has an important role to better the environment. Some of these are conserving and protecting the soil from erosion, enabling water to percolate, enhancing moisture level by providing shade and improving soil fertility through the shading of their leaves (Forest genetic resources conservation project, 2004:12).

Currently, the existing environmental situation on the area is at a high risk level. There is an on going erosion problem which contributes to the drying up of springs which would have supplied water on long and permanent bases. The flooding is so catastrophic that its effect is felt as far as Debre Zeit in the form of siltation (Campbell, 2006:3, 4). This will perpetuate the worsening of living standards for the farmers and an increasing environmental problem in the area.

3.7 Conservational efforts in the area

There has been a conservation attempt on the area for quite a long period. The measure however, has been consistently a setting up of forest guards and measures involving imprisonment, eviction, fine and demarcation. A letter written in 1969 G.C by the secretary of the first patriarch to the abbot of the monastery clearly demonstrates this fact.

“ I have been ordered by our father to tell you that Emperor Minilik had given the royal orders that the Tikur Ras should never climb the hill and make a settlement, from cutting trees, plowing the land and from raising livestock and this order has been broken by the current people therefore evict them from the place deploying the police force in the Woreda .”¹

This letter indicates clearly the use of eviction as a conservation measure in the area during the Imperial times. The Monastery's apparent power in the government structures had succeeded in keeping the settled community to engage only with the growing agroforestry products. Moreover, the population density was very small in and around the mountain. Therefore, the burning or cutting of trees was very minimal (Slomon, 2005).

¹letter sent from his holiness Aba Baslios's secretary to the Abbot of the Monastery No.778/518 1961 E.C.

The change of government brought with it land reformation and confiscation measures. This decree made all the lands found in Zeqwala to become state property. Following the decree there was a great expansion and land degradation. Moreover, conflict on the question of right over the resource between the settled community and the monastery became the order of the day. The measure taken by the military government was establishing Womber Peasant Association which was thought capable of protecting the forest around the monastery by employing militias and creating of borders between the monastery and the peasant association (Slomon, 2005). However, during this period, illegal plank making and forest fires still continued. Corrupt members of the *kebele* administration at Wonber opened the road for such activities by taking bribes from individuals engaged in producing planks.

With the fall of the military government, there were many years of deforestation up until 2005. By 2005, the complete devastation had made the *Woreda* administration to use different conservation measures, such as employing forest guards, resettlement based on voluntary bases and penalties like imprisonment (Solomon, 2005).

However, the most important and controversial measure taken by the administration are area closure and eviction. Area closure banned all cereal agriculture and the cutting of trees as well as animal grazing. Therefore, it became an issue that provoked a great resistance and opposition from the peasants of Womber *Kebele*.

The measure was vital to bring about the vegetation cover on the mountain. It also allowed the regeneration of different shrubs. However, it remains unsustainable so long as it is pursued permanently on the area to maintain the lost biodiversity. Nonetheless, the dangerous flooding, erosion and siltation occurring on the area has decreased because of it.

However, the need and demand of the communities to engage in agriculture activity on the mountain still remains. Therefore, an all encompassing solution must be implemented for a successful conservation.

Chapter Four

Data Analysis and Discussion

4.1 Background to the Communities

Information has been gathered from three *Kebeles* (Wonber, Illmo and Ashufe) which have farmers living in and at the base of Mount Zeqwala. These peasant households usually encroach up on the forest for grazing purposes or agricultural practices. As a result, they share common socio-economic characteristics.

The household heads of the area are dominantly male headed, accounting for 98% of the sample survey. In terms of education, the community settled on the mountain, mainly the ‘Tikur Ras’ are literate having 26.3% literate household heads from the total, than the farmers of both Illmo and Ashufe *Kebeles* which have only 17.5% and 7.5% literate household heads, respectively. In general, there is an almost equal proportion of literate (51.3 %) and illiterate (48.8%) individuals in the area.

The dominant tribes in the *Woreda* are the Tulema, Jida and Liben Oromos. The composition shows 52% Oromos and 47% Ahmaras living in the area. There are only a small number of individuals belonging to other ethnic groups in the area. The presence of the monastery had attracted a steady influx of Ahmara migrants and settlers. These people, who came mainly because of religious reasons, have formed an enclave in and around Mount Zeqwala. This shows to some extent a migration and settlement process in the area dating from an early time of one hundred years.

In-depth interview with key informants showed the sources for this type of settlement to come from individuals who came to the monastery wanting to become monks. These people who failed to become monks ended up in intermarriage with the settled community at mount Zeqwala and engaged in farming activity. As a result, it is only on Mt. Zeqwala’s Wonber Kebele that there are 3.8% out of the sampled households who claimed to have come and settled in the place recently from elsewhere. The

remaining 96.2% are people who were born there. Therefore, new settlements like this have exacerbated the already distractive resource use (Taddesse and Masresha, 2007).

The people living in and around Mt. Zeqwala are almost 100% Orthodox Christians. Nonetheless, there are traditional religion believers belonging to the Liben and Jida tribes of the Oromo and also some Protestants. There is a very high number of family size, with the average being eight individuals per family. Hence, heavy dependence on available natural resources and the need for generating extra household income takes a pressing importance in their life. It also has a direct negative impact on the resource of the area (Muys 2000; Demel 2001)

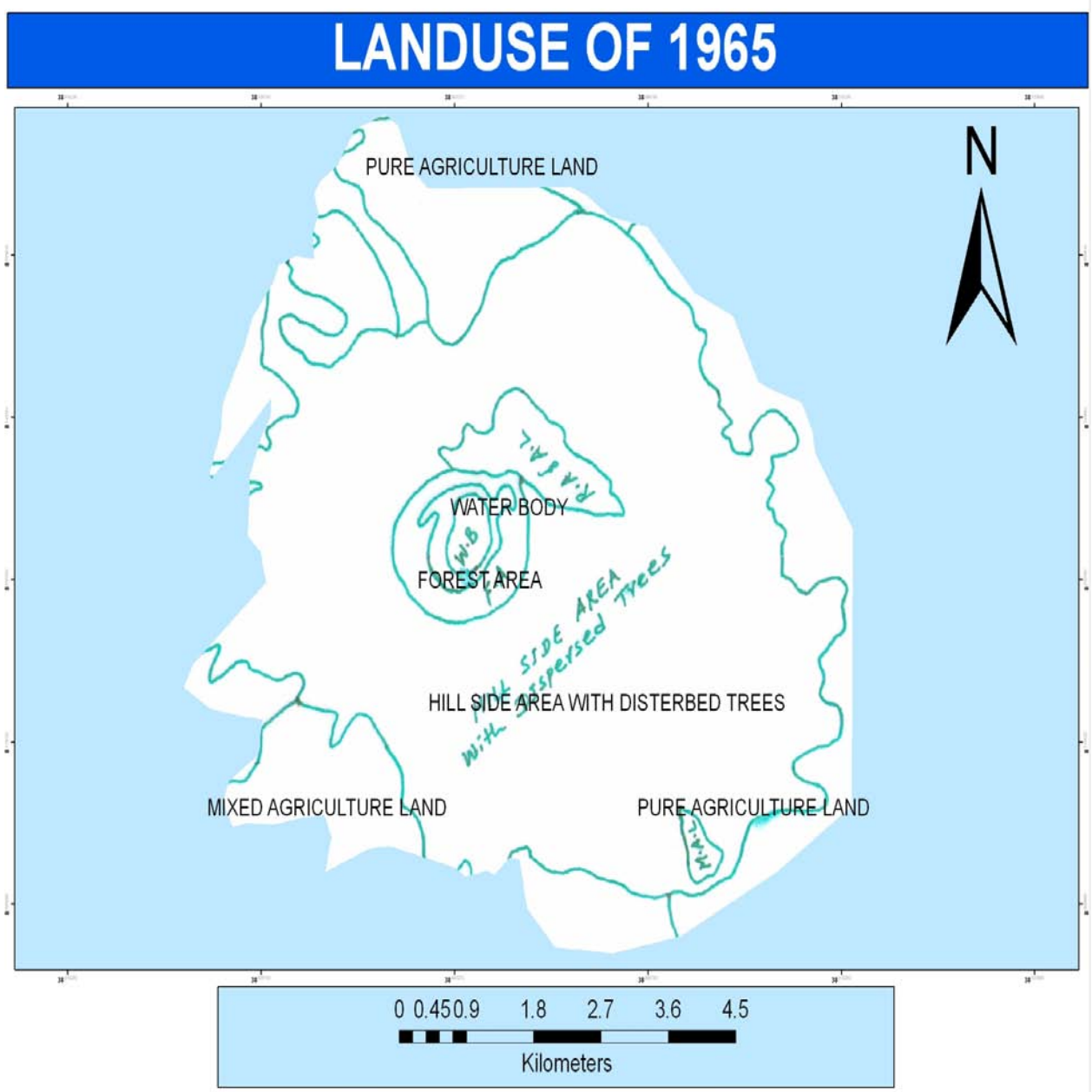
4.2 Land Use pattern and ownership in the area

The community in and around Mt. Zeqwala have mainly two major land use systems. The first is cereal agriculture while animal grazing, agro-forestry and vegetable farming take a secondary role. The major land property holding status is ownership through government grant (71.3%), while 22.5% got their piece of plot through inheritance and only 2.5% and 3.8% rented their piece of plot or have partly rented and owned property regimes, respectively.

In order to understand the deforestation that has occurred on Mount Zeqwala, one must first establish the boundary so that there will be a baseline from which one can further classify and understand the land use and land ownership aspect. Therefore, the study area's boundary has been selected from a topographic map (See annex two).

There has occurred starting from an early time a small level of expansion of agriculture by deforesting the land covered by the natural forest (Badege 2001; Demel 2001; Reusing 2002). This can be clearly seen from the land use map that has been developed from the aerial photograph of 1971. When one Contrasts the land use and land cover in the periods of 1965 and 1971 it shows the different land use patterns and the extent of agricultural expansion on the mountain. Moreover, such a contrast is a major indicator that shows the extent of loss and decline of the forest coverage, the expansion of farmland, the area of settlement and the degradation of the environment in general (Refer to figure 2).

Fig. 2: Land use and land cover map of the mountain developed from an aerial photograph of 1965.



Key

PAL. Pure agricultural land
RA&AL. Settlement area and Agricultural land
MAL. Mixed agricultural land.

Source: prepared by the author, 2008

Fig 3: Land use and land cover map of Zeqwala (developed from an aerial photograph of 1971)

LANDUSE OF 1971



Source: prepared by the author, 2008

As can be clearly seen through visual interpretation of the Map 1 and 2 it is apparent that there was neither human encroachment nor pure agriculture on the hillside area of the mountain in 1965. Instead, one can observe only an isolated case of mixed agricultural practice. However, in 1971, an increase in agricultural lands on the hillside of the mountain was observed. There was also the occurrence of a new settlement and agricultural land expansion on the mountain apart from the old Wonber Mariam *Kebele*. The lands at the base of the mountain have expanded and become also pure agricultural areas. Based on the two land use figures, an intense investigation was made to determine the change that has occurred in terms of forest cover, settlement, agriculture intensification and degradation on the environment. As a result the following result has been obtained (See Table 3).

Table 2: Table showing the change in forest cover, resettlement, and agricultural land.

No	LAND USE TYPE	1965		1971		Change in (ha)	Rate of change
		Area (ha)	% of the area	Area (ha)	% of the area		
1	Water body	40.5818	0.79	40.5818	0.79	0	<i>0</i>
2	Forest area	140.2447	2.73	107.8136	2.1	-32.4311	<i>-5.4</i>
3	Grass land area b/n Forest & water body	46.7847	0.91	50.7043	0.99	3.9196	<i>0.653</i>
4	Pure Agriculture	961.1291	18.71	1368.6332	26.65	407.5041	<i>67.92</i>
5	Mixed Agriculture	475.3822	9.26	646.5493	12.59	171.1671	<i>28.53</i>
6	Settlement with Agricultural land	135.5437	2.64	152.6147	2.97	17.071	<i>2.85</i>
7	Hill side area with dispersed trees	3336.3376	64.96	2769.1069	53.91	-576.2307	<i>-96.04</i>
	Total Area	5136.0038	100	5136.0038	100	-	-

Source: Based on the aerial photograph, 2008

The dominant physical feature and land cover on the mountain in 1965 was the hillside (steep slope) area with dispersed trees which comprised 65% of the total study area. The next was the pure agricultural land that encircles the mountain at its base with 18.71% of the whole. As can be seen clearly from the compiled result in Table 3, there has occurred a dramatic decline in forest cover at the area surrounding the crater lake in the space of only 6 years. The same could be said (only this time the degree of loss is huge) to the hillside area with dispersed trees. This area by far had been the major portion of the mountain that has suffered a tremendous degradation and vegetation cover loss.

In quiet an opposite aspect, there was an increase in agricultural lands and also settlement on the mountain. The largest settlement and agricultural land was the *Wonber Kebele* whose proximity to the natural forest located inside the monastery's grounds became a bone of contention as expansion was possible only with the deforestation of the natural forest.

Encroaching on the dispersed forest land found on the slopes of the mountain has intensified throughout the years. Hence, taking the rate of land cover change established from the two maps one can draw a general picture of the current state of the mountain. The following table (Table 4) gives us hypothetical figures which show the expansion of farmlands, extents of deforestation, the settlement and environmental situation of the area in general by assuming the rate of change as constant. However, there are social and natural factors that make the rate of change to increase or decrease in unpredictable fashion. Therefore, the qualitative data gathered through observation and interviewing key informants has been used to triangulate the results obtained from such an exercise.

However, in cases of both the water body and the hill side area with dispersed trees, the rates of degradation and deforestation have gone shockingly and unforeseeably high. In 2004/5, this particular place lost every single bush, and tree coverage has become literally bare. The loss means in figures above 3336.3376 hectares of land becoming bare. The severe shortage of rain and degradation has brought the same effect on the crater lake which has become dead by 2006/7. This amounts to a complete drying up of a water body that used to cover 40.5818 hectares of land. In another dimension the forest area has been conserved at different periods by the dedication of the monastery and *Woreda*

administration in their attempt to stop the deforestation taking place at various times. This means that there is a very small figure for the rate of change on this particular place. Forest fires and natural calamities on the other hand had brought a change which is hard to predict in size and extent. The case of the crater lake is a good example of this statement as the succeeding rainy season of 2006/7 and a strict measure of area closure and conservation had created the ideal condition for the crater to be refilled with rain water.

Table 3: Table showing the hypothetical change that occurred in hectares of land up to the present using estimation based on the rate of land cover change.

No.	LAND USE TYPE	Rate of change	The change in 27 Years (from 1971 – 2008)	The change in (ha) by 2008
1	Water body	0	0 * 27	0
2	Forest area	-5.4	-5.4* 27	- 145.8
3	Grass land area b/n Forest & water body	0.653	0.653* 27	17.631
4	Pure Agriculture	67.92	67.92* 27	1833.84
5	Mixed Agriculture	28.53	28.53 *27	770.31
6	Resettlement with Agriculture land	2.85	2.85 * 27	76.95
7	Hill side area with dispersed trees	-96.04	-96.04 * 27	-2593.08

Source: based on the aerial photographs, 2008

Out of the total number of farmers living in and around Zeqwala, 78% claim that farming and the farm land they own today has been inherited from their parents while 11.3% recognized that they remember the land they are plowing now being a grazing land in the past. The remaining 5% stated that their land used to be a forestland before they started plowing. This means in other words that the expansion of agriculture started quiet early. In addition it indicates that there will be farmland expansion or the conversion of farm lands to agriculture every year by some segments of the society (Berhane and Agajie, 2006).

The piece of land thus acquired was converted for plowing through actions that evolved deforestation and land degradation. As a result, 5% of the farmers stated to have cut down the vegetation growing on the land before converting it to agriculture while 1.3% burnt down the vegetation found on the piece of plot they encroached upon before they started plowing.

The other major aspect of land use in Mount Zeqwala is animal grazing. Grazing of animals on the mountain slopes and on lands found at the base of the mountain is extensively practiced. Out of the total surveyed households, 88% affirmed to have used the mountain slopes as their grazing area. There are only 7.5% of the farmers who use the lands found at the base of the mountain for grazing purposes, the remaining either do not possess cattle or feed them strictly in their shed.

This also leads to the identification of this practice as another major source for land degradation and deforestation i.e. cattle caused overgrazing, inhibition of regeneration of tree species, purposely lit forest fires for the creation of grass lands and cleft hoof induced erosion and land degradation. Moreover, the number of cattle is by far in excess of what the land can support. The average number of cattle owned per household is seven animals. On average, the number of sheep and goats owned are two per person. Burden animals in the area are donkeys, and mules. There is one equine animal owned on average by every farmer contacted in the survey. In general, the degradation caused by large number of livestock and other farm animals is extensive (Berhane and Agajie, 2006).

4.3 Livelihood source and household income of the community

The farmers living in and around Mt. Zeqwala earn a livelihood mainly from cereal agriculture. This is easily observed from the result of the questionnaires distributed. For instance, 32.5% of them earn an income above 10,000 birr per year from agriculture or cereal production. Thus, income that is gained from agriculture is of a substantial amount. Out of all the sampled households, there are only 17.5% of the farmers who do not earn an income from cereal agriculture. All of the farmers are found in Wonber *Kebele* and have been forbidden from plowing on the mountain. There are 17.5% of the communities who get an income from agriculture that is less than 3000 birr.

Moreover, the others or 32.5% gain in the range starting from birr 3,001 to 10,000. Therefore, 65% earn above 3,000 birr per year mainly from practicing agriculture. This points that the people in and around Mt. Zeqwala are heavily dependant on agriculture for generating household income as well as for the satisfaction of their basic needs. As a result one can see that, traditional cereal agriculture production system being the major cause for the deforestation of large parts of Ethiopia (Pankhurst, 1964).

The other livelihood systems that are practiced in the area are agroforestry and vegetable gardening. Out of the total sample surveyed households 65% of them earn an income from one to more than 1000 birr by engaging in these activities. The farmers who never involve in such an activity are only 35% from the total surveyed households.

Nonetheless, starting from an early date when the ‘Tikur Ras’ or people of Zeqwala (i.e. wonber *Kebele* peasants who are settled on the mountain) have been told to live on agro-forestry and vegetable gardening practices up until the beginnings of the second half of the 20th century by royal decree. This livelihood is still being practiced by these people. Some of the major herbs and tree products produced are ‘Geshe’ (*Rhamnus Prinoides*), the split logs of ‘Woirra’ (*Olea Africana*), Kosso (*Hygenia Abyssinica*), ‘Tena Adam’ and Nech Sar. They also grow cabbages and some herbs. Out of the total people interviewed, the 26.3% who live in Wonber *Kebele* stated that they are engaged in agroforestry practices and earn an income ranging from birr one to 1,000.

Table 4: Income earned from engagement in agroforestry

The sample <i>Kebeles</i>	Category of Income		
	0	1-1000	>1000
Wonber <i>Kebele</i>	11	23	2
% share of Total	13.8%	28.8%	3%
Ilmo <i>Kebele</i>	12	6	6
% share of Total	15%	7.5%	7.5%
Ashufe <i>Kebele</i>	4	3	13
Total in %	5%	3.8%	16.3%
total	33.8%	40.1%	26.8%
Pearson chi-Square 27.56***			
P-value 0.000			

***= Significant at 1% level

Source: Based on field survey, 2008

Among the three *Kebeles*, Wonber Zeqwala's settled community's engagement in this livelihood is highly significant because of the reasons mentioned above. (See Table 5)

There are only 11.3% of the peasants on Mount Zeqwala who are not engaged in this activity.

Plate 2: Products of agro- forestry and vegetable gardening on sale at Adulala market.



Source: Field survey, 2008

In terms of conducting apiculture farming, 91.3% of the sampled households do not earn any thing from it while the remaining few individuals earn an income ranging from one to 5,000 birr. Livelihood activities like charcoal making had been declared as an occupation of illegal individuals. Therefore, there are no individuals who admitted in selling fuelwood as their only livelihood means found settled in the farming communities in and around mount Zeqwala. This does not mean nevertheless that there is no engagement in such activities to supplement the household income earned from either agriculture or agroforestry. Individuals who usually make charcoal and cut trees for

fuelwood are persons who have no plot of land and who stay in small towns like Adulala, Danisa and Wonber.

Contrasting the bulk of household income driven from different livelihood activities, cereal agriculture by far ranks first. Therefore, the farmers resist engaging in other livelihoods which are not worth the effort from their point of view. In fact, this has led to farmland expansion (using sometimes conflagration) which resulted in a serious conflict, outlawry and deforestation in the area. The 46.9% of the households in and around Zeqwala believe they have no options for another livelihood if they were forced to abandon agriculture. The other 10% of the community identified fattening cattle as an option while 17.6% want to engage in agroforestry and vegetable gardening. The rest or 11.3% chose trade as their only option while the remaining few mentioned labor work, bee keeping and renting agricultural lands to continue with farming elsewhere.

The reason for wanting to engage with farming as a livelihood and show no desire to abandon it or settle in other *Kebeles* so that it gives room for the forest to regenerate is attributed to a number of reasons. These are like having an indigenous knowledge on the type of soil, seeds and climate of the area. In addition they like the place where they have been born or settled and want to maintain the big piece of land they already hold.

However a considerable number, i.e. 40% showed willingness to abandon the place and settle elsewhere. The reasons for such a decision on the part of this sizable proportion of the communities in and around Zeqwala are like;

- ❖ The presence of vermin in the place
- ❖ Land degraded by erosion
- ❖ The *Wereda's* ban for any plowing on the mountain
- ❖ The non availability of land
- ❖ The decline in fertility of the plot of land they own
- ❖ The steep slope nature of the land owned

This decision and disposition on the part of the farming community indicates the severe degradation of the land and the worsening situation of the environment in general. It also proves that the consequence of environmental degradation leads to underdevelopment in general and rural poverty in particular. On the other hand, it also

points at the heavy dependence the communities on agriculture because of the absence of an employment opportunity in other sectors of the economy in the area.

4.4 Major livelihood practices and their contribution to the deforestation

The case of deforestation at Mt. Zeqwala is a miniature case of the general deforestation that occurs throughout Ethiopia. However, its intense aspect in terms of conflict, poverty, degradation and loss of fauna and flora gives it a colossal aspect and significance. Out of all the interviewed farmers, 36.3% of them pointed out that the lack of more farmland as being the major reason for the deforestation. The other 18.8% identified need for fuelwood and charcoal as being the major reasons for it, while 32.5% identified both fuel and charcoal as well as need for arable land as the driving force behind the scene. Reasons like need to control vermin and pest, extra income generation and the need for creating grazing lands were identified by the few remaining interviewees as causes of the deforestation that occurred on the mountain. Fire and arable land need using fire as a means are in general the main causes of deforestation (Zerfu, Sieghardt and Glatzel 2005; Taye 2006).

The major practice that has caused great deforestation on mount Zeqwala is either purposely or not purposely lit conflagration in the charcoal making processes. This had been acknowledged by almost all key informants. The other cause which is interrelated with the recurring forest fire in the area is the need for arable land. Such a conflagration some times starts when farmers lit fire on the vegetation in order to get plots of land. This procedure through negligence gets out of control and ends up into a forest fire. Such an activity has been recognized as a cause by 36.3% the total surveyed population. These are by far the major causes that are accepted by all of those who have a life long acquaintance with the problems of the area. Hence, out of all contacted interviewee 32.5% identify both arable land need and forest fires as central causes to the deforestation.

As can be seen in the plate below (plate 3) the steep slope part of the mountain has sustained this year's forest fire. The fire outbreak in the mountain has occurred twice affecting a total of five hundred hectares. Plate three shows the area devastated by this

year's fire, which is in the direction of Aduala and located at the middle of the mountain in the south east direction. The fire outbreak has stopped from reaching the dense forest on top of the mountain. The fire outbreak has devastated the bushes that have regenerated extensively. The bush comprises mainly “dedeho” which has grown after the imposition of area closure in 2005/6. Many researches, conclude that the use of fire in east Africa as being the major factor for the devastation of the natural forest (Ker et.al.1978).

Occurrences of forest fires ignited by people who sell charcoal are common occurrences in Zeqwala. These sources, which are usually left to burn for days end up in huge forest fires if there is wind in the area. The local communities also are less concerned to take immediate measures. This makes the mountain vulnerable to such depredations.

Plate 3: Partial view of burnt bush land on the slopes just below the top of Mount



Source: Field survey, 2008

The cutting of trees for planks and fuel had eliminated the forest trees that escaped the onslaught of forest fires. Organized and highly efficient ways of cutting giant trees using saw and ax to secure the planks had been carried out for years on the mountain. Tree cutting for fuel wood and construction purposes is also another major cause that has deforested the natural forest in Ethiopia (Degefa and Baudouin, 2004). There are huge stumps in the vicinity of the natural forest which can attest this fact. Moreover, one can still find logs of huge trees left to rot on the ground in such places. (See Plate 4)

Plate 4: Evidences of the sawing carried out to obtain planks from the huge trees of the mountain



Source: Field survey, 2008

This type of illegal activity was the major factor in creating conflict and deforestation on the remaining natural forest around the crater lake. Inclination to cut and yet not even use the wood conveys a serious message. It shows the negative outlook of the settled community to the natural forest in the past. Moreover, there should be an intense investigation to check whether this feeling has persisted. If the situation continues, it will withhold the chances of recovery of the natural forest.

Among the surrounding community and those settled on the mountain, 26.3% of the farmers acknowledged the usage of forest resources at one time or the other. This comprises sawing out trees and the making of planks, charcoal making and the cutting of wood for fuel. However, only 11.3% of the interviewed farmers readily confirmed that they are engaged in charcoal making and fuelwood selling occasionally. The explanation given for conducting such an activity is that they do so only in times of drought or famine meaning in times of food insecurity. Moreover, 93.8% of the farmers affirmed that they get all the wood they need for household consumption and for different purposes from Mt. Zeqwala. This has created a heavy encroachment on the natural forest.

4.5 Biodiversity Composition and its future trend in terms of loss on land coverage

Inventory on two sampled plots on the natural forest surrounding the crater lake has yielded a variety of tree and shrub species that are seven in number. However, there is a rich variety of biodiversity in terms of flora in the natural forest. In fact, the research done on the biodiversity aspect in the area revealed the existence of 217 tree and shrub

species (Hylander, 1991). The occurrence and diversity of the various tree species on the two sample plots of 20 meters by 20 meters had been recorded to understand the dominant tree species composition of the natural forest (See Table 3). The mountain forest of Zeqwala has formed an almost pure stand of *Juniperus procera*. This hampers the observance and occurrence of diverse tree species in small and specific areas.

The extent of biodiversity loss in terms of disappearance of tree species from the land is one of the concerns of this research. In addition, the number of tree stands of different species lost because of the deforestation is another aspect which has been explored. Currently, part of the natural forest area that used to be covered by a dense forest has given way to shrubs and formations of grassland and farm plots because of the severe deforestation. Hence, an average of two sample plots from the part of the natural forest that was not disturbed had been used as a baseline for past vegetation cover reconstruction and also to understand the degradation in terms of biodiversity loss (See Table 3). On average a total of seven different species have been recorded as dominant species in the natural forest surrounding the crater lake (See Table 3).

Table 5: The composition of trees in plots of 20 meters by 20 meters.

No.	Local name of the tree	Scientific Name	No. of occurrence	The Loss of tree stands per hectare
1	Tid	<i>Juniperous procera</i>	16	80
2	Weira	<i>Olea africana</i>	4	20
3	Amija	<i>Hypericum revoluton</i>	13	65
4	Kosso	<i>Hyginia abyssinica</i>	1	5
5	Ahot	<i>Pittosporum Viridiflorum</i>	2	10
6	Atat	<i>Maytenus obscura</i>	2	10
7	Asta	<i>Erica arborea</i>	1	5
Total	–	–	39	195

Source: prepared by the author, 2008

Moreover, to calculate the loss of species and number of trees from one hectare of land the following simple formula has been developed;

Number of trees of the inventory * 5 (20 m by 20m plot sample multiplied by 5 gives us 1 hectare)* the deforested land in (ha)

The result that can be obtained from this type of reckoning is the number of tree stands that has been either burnt, cut or destroyed in another manner. As a result, the loss of biodiversity by 1971 is expressed in table 4. This exercise takes it for granted that all the slopes and the mountain top have the same types of tree species like the sampled plots. As a result this research narrows down only on the dominant tree species of the area.

Table 6: The loss of different species and of tree stands by 1971.

No.	Tree species found per (ha)		The forest area (deforested) ha	The Hill side area (deforested) ha	Loss of tree stands in the area	
					Forest area	Hillside area
1	<i>Janiperous procera</i>	80	-33	-576	2,640	46,080
2	<i>Olea africana</i>	20			660	11,520
3	<i>Hypericum revoluton</i>	65			2,145	37,440
4	<i>Hyginia abyssinica</i>	5			165	2,880
5	<i>Pittosporum Viridiflorum</i>	10			330	5,760
6	<i>Maytenus obscura</i>	10			330	5,760
7	<i>Erica arborea</i>	5			165	2,880
	total	195	-	-	6435	112,320

Source: Prepared by the author, 2008

This shows us the decline of tree species by showing us the number in tree stands lost. Taking into consideration the long years needed by native species to regenerate and mature it would mean a loss of biodiversity from the specifically deforested land. Specially, on the steep slope part of the mountain there had been a deforestation that dates back to the beginning of settlement in the area. Hence, the number of tree stands

lost in the area encompasses a picture of the deforestation that dates from that time. However, in the last decade this particular place saw a complete destruction.

One can still observe the remnant of dense forests in inaccessible gorges on this place. These patches of forests had escaped destruction from man and nature because of the unreachable lay of the land. This served through observation as a means to reconstruct the past vegetation cover in its full flourishing and diverse biodiversity aspect.

Plate 5: A lone tree of ficus species which is the only survivor of the deforestation on the slope.



Source: field survey, 2008

Out of all the parts of the mountain the steep slope or the hilly part of the mountain had been the part that was badly affected. By 2005/6 this part of the mountain was at zero vegetation cover. As a result the *Woreda* administration has imposed a measure of area closure. This situation was favorable for the regeneration of some shrubs and bushes. Consequently, the whole mountain is currently overrun by dedeho (*Euclea shimperi*). If this measure continues in the future this primary growth will give way to the formation of climax ecosystem which is tantamount to the original.

4.6 Cases of decline and extinction of wildlife

Mt. Zequala is the destination of various migratory bird species and a home to many big mammals. In the past, the dense montain forest has provided habitat to big animals like lions and leopards. As late as the end of the 19th century, the mountain was recognized as a home to a large pride of lions (Pankrust, 1964). People who were born there remember the existence and presence of lions as recent as the 1970's. Today, however because of the extreme degradation there is a continuous decline and extinction of wildlife in the area. This however can not be proven quantitatively in absolute figures since conducting a census study of wildlife population is inaccurate, challenging and dangerous. In short, it is a line of research which calls attention. However, contacting key informants and monks who spent many years in the area has allowed for the generation of a data that gives a general overview. Moreover, the researcher himself had an opportunity to encounter animals like baboons (they have a social structure of living in bands), deer and the various bird species. Using this data a rating has been prepared to show the types and condition of wild animals in the area.

Table 7: Rating on the decline, increase and extinction trends of wild animals in Zeqwala.

No.	Name of the Animal	Scientific Name	Max. and Min. Occurrence	Declining trend	Increasing trend	Extinct or Endangered
1	Lions	<i>Panthera leo</i>	-	-	-	✓
2	Leopards	<i>Panthera pardus</i>	1-3	✓	-	endangered
3	hyenas	<i>Cricuta cricuta</i>	40-60	-	✓	-
4	jackals	<i>Canis aureus</i>	20-30	-	✓	-
5	Bush pigs	<i>P. porcus</i>	20-30	✓	-	-
6	Wart hogs	<i>P. aethiopicus</i>	20-30	✓	-	-
7	Baboons	<i>Papino anubis</i>	30-60	-	✓	-
8	Colobus monkeys	<i>Colobus guereza</i>	20-40	✓	-	-

9	Red duicker	<i>C. natalensis</i>	10-20	✓	-	-
10	Bush buck	<i>Redunea flvorufula</i>	10-20	✓	-	-
11	porcupine	<i>Hystrix cristata</i>	10-20	-	✓	-
12	caffre	<i>Felis libyca</i>	1-3	✓	-	endangered

Source: field survey, 2008

The destruction of one type of ecosystem is the creation of another which calls for an in depth observation to understand the situation in the area (Mcfarland, 1986). Such a change will make animal and plant species to exploit or disappear in the situation. As a result, the change in ecosystems can create an ideal environment for some animal and plant species to thrive. An Ecosystem has a direct influence on the food chain and fertility of animals. In other words, this means that animals like baboons, porcupines, hyenas and jackals will have more food accessibility in areas where there are human settlement and agricultural activities. For instance baboons can steal wheat grains from farmer's wheat fields while jackals and haynes can scavenge the food thrown by humans. This is the major reason why some animals increased in the area than the others in the general setting of the deforestation. Nevertheless, the greater number of wild animal species of the area are declining and becoming extinct.

The natural forest and the wildlife of the area have been protected through the effort and dedication of the monks. One key informant has stated that some of the monks even went further to preserve the animals by sharing them their own food. There is also a teaching by the monastery referring from life history of Saint Abune Gebre Menfes Kidus that the wild animals should be regarded as the pates of the saint. The monastery also teaches the surrounding community that cutting trees and killing animals inside the grounds of any monastery is a sinful act.

4.7 General overview of the challenges and alternatives for better livelihoods of the communities in and around Mt. Zeqwala

The communities found in and around Mount Zeqwala are perceiving challenges to their livelihood and way of life as time passes. This holds a dark future with only

problems in store for them. Among those contacted, 53.8% of the farmers are experiencing a decline of soil fertility on their plot while 6.3% experienced a very poor state of soil fertility. As a result, about 18.8% of the farmers are willing to abandon their plot of land for any available land elsewhere. The remaining 81.3% still cling on their piece of plot for several reasons like;

- ❖ Association with the place where they and their ancestors lived all their lifetime.
- ❖ Their possession of a well built home on top of the mountain
- ❖ Adoption to the dega agro-climatic condition of the mountain.
- ❖ The fertile volcanic soil and the high yield that could be got from a wheat variety known as ‘pavan’.
- ❖ The access to wood, grass, and herbs and vegetables which grow well in the ‘dega’ agro- climatic zone they inhabit.
- ❖ Some also have a claime of strong religious attachment with Abo church and monastery.

Focus group discussion with members of the community revealed that there is no single and simple answer for the problem. This creates an impediment to facilitate a solution to the worsening situation. The communities are not willing to accept any plan that does not guarantee them the above benefits. However, they are willing to take alternatives when the alternatives are favorable and ensure for them a better life. This indicates for a comprehensive solution where every one shares a benefit.

Measures like banning agricultural practice on the mountain and animal grazing through area closure means loss of an almost total household income for most households. However, there are some alternatives that the community acknowledged as a possible means of earning an income. Out of the total respondents, 28.8% choose agro-forestry as a livelihood means while 12.5% preferred selling vegetables (Cabbage and Onions). The greater part or 37.5% chose both agro- forestry and vegetable and herb gardening as their only means of earning income if they were forced to abandon agriculture. If they are to be helped through an extension program getting sufficient household income is still possible (Berhane and Agajie, 2006). Hence, encouraging

livelihood activities that affect the natural forest minimally should be stressed by the authorities.

4.8 Conflicts emanating from natural resource exclusion, use and ownership

In Mount Zequala, there is an intense conflict over the forest resource between the different groups found in the area. There are mainly four major groups in the conflict over resource ownership and exploitation. Each group wants to further its interest and benefit at the debilitating cost on the environment and other groups. The resources on the area are forest lands that are convertible to arable plots, slopes convertible to grass lands and wood that can be used for making planks, poles and charcoal. Hence, encouraging livelihood activities that affect the natural forest minimally should be stressed by the authorities (Degefga and Baudouin, 2004).

It became possible to know these four groups during an intense group discussion with key informants. The first group belongs to the settled community at Mount Zequala. This group wants to engage in agriculture and use the forest resource as extra income means by sawing out planks from the huge trees.

This desire makes them to trespass the traditional borders of the monastery and cut the huge trees at the cost of conflict and imprisonment.¹

The second group is made up of individuals who engage in charcoal making and fuelwood selling livelihood. In fact, the Woreda had been the hub of charcoal making activity which explains about the huge forest fires that had occurred repeatedly on the mountain. Moreover, there are individuals who have made a fortune engaging in such an activity. The People in this group are by far the destructive ones with a criminal mind set and want to scrape out only a living or profit at all costs. They usually have no other occupation and live on small towns like Adulala and Wonber. The conflagration that flared on the mountain for years mostly occurred because of the presence and activity of these types of people.² Such problems have left scares still visible up to day. The South eastern part of the mountain is currently completely bare.

The third group's members are the surrounding farmers who are interested in grazing their animals on the slopes and procuring fuelwood and for household use like

implement and house construction. The fourth group is simply the monastery whose role has been conserving the forest and engaging in protecting the crater lake from trespassing.

The forest on the area is under the control and ownership of both the government and the monastery. However, the current existing dense forest surrounding the crater lake belongs to the monastery. Trees growing on the slope are under government ownership. There is no agreement and consensus on the part of the communities as to whom the forest belongs. Out of all persons contacted, 90% think that the forest belongs to the government while the remaining 10% think that it belongs to the monastery or even to the community. Hence, the absence of clear demarcations on the ground creates the opportunity for conflicts to occur.

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1. The monastery had a different border during the Imperial times which extended to the base of the mountain. During Derg's rule a new border was created after a court battle between the wonber community and the monastery.
 2. The other suspected members in this group are herders and farmers who commit such a crime looking for extra income.

Moreover, the absence of convincing or organizing local people in resource management and participatory forest management has been found to prepare the ground for conflicts (Wood 1993; Irwin, Jordan and Zelalem 2006).

The same is observed when one questions up on the existence of a clearly demarcated border. Out of the total 50% recognize borders while the remaining 47% and 3% are unable to know or affirmed the non- existence of borders. In the case of use rights and restriction, 97.5% of the community stated that there is a restriction binding the communities in and around Mt. Zequala from engaging in exploiting the forest resource. Out of all people contacted, 88.8% stated that the restrictions are imposed by the government. As a result of which there is a strong sense of exclusion from a resource which the community feels belonging to the government. The connotation or association with the word government is an open access resource ownership regime in the area.

Therefore, the belief and perception they have developed for years meant exclusion from a resource which is lying in unused manner. This conviction drives the community to engage in distractive tendencies. In 2004/5, the mountain was completely

bare which proves the capability and tendency of the communities to take such an extreme measure. Moreover, whenever the community engages in such a destructive behavior there will be a counter measure awaiting the community such as area closure and eviction from the place.

The result of all this is an intense conflict resulting between the settled community on the mountain which strives for exploiting the resource versus the monastery which stands in defense of conservation through preservation. In such a scenario, the government intervenes in bringing the conflict to an end using every means available. Moreover, since the area is recognized by the government as a forest land, it takes a stand usually on the side of the monastery in combating such conflicts. This creates another conflict cycle between the community and the government.

There are also sporadic cases where the surrounding farming community evolves in to conflict with individuals who engage in fuelwood cutting and charcoal making. Out of all household heads contacted, 18.8% affirmed the existence of conflict between the community and the government, while 33.8% identified the existence of conflict between the wonber peasant community and the monastery. The remaining 47.9% recognized the existence of conflict between all groups.

4.9 Past conservation measures and the communities' view

In depth focus group discussion with the monks at Abune Gebre Menfes Kidus revealed that there has been a conservation measure taken to protect the natural forest as early as the 1960's in the area. The measures included; area closure, penalties, employing forest guards and patrolling. The conservation measures that had been employed also vary under the Imperial, Military and the current government. During the Imperial times, the common practice employed was eviction of settlers on the mountain to lands found at the bottom and to kebeles found around the mountain. Moreover, strict regulations were employed to protect the mountain from being exploited by any land related livelihood. Hence, animal grazing, plowing and the cutting of trees were not allowed on and near the mountain.

The unstable times at the beginnings of the ascension to power of the military government saw deforestation occurring rapidly (Berhane and Agajie,2006). This called for an effective measure and at the same time able to bring about conservation. The

measure implemented by the then government was employing forest guards and patrolling. The individuals who violated this were imprisoned and fined. The worst deforestation in the history of the place occurred during the transitional period after the demise of the Derg. This situation continued with out a check and was stopped only for a brief period in the area. However it raged with a new force during the election turmoil in 2005. Because of the anarchical situation at that time in the area, there ensued an armed struggle between the settled community and the monastery to decide over the mastery of the place.

There were many different types of conservation measures applied on the mountain. The major ones include;

- ❖ Stopping tree cutting, has been identified by 64.4%
- ❖ Fine and imprisonment, identified by 21.3%
- ❖ Stopping agricultural activity and charcoal making, which is identified by 17.5% from the total

It was during this period that the mountain became completely bare of vegetation. Numerous forest fires, charcoal making and fuelwood cutting are the activities that brought about such a deforestation. As a result of which the government employed area closure and imprisonment for trespassing and engaging in any activity that undermines the forest. Moreover, measures like resettlement have been proposed to the settled community on the mountain top. Apart from initiating hard resistance this measure has been known to create a feeling of revenge and alienation in rural communities (Adames and Mcshane; 1992). Out of all persons contacted, 61.25% think the measures that had been taken as very important comparing the situation of the area after 2005, while 26.25% declared that it has aggravated the deforestation, 5% stated that such a measure has caused them anger and 1.3% fearlessly proclaimed the measure as a policy that ignored the people. The remaining 3.7% agreed with all the above mentioned points except the first option.

4.10 The communities' attitude, perception, preferences and attached values to the natural forest

The case of deforestation at Mount Zeqwala calls for understanding the perception, preference and attached values of the community. Their point of view is critical to grasp the general scenario and future trends in the area. The survey findings show that, the surrounding communities have a positive attitude towards the natural forest since 78.8% want the area to be covered by a forest and only 21.2% do not want it to be a forest land. This is well ascertained as out of all individuals interviewed 86.3% agree that the forest causes no problem whatsoever in their life, the remaining few namely 13.8% affirmed that the forest causes problems.

The rejection on the part of the communities in and around mount Zeqwala to preserve the natural forest lies in the opinion that a dense forest brings unwanted occurrences. For instance, 3.8% fear that it will increase wild animals and serves as a hide out for bandits while 2.5% perceive that it takes away agricultural lands. The other 3.8% apprehend that wild animals might start attacking livestock and humans when the forest coverage in the area increases. However, 90% still believe that there will not occur any problem if there is a well conserved forest.

Thus, knowing the value the community attaches to the forest is very important since it helps us to identify easily the service and benefit they procure from the resource. As a result, 28.8% believe that it has an environmental benefit while 13.8% see it as a great improver of the climate, 12.5% appreciate its aesthetic value while the remaining 45% attach all the values mentioned above.

In quite the opposite, household heads were asked to foresee the benefits they would lose and the problems they would face, if there occurred a complete deforestation on the area. Out of the total 62.5% chose environmental problems, while 17.5% chose the drying of springs and occurrences of drought while the remaining 20% chose both challenges as bound to occur.

Those segments of the society who have rejected the need for the conservation of the forest agree to conserve the forest only under a condition of having their priority met. Some of the priorities they listed are;

- ❖ The allocation of flat and plowable parts of the mountain for agriculture and allocation of some parts for grazing.
- ❖ food aid and guarantee of food security

- ❖ Protection and compensation from the attack of wild animals the forest shelters.

Such hard core elements that resist the conservation of the forest are present in the communities in and around Zeqwala. It is clear that the priorities identified are linked in one way or another with agricultural livelihood and livestock rearing.

4.11 The deforestation induced degradation on the environment

At this particular moment, the awareness level of the communities on the negative impacts resulting from deforestation is high. Farmers know that deforestation can bring serious land degradation. However, the impact of the degradation differed with the lay of the land and settlement pattern. The extent of the effect and damage or loss incurred on the part of the communities found in and around Mount Zeqwala also differs. For instance, those living on the mountain top are the least affected relatively than those settled at the bottom of the mountain.

This happens because, a number of factors favor those settled on the mountain top than those at the foot of the mountain. The factors are like; the better amount of precipitation they get because of their high altitude or ‘dega’ agro-climatic zone. In addition the severe slope makes the running water to gain force as it reaches near the base of the mountain and becomes unstoppable causing gullies and all types of erosion at the foot of the mountain than on top. Flooding is another danger experienced at the bottom lands, when the running water reaches the level ground than the steep slopes of the mountain.

Moreover, all lands found at the base of the mountain and especially towards the towns of Addulala, Wonber and Danisa show very deep and wide gully formation by running water. The problem of intense erosion has washed away the soil so severely that one finds out cropping rocks exposed all over the mountain base.(See plate 6)

Plate 6: Gullies, flood affected plain, and exposed rocks at the foot of the mountain near the capital town of Adulala



Source: field survey, 2008

Flooding is another problem that is also likely to continue under dire results in terms of life and property to the population of these towns so long as the mountain is not under well maintained vegetation. The huge gullies and washes created by storm rain water head directly towards the town of Adulala (See plate 6).

Nevertheless, it does not mean that there had not occurred or will not occur any degradation and environmental problem at the top of the mountain. In fact, severe erosion and loss of top soil, decline in fertility and drying up of soil moisture and springs are some of the environmental problems that occur for those living on top of the mountain. As a result, out of the total sample taken, 2.5% experienced loss and decline of fertility, while 6.3% have encountered a problem of erosion, 11.3% have observed the drying up of springs and severe water shortage and 2.5% experienced shortage of rain and increasing dryness of the climate on the area. The majority i.e. 70%, experienced most or all of the above mentioned problems, while 66.3% of the sampled communities identified deforestation as the cause for such problems to occur. The other, 23.5% identified general climate change as the major factor for the creation of the problems in the area. The remaining 8.8% pointed that it was a curse from God. This demonstrates that the majority

among the community know that deforestation can cause serious environmental problems.

Thus, the most serious environmental problems the people have witnessed in the area are like;

- The change in the micro-climate of the area
- Severe erosion
- Deforestation
- Drought and extreme dryness
- Loss of huge trees
- Migration of wild animals

There is also an extreme case of the drying up of springs and water points in the area. Lands at the foothill were relatively cool and moist in times back. Currently, there are only two springs with a small supply of water at the middle and base of the mountain. Even then only a small volume of water trickles from these springs. The intense dryness that has developed at the bottom lands of the mountain has as a result caused a decline in farmland soil moisture level which is directly related with soil productivity and quantity that can be produced (Berhane and Agajie 2006; Campbell 2006).

Plate 7: One of the two remaining springs found at the middle part of the mountain.



Source: field survey, 2008

This means that the lands found at the base and adjoining the mountain are becoming less productive which makes the peasantry food insecure and at the same time live in abject poverty. Related with the dryness of the area, many former springs that used to gush out at the foot hills of the mountain had also dried up. This had created a serious water shortage in the area. Therefore, women have been forced to travel long distances to

fetch water which again is related with a decline in productivity as it diverts domestic household labor away from the production activity. It also means loss in terms of time spent and the creation of a shortage in domestic labor.

4.12 The *Woreda*'s attempt and policy on rural development and conservation

Focus group discussion with the *Woreda*'s administration on their policy of rural development and conservation has revealed important findings. The rural development policy of the *Woreda* administration focuses on giving priority to putting the necessary capacity building and physical infrastructures for attracting investment. The policy in terms of conservation was planned giving priority to conservation through implementing area closure, stopping agriculture on the mountain and resettling the community found on top of the mountain to nearby *Kebeles*. Moreover, the plan advocates for controlling the illegal activities of charcoal making and fuelwood selling by organizing local militias and through apprehending individuals who are found in such activities. Moreover, banning the sell of charcoal and confiscating any which is found in trucks passing through the *Woreda* is also another conservation mechanism employed by the *Woreda*.

As a result, the major strategy proposed by the *Woreda* administration is the stopping of agricultural activity on top of the mountain by providing alternatives of micro finance, opportunity to engage in trade and resettling voluntary individuals elsewhere in the *Woreda*.

Moreover, the administration supports and is willing to encourage the engagement of the communities in agroforestry practices. In fact, some of the major extension packages that the administration is currently determined to embark upon are like the introduction of modern apiculture farm techniques, supply the seedlings of Mangos and Guava trees and introduction of *Eucalyptus saligna* to the communities in and around Mount Zeqwala (Campbell, 2006). The *woreda* Administration has a strong belief that investment on the area would serve as a sink to the excessive unemployed rural labor so that they will be diverted from using the natural resource in the area in a short sighted manner. Rural development through whatever means is critical for insuring conservation

and development. This can be said for the case of Zeqwala and many other places in Africa (Adams and Mcshane, 1992; pratt, 1997)

4.13 Community Identified conservational and environmental rehabilitation measures in sustainable development framework

Since the communities in and around Zeqwala are the main stakeholders in the betterment of the environment, engaging them in discussion that can lay ground rules for a better management of the area is essential. However, it is quite predictable that their preference always reflect there own personal benefit and interest only. On the other hand, this must be conducted in order to help any decision making body to embark on a successful plan that can bring common benefit sharing mechanisms.

Out of all persons contacted 28.8% think that terracing at the foot of the mountain and practicing agriculture as the best a solution. The other scheme preferred by the communities was resettlement in other *Kebeles*. This was chosen by 3.8% who believed such a measure as essential for a better conservation on the area. A sustainable livelihood to the farming community was identified to be both terracing and agroforestry which was chosen by the greater number i.e. 55%. The remaining 6.3% are of the opinion that all the above measures will ensure conservation and sustainability.

The communities were asked to identify the best possible way for exploiting forest resource in a sustainable manner. The response of the communities gives the following result with 38% recognizing tourism and 6.3% identifying selling medicinal plants as a sustainable way. The other 5% advocated for selling wild animal products and the greater number or 35% chose bee keeping as an important option to exploit the forest resource in a sustainable manner.

In order to stop and avoid the current environmental problems the community has recognized the major actions that should be undertaken. The first method that had been selected was halting deforestation. This had been selected by 52% of the community while planting seedlings and afforesting the mountain was preferred by 6.3%, the remaining 32.5% chose both methods. Small segments of only 7% chose praying as their last option and resort.

Chapter Five

Conclusion

Mount Zeqwala's natural forest is one of the most important migratory bird area and biodiversity center in the country. This by itself can make the mountain a special area that should be protected by a conservational program. Moreover, there are sites on the mountain that are of high historical and cultural significance. However, all these resources are facing a serious challenge in the current situation that makes future recovery an impossibility.

Settlement on the mountain top by a group of people known as the "Tikur Ras" directly and indirectly contributed and also created some of the deforestation and land degradation. An increase in their population and the coming of some migrants to the area has put a pressure on the existing natural resource.

The conversion of forest lands found on the slopes of the mountain to grazing and agricultural land was the major land use pattern that initiated the deforestation. In addition animal grazing has suppressed the recovery or regeneration of deforested areas. The majority of the farmers on and around the mountain being highly dependent on cereal agriculture to earn a livelihood served as the push factor for the deforestation. However, a considerable portion of the people especially those settled on the mountains still engage in agroforestry to earn a livelihood next to cereal agriculture. Most of them engage in it to supplement the income they get from cereal production. These people grow permanent crops such as vegetables, spices, herbs and some tree species. As a result, this practice is encouraged and looked favorably by the Woreda administration.

Mount Zeqwala has different and many physical features which dictate the classification of the forest growing there according to these physical features. As a result, it is the forest that used to cover the steep slopes of the mountain that sustained an extreme damage and deforestation. This makes the area around the Crater Lake to remain covered by a dense forest. Human settlement, expansion for agricultural land, fuel wood cuttings and charcoal making led to a complete deforestation at unprecedented scale.

The deforestation that occurred on Mount Zeqwala is a result of many livelihood practices. However, charcoal making activity and the fire that usually gets out of control in doing so; has been identified as the major cause for the deforestation. Plank making

activity, farm land creation, need for fuel and construction wood are also factors that play a secondary role.

The deforestation on the mountain starts from an early period of time. Moreover, the aerial photos of both 1965 and 1971 show the pace and extent of the deforestation. In the space of six years 32.4 hectares of natural forest has been deforested. On the steep slope of the mountain 576.2 hectares of land lost its vegetation cover. In these years expansion for arable plots and settlement increased tremendously.

The effect of the deforestation as a result has, brought a negative impact on both the biodiversity composition of trees and in the population of wild animals. There is a high loss of tree stand and mature trees on the area. If one is to take the dominating species of the area i.e. *Janipurus procera* there has been loss of 2,640 trees from thirty three hectares of deforested land in the times from 1965 to 1971.

Currently, there is no mature tree on the steep slope part of the mountain. This situation shows the devastation that has been taking place on the area. The population of wild animals has also declined dramatically. Lions have become extinct on the area and leopards and caffres are also disappearing. Even though, some animals tend to increase by exploiting the change of the ecosystem to their advantage through quick adaptation most of them have declined or have migrated to other areas. Only the monks have a positive attitude towards the wild animals in the area. They have been protecting them from the hostile community in and around Zeqwala for years. The finding of the research on this regard, shows the monastery being an important institution for the preservation of biodiversity on the area.

Man induced problems of deforestation and forest fires have brought about a general environmental crisis for those living in and around the mountain. Thus, the wrong action taken by those living in and around Zeqwala has hit them back. In the aftermath of the deforestation the area encountered natural disaster or shocks in quick succession. The major disaster experienced on the area had been an intense flooding. This problem has affected the towns found at the foothill of the mountain. Many town residents have lost their property because of the destruction caused by the flooding in 2005/2006. Some of the farmers at the foot of the mountain lost their plots as the flooding eroded and created huge and deep gullies. Erosion, affected most of the farming community and brought

about a decline in fertility. Side by side with these adverse situations springs that used to trickle from the mountain top dried and acute water shortage on seated. The change of micro-climate of the area from a humid moist kind of environment to a dry and hot had been felt by most of the people living on the area.

However, the settled community on the mountain top and the farmers around the mountain still do not want to abandon their plots and get another else where. There are numerous benefits they have been accustomed to get by remaining on the area. These are like; access to herbs, fuel, construction wood, the dega agro-climate and a strong and well made dwellings they have constructed throughout the years. This disabled the *Woreda* administration from implementing any feasible conservation measure.

The *woreda* administration has implemented a conservation measure like banning agricultural practice which nearly denies a total source of livelihood for the majority of the peasants in and around Zeqwala. This calls for a comprehensive solution on the place to make a lasting and well accepted change on the area. The communities have identified agroforestry as the best alternative to engage in for generating household income.

The research finding points that, in case such alternatives for livelihood generation are not recognized there will be a greater chance for the failure of conservation on the area. It would also exacerbate the conflict on resource control and use that still exists on the area. The conflict has an intensity to engulf all stakeholders. At the beginning phase it starts between the monastery and the settled community of Wonber and expands to all stakeholders in time.

Past conservation measures practiced by the authorities to reduce the conflict and preserve the natural forest had not brought a lasting solution. The measures were like; stopping tree cutting; through the imposition of fines and imprisonment. There had been also penalizing for any charcoal making activity and farm land expansion. Currently, the conservation measures employed in the area are like area closure and banning cereal production that evolves plowing or digging the land. This measure still has not bought a solution to the conflicts and preserved the natural forest.

The communities declare that they have a positive attitude for the natural forest and the majority still want to see the area covered with a forest. None the less, some of them express their fear that a dense forest brings unwanted occurrences like wild animals

and bandits. In another dimension the communities believe that the forest has numerous environmental benefits like improving the microclimate of the area and bringing more rain.

The awareness level of the communities, therefore about on the negative consequences of deforestation is quite high. The environmental problems that occurred after the deforestation have made many farmers to realize this. The Woreda administration aims to solve the bad conservation situation by taking major measures in rural development. The Woreda strongly calls for investment and the construction of the necessary physical infrastructures. This is thought as one means to solve the real cause for the unsustainable resource extraction practiced on the area.

For any conservation to be successful it must take into consideration the people living in or near it. Therefore, common benefit sharing mechanisms and participation is the key for a sustainable conservation. The communities living in and around Zeqwala, consider agroforestry practices, terracing and even resettlement as some options available for them. Currently a better means of getting a livelihood out of the forest resources in sustainable extraction has not been identified and decided by all stake holders. Such ways are like, setting the principles of participatory forest management, expanding ecotourism for generation of economical benefits, Bee keeping and selling wild animal products.

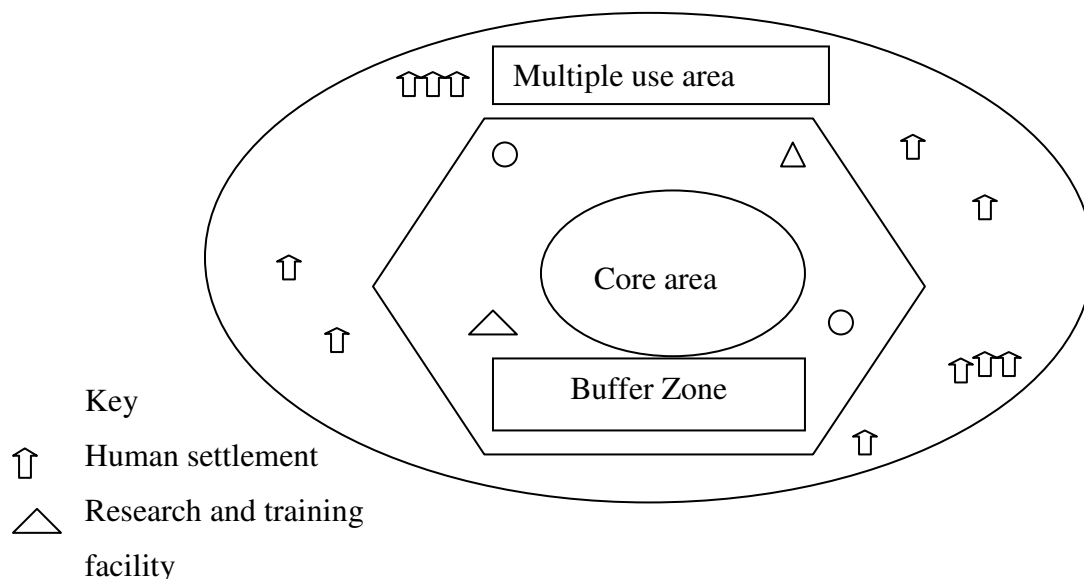
The deforestation at Mount Zeqwala has received national attention recently because of its propensity. The situation on the ground however, remains literally bleak and hopeless. This year's forest fire outbreak proves this fact. Years of hard work and dedication and unreserved effort awaits all stake holders to reverse the current situation. Moreover, an action plan that aims to resolve the underling factors that act as the push force must be outlined and dealt with to realize conservation.

Recommendation

5.1 Global conservation strategies that fit mount Zeqwala

The tragic devastation of the natural forest by illegal cutting and forest fires at Zeqwala has currently drawn national attention. However, understanding the causes of the deforestation and finding the best solution still remains undone. In fact, preliminary and minor researches done on the areas only focus on the causes and the effect of the deforestation and never do justice to the solution. Our world is facing currently loss on immense proportions on biodiversity and deforestations of natural forest in most of its parts. The case of the deforestation of the natural forest of Zeqwala is part of this global problem. Moreover, this situation is at its worst in LDCs and especially in those found in sub Saharan Africa. The tendency of rural communities to exploit natural resources in unsustainable manner adds fuel on the existing distraction. Therefore, the norm, to bring about conservation to areas designated as forest lands had been evicting the rural communities from them. The solution however, lies in bringing both conversationalists and rural communities to common understanding and objectives. The objectives must comprise and fulfill a better rural livelihood development while insuring conservation.

Model 1: A model designed by UNESCO to bring better management to protected areas.



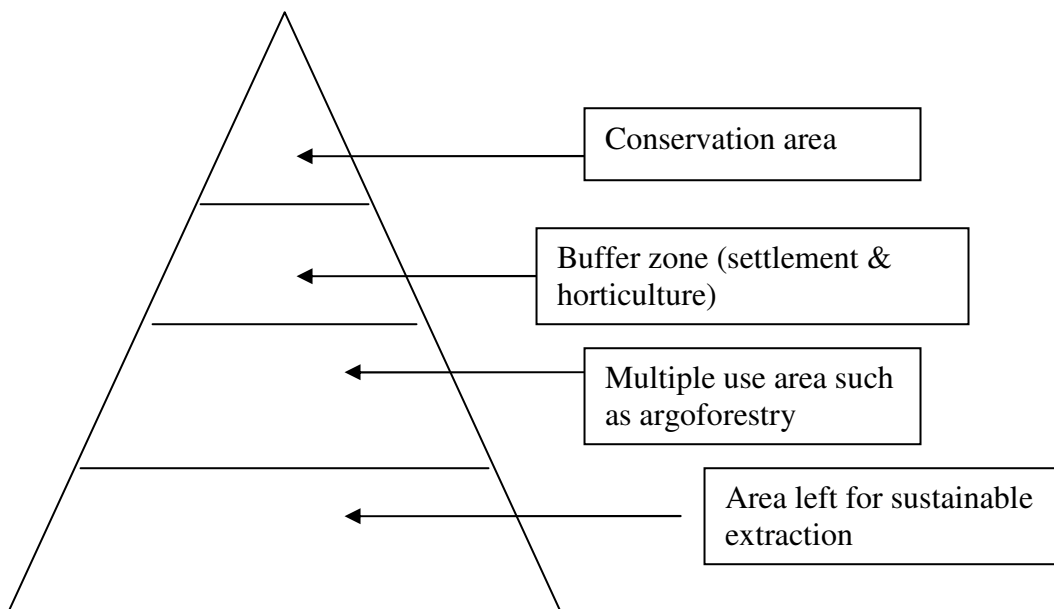
○ Tourist Facility

Source: Cunningham and Sigo, 2005:318

In 1986, UNESCO initiated its 'Man and the Biosphere' program that encouraged dividing protected areas into zones with different purposes. As a result of which a model has been prepared which classifies a conservation area into three parts. The central core protects critical ecosystem functions and endangered wild life. Ecotourism and research facilities are located in a relatively pristine buffer zone around the core. Sustainable Resource harvesting and permanent habitations are allowed in multiple use peripheral regions.

The model with a slight alternation is an ideal solution for the problem at mount Zeqwala. Modifying the model however is very important since there are issues which are unique to the area. The following modified model is prepared for Mt.Zeqwala.

Model 2: Modified model which considers the various issues of the mountain and aims to bring about a lasting solution.



Source: prepared by the author, 2008

The above model must be applied to solve existing problems of mount Zeqwala. The mountain top is an area where one finds the remaining natural forest, the Crater Lake and numerous historical and religious sites. This area and all the deforested space around it must be a conservation area free from human contact and exploitation. The settlement area and the agricultural lands are located just below the mountain top. There plots must be planted with shrubs like “Gesho” (*Rhamnus prinoides*) and trees which must be permanent Crops. The community must not engage in any cereal producing agriculture and must grow only horticultural products, or must engage in apiculture and while applying “cut and carry” system to their horticultural products. The partial dependence of the communities on horticulture such as vegetables, spices, aromatic and medicinal plants must be further encouraged and intensified by providing them with extension service, lone and equipment assistances. If this is carried out, the betterment in rural household income brings a better economical as well as environmental situation (since vegetable, spice and shrubs are perennial crops they reduce erosion on hilly areas) will be quiet significant (Singh et.al., 2006).

The hill side area or steep slope must be left to regenerate and recover to the original ecosystem. It must also be an area for multiple uses where the community must be allowed to conduct agroforestry. Coffee trees in particular are very effective because their natural adaptation to grow under the shade of other trees and by providing good income and livelihood base for the local communities.

In traditionally managed forest coffee, in the southwest part of Ethiopia there are about 300 shade trees per hectares (Bedru, 2007). This shows us the means to conserve the trees of the mountain while getting a livelihood at the same time. Moreover, they can also plant different fruit trees and exploit the diverse agroclimatic zones found on the mountain.

Such a practice has also a positive environmental outcome. Research conducted in the Sidamo highlands prove that only insignificant erosion occurs due to vegetation cover by perennial crops such as fruit trees, Enset, coffee and chat (Berhanu et.al, 1998). Finally on the base of the mountain there should be an Eucalyptus tree plantation. This would deter the numerous fuel wood induced illegal cutting and charcoal making activity. Moreover, the small towns like Dannisa, Hamus Gebeya and Adulala which had been

dependant on the wood from the natural forest of Zeqwala would get another source to exploit. The base of the mountain is the part which had been badly eroded presently; as a result the Eucalyptus plantation would serve as a means of rehabilitating the badly affected land or marginal land of the mountain. Thus, the plantation would serve as a barrier and a buffer to the natural forest and its critical ecosystem.

5.2 Identifying opportunities for conservation with rural development

Unsustainable exploitation and farm land expansion are linked with the need to be food secure by the rural communities. Therefore, before applying the above model there should be a safety net program that wholly engages the rural community in a food for work program. This will allow the people to remain on the place (which they prefer at all costs) and at the same time abandon cereal agriculture. During the safety net program, the *Woreda* administration can use the labor of these people to put permanent infrastructures and conservational activities on the place. These are like constructing an all weather road, establishing an Eucalyptus plantation at the foot of the mountain and putting Permanent structures that designate the borders of these different areas and build check dams in washes, ravines and gullies.

The *Woreda* administration has made the right decision in banning agriculture and animal grazing on the mountain top. This must be also accepted by rural communities so that it becomes easy to stop the practice entirely. Hard core elements that resist the decision must be settled on other areas. Moreover, the rural community must understand that they would get a better income by preserving the natural ecosystem on the area than engaging in cereal production. This calls for establishing a joint committee by all stake holders and start educating the rural communities about the environmental benefits and economical gain they would get by conserving the natural forest on the mountain.

5.3 Insuring sustainability by involving rural community on benefit sharing

The rural communities must be organized and shown means to get an income by involving in Ecotourism. There are many services they can provide which are like guiding tourists, renting mules, providing refreshments (fruits, bottled water, and soft drinks) and traditional or local crafts. An organized committee of this people can learn a

lot from the successful peasants of Wonchi and their ability to realize conservation and development from a situation quite similar to Zeqwala.

The rural communities must be helped, so that they can easily get market access and offer their horticultural products to big markets like Nazret and Debre Zeit. This demands the construction of an asphalt road from these cities to the capital of the Woreda i.e. Adulala and even beyond. Hence, putting the necessary infrastructures (transportation service, electricity, pipe water and telecommunication) is mandatory in order to attract investment and a better rural development. There should be modern facilities for tourists in the area to intensify tourism. There should also be an investment in this sector to help the conservation effort.

The conflict over the resource by the monastery and the rural communities must be solved by putting lasting demarcations on the settlement and holdings of both. Moreover, farm land expansion should be made illegal. This demands an open negotiation from both to reach at an agreement for their own benefit over their differences. It compels the monastery to recognize the right of the people to live on the mountain while at the same time it binds the people to conserve the forest, fight fire out break, plant trees and keep away domestic animals from free grazing. Hence, all stake holders will have a share of benefit.

At present, the *Woreda* administration coupled with the Monastery has got no ability and capacity to protect the mountain's natural forest from fires and illegal cutting. The patrolling of the Woreda has not stopped the cutting and forest fires of the area. In fact, a huge police and military force is needed to conduct conservation through guarding and policing system which is unrealistic and unsustainable. This limitation must be realized quickly and all stake holders must come to agreement to share the responsibility in protecting and patrolling on the area.

These measures can bring about the desired objectives i.e. conservation and rural development at the area. Moreover, since it brings all stake holders together. It has the needed element and potential to ensure sustainability. Therefore, dedicated leadership and unfailing implementation is required from all concerned bodies.

10. Reference

- Abramovitz,C.,Banuri,J.,Giot,P.,Orlando,B., Schneider,N.,Siegfried,E.,Switzer,J and Hammill,J., (2001). Adapting to climate change :Natural Resource Management and Vulnerability Reduction. Background paper to the task force on climate change. Joint effort by IUCN, WWI, IISD and SEL.
- Adams, J. and Mcshane, T. (1992). The Myth of wild Africa: Conservation with out Illusion. Norton and Company, New York , U.S.A
- Allen, S. (1955). Conserving Natural Resource-principles and practice in a Democracy. Mcgraw-hill Company Inc. New York, U.S.A
- Aklilu Amsalu (1995). A Study on Soil Erosion, Land Degradation and Conservation in the Hulet Wenz catchment: Andit Tid Area, North Showa, AAU unpublished M.A. Thesis
- Assefa Abegaz (1995). The Status and dynamics of natural Resource in Ziquala Area North Wello, Ethiopia. Masters Thesis presented to Geography department.AAu Addis Ababa.
- Badeg Bishaw (2001). Deforestation and land Degradation in the Ethiopian Highlands: A strategy for Physical Recovery. *North East African Studies* 8.1, 7-25 New York.
- Bekele A., Birnie A. and Tengnas B. (1993). Useful Trees and shrubs for Ethiopia. Swedish International Development authority, Nairobi, Kenya.
- Berhane, kidane and Agajie Tesfaye. (2006). Agro forestry practices and tree planting Constraints and opportunities in Sekota district of the Amhara Regional state. *Journal of the Drylands*. Vol.. I (1) 52-63

- Berhanu Debele, Regassa Feyissa and Wassie Berhanu (1998). Regional conservation strategy: The resource base, its utilization and planning and Resource management. Addis Ababa, Ethiopia.
- Bedru Sherefa (2007). Land use / land cover changes in Anderacha and Masha Woredas of Sheka zone Snnp Regional State. Forests of Sheka. (ed) Masresha Fetene MELCA mehaber Addis Ababa, Ethiopia.
- Campbell, I. (2006). Improving Productivity and market Success of Ethiopian Farmers (IPMS) for pilot learning wereda, Ada'a. CIDA1519-2E Environmental Assessment and Screening Report Addis Ababa, Ethiopia.
- Chojonaki, S. (1963). Forest and Forestry problems as seen by some travelers. *Journal of Ethiopian Studies*, Vol.I. No.1 pp. 30-55 Addis Ababa, Ethiopia
- Cunningham, W and Saigo, B.(1900). Environmental Science: A global concern. 3rd ed. Wmc Brown Publishers, U.S.A
- Degefa Tolosa and Baudouin, A. (2004). Access to natural resource and conflicts between farmers and agro-pastoralists in Borkena wetland, north-eastern Ethiopia. *Norsk geografisk Tidsskrift-norwegian Journal of Geography* Vol. 58, 97-112. Oslo
- Demel Teketay (2001). Deforestation and Land Degradation in the Ethiopian Highlands: A strategy for Physical Recovery. *Northeast African studies* 8.1, 53-76 New York
- Desta Hamito (2001). Research Methods in Forestry Principles and practices with particular reference to Ethiopia. Alemaya University Press. Diredawa, Ethiopia
- Environmental Protection Agency, (1997). The conservation strategy of Ethiopia Vol. 1. Federal Policy on the Environment .EPA in collaboration with Ministry of Economic development and Cooperation Addis Ababa, Ethiopia.
- FAO (1984). Land use, Production and Farming Systems. Assistance to land - use planning, Technical Report No.3 Rome
- FAO (2007). Land use, Production and Farming Systems. Assistance to land - use planning, Technical Report No.3 Rome

- FGRCP (Forest Genetic Resources Conservation Project) (2004). Socio-Economics participatory Rural appraisal Report of Ziquala Monastery Forest. Institute of Biodiversity Conservation and Research in cooperation with GTZ.
- Furze, B., Delacy, t. and Brickhead, J. (1997). Culture, Conservation and Biodiversity. Macmillan Publishers. Chiester, England.
- Guinand,Y. and Dechassa Lemesa (2000). Wild-Food Plants in Southern Ethiopia: Reflections On the role of ‘famine- foods’ at the time of drought. Research report commissioned by United Nations emergencies unit for Ethiopia. Addis Ababa UN- EUE.
- Huberty, M and Flock, W. (1959). Natural Resources. McGraw-Hill Book Company, New York, U.S.A
- IBCR (Institute of Biodiversity Conservation and Research) (2007). Moist Montane Forest Ecosystem. Institute of Biodiversity Conservation and research . [http://www. IBC.org/mon 2htm](http://www.IBC.org/mon2.htm) retrieved at 10 Apr.2008
- ILR (International Livestock research & Ministry of Agriculture) (2004). Improving productivity and market success (IPMS) joint project, Canada International Development Agency. (Unpublished) Research
- Irwin, B, Jordan, G and Zelalem Temesgn (2005). Reducing Conflicts through collaborative forest management in the Borana Low lands, South Ethiopia forest and Conflicts. European Tropical forest research Network
- Ker K., Moore M., Watts E and Gill B., (1978). Agriculture in East Africa. International Agriculture Research, Kenya
- Kristoffer Hylander and Eva Hylander, (1991). Mount Zuquala: an upland forest of Ethiopia; Floristic inventory and analysis of state of conservation. Department of Biology, (unpublished) Addis Ababa.
- Macfarland, D. (1986). Animal Behavior. Longman Scientific and technical publication. Avon. Uk.

- Melaku Bekele (2003). Forest Property Rights, the role of the state and Institutional Exigency: The Ethiopian Experience. Doctoral dissertation. Sweedish university of Agricultural Science. Uppsala, Sweden
- Million Bekele (2001). the Forest revenue System and Government Expenditure On forestry in Ethiopia. FAO. Forestry Policy and Planning Division, Rome.
- Mooney, H. (1959^a). The need for forestry in Ethiopia. Hayle Selassie University collage press, Addis Ababa
- Mooney, H. (1961^b).The Natural vegetation of Ethiopia. *Ethiopian Observer Journal of independent opinion, Economics, History a Arts* Pankhurst (ed) Vol.. No.3. 203-206. Addis Ababa, Ethiopia.
- Muys, B. Kideya Gebrehiwot and Bruneel,S. (2006). The Ecology and Silviculture of Dryland Forest rehabilitation in Ethiopia. *Journal of the Drylands* 1(1): 1-2
- Pratt, J. (1997). Rural Development Initiatives. Schoomaker, Hagen and Wolf (eds) The Rain forests of home: profile of a North American bioregion island press: Washington.
- Pankhurst, A. (2001). Conflict Management over Contested Natural Resources, a case study of Pasture forest and irrigation in South Wello, Ethiopia. Department of Sociology Addis Ababa University.
- Pankhurst, R. (1964 ^a).Wild Life and forests in Ethiopia. *Ethiopian Observer journal of independent opinion, Economics, History and Arts* Pankhurst, R. (ed.) Vol. VII no.3. 241-255
- Pankhurst, R. (1964 ^b). Notes for a History of Ethiopian Agriculture. *Ethiopian Observer journal of independent opinion, Economics, History and Arts* Pankhurst, R. (ed.) Vol. VII no.3. 241-255
- Singh, V., Kikon, Y. and Maiti, C. (eds) (2006). Horticulture for sustainable income and environmental protection. Concept publishing company, New Delhi India.
- Solomon Haylemariam (2005). Preliminary study of Mount Zuquala. Institute for sustainable development (unpublished) Addis Ababa, Ethiopia.

- Tadesse Woldemariam and Masresha Fetene (2007). Multidisiplinary case studies on impacts of land use / land cover changes in South west, Ethiopa. Forests of Sheka. (ed.) Masresha Fetene MELCA mehaber Addis Ababa, Ethiopia.
- Taye Assefa (2006). Land and the Challenge of Sustainable Development in Ethiopia. Dessalegn Rahmato (ed.) Conference Proceedings Forum For Social Studies, Addis Ababa
- Tesgaye Asgele. (2000). Indigenous Church –Yard Forest Management Practices in the environs of Addis Ababa. Addis Ababa University, unpublished Masters Thesis presented to Geography department. AAU Addis Ababa.
- Warring, R. and Schlesinger, W. (1985). Forest Ecosystem. Academic press, Inc. New York, U.S.A
- Wild, A. (2003). Soils, Land and Food: Managing the land during the twenty-first Century. Cambridge University press, U.k.
- Wolf, p. (1986). Elements of Photogrametry: with Air Photo Interpretation and Remote Sensing. McGraw- Hill Book Company Auckland. U.SA
- Wood, A. (1993). Natural Resource conflicts in South-west Ethiopia: State, Communities And the role Of the National conservation strategy in the search for sustainable development. *Nordic Journal of African studies* 2 (2) 83-99
- Yeraswork Admasu (1995). Twenty Years to Nowhere: Property Rights, Land Management and Conservation in Ethiopia. (PhD. Dissertation) Uppsala University, Sweden.
- Zerfu Hailu, Sieghardt, M. and Glatzel, G. (2005). Acknowledging farmers choice of tree species: A reasonable Approach and utilization of natural resource in the highlands of Ethiopia. Research Report Institute of forest Ecology, University of natural resource and applied life Sciences, Vienna.

Annex one

Questionnaire for M.A thesis

This Questionnaire will be used during a field work of data gathering. The study is conducted for a research purpose under the title “**Resource Conservation for better Environment and Development: the case of Mt. Zeqwala Natural Forest**”. The data will be gathered by enumerators who will assist the researcher.

Objectives of the Survey

The basic objective of this survey is to understand and explore the major reasons or factors that led to deforestation in the area. It is also expected that it will generate data that indicates the decline in species and other consequences of environmental degradation. The study aims to come up with possible solutions for a better conservation.

Dear respondent

This questionnaire has only a research purpose. Thus, the outcome from this research will help address the problems of deforestation and resource conflict. Its finalization is thought to lead to a better and inclusive indicator for a solution to the existing problem of deforestation. The government, community, NGO's and religious institutions will use it in their respective concerns. It will also help the effort to improve the environment and the living standards of the people living in and around mount Zeqwala. Therefore, I kindly request the respondent to fill this questionnaire. I assure you that all your responses will be held confidentially.

Household Identification

Questionnaire No. _____

Name of the respondent _____

Date of interview _____

Name of the enumerator _____ sig. _____

Checked by _____ sig. _____

The enumerator must write the numbers of the choices the respondent opted for.

I. Demographic and household profile questions

1. Sex of respondent (HH head) 1. Male 2. Female ☐
2. Age of the respondent ☐
3. Marital status ☐
 1. Married 2. Single 3. Divorced 4. Widowed
4. Educational status ☐
 1. Illiterate 2. Literate
5. Religion ☐
 1. Orthodox 2. Muslim 3. Protestant 4. Other (specify)
6. Ethnicity ☐
 1. Oromo 2. Amhara 3. Others (specify) _____
7. Place of birth ☐
 1. In Zeqwala 2. Elsewhere (specify) _____
8. If the response is elsewhere, when did you settle here? ☐
 1. Before 1966 E.C 2. After 1966 E.C 3. From 1983 to 1990 E.C 4. Recently (specify) _____
9. What is the reason that made you settle here?

1. Marriage 2. Proposal from relatives 3. Access to land 4. Religious reason
5. Other (specify) _____ ☐
10. Family size
1. Male children _____ 2. Female children _____ 3. Total _____
11. Land holding size (in hectares) _____ ☐
12. Property Status
1. I own the land (granted by the P.A) 2. It's a rented land 3. Used it as an open access resource 4. Others (specify) _____ ☐
13. Farm animals owned (Multiple answers are possible)
1. Cattle _____ 2. Horse and mule _____ 3. Sheep _____ 4. Goats _____ 5. Bee hives _____
6. Others (specify) _____ ☐
14. Where do you graze your animals _____?
1. On mountain slopes 2. At the foot of the mountain 3. Own pasture
4. Communal pasture 5. .Other (specify) _____ ☐

II. Land use

1. What was the land use aspect of your plot before you settled?
1. Farmland 2. Forestland 3. Grazingland 4. Unused land ☐
5. Others (specify) _____
2. How have you converted your piece of plot before you started cultivation?
1. Plowed without a problem 2. Cut the vegetation and then plowed 3. Burnt the vegetation and then plowed 4. Others (specify) _____ ☐
3. What is the condition of the fertility your plot now?
1. Very fertile 2. Moderate 3. Declining 4. Very poor
5. Others (specify) _____ ☐
4. Have you ever thought of abandoning this plot and of getting another one? ☐
1. Yes 2. No
5. What is your reason for your answer in Q.4?

III. Livelihood Pattern

1. What is your major source of income?

No	Major sources of income	Yearly income in birr
1	Grain sale (Barley)	
2	Sale from agro-forestry (Gesho)	
3	Sale from fruit and vegetables	
4	Sale from honey	
5	Sale from Charcoal	
6	Sale from fuel wood	
7	Others (specify) _____	

2. Apart from farming activity are you engaged in other activities? (Multiple answers possible)

1. Sale from agro-forestry (Gesho) 2. Sale from fruit and vegetables
 3. Sale from Charcoal 4. Sale from fuel wood 5. Animal products 6. Trading
 7. Artisanry 8. . Others (specify) _____ ☐

3. Are you using the forest around you to earn a living solely at some part of the year?

1. Yes 2. No ☐

4. If yes, in what ways _____

5. Have you been involved through the years in charcoal making or fuel wood selling business? ☐

1. Never at all 2. Sometimes 3. Rarely 4. Others (specify) _____

6. If you abandon farming, what options would you use to earn a livelihood?

IV. Questions on causes of deforestation.

1. Have you sensed the difference in forest cover on the mountain since when you first came to this place?

1. Yes 2. No Others (specify) ☐

2. If your answer is yes, what kind of change have you detected?

3. Have you encountered any problem because of the deforestation on the mountain slopes?

1. Yes

2. No

3. Others (specify) _____

☐

4. If yes, what for instance _____

5. What do you think is the major reason for the deforestation? (Multiple answers possible)

1. Need for other income apart from agriculture

2. Fuelwood needs

3. Problem from the vermin it shelters

4. Need for more arable land

5. Need for more grazing land

6. Others (specify) _____

☐

7. Which of the following factors are mainly responsible for deforestation? (Multiple answers possible)

1. Farmland expansion

2. Tree cutting for fuel wood

3. Charcoal

making

4. Burning of forest for creating a farmland or grazing land

5. Tree cutting for

household use

6. Others (specify)

8. For what purpose and where do you get the wood you need for household consumption?

No.	Types of use	Source
1	Firewood	
2	Timber for house construction	
3	For the making of farm tools	
4	Fencing purpose	
5	Charcoal making	
6	Income from sell of timber	

9. Do the framers cooperate in tree cutting or charcoal making?

1. Yes

2. Never at all

3. One man can do that

☐

10 If yes, in how many numbers? _____

11. Have you ever got engaged in planting seedlings or protecting the natural forest?

1. Yes

2. No

☐

12. If Yes, Why? _____

V. Resource use right

1. Do you have any user rights or usufructory rights over forest resource?

☐

1. Yes 2.No 3. No need because it's an open access resource
 4. Others (Specify) _____
2. Are there any restrictions on the community from cutting the forest resources?
 1. Yes 2. No ☐
3. If yes, by whom? _____
4. What are the restrictions? _____
5. To whom does the forest on the slopes belong?
 1. The Government 2. The community 3. The PA 4.No one ☐
6. Have you ever been involved in a forest management where many group share benefits? ☐
 1. Yes 2. No

Vi. Resource use conflict

1. Is there a resource conflict in the area? ☐
 1. Yes 2. No 3. Others (specify) _____
2. If, your answer to the question is yes, what is the major cause for the conflict? ☐
 1. Conservation through confiscation and penalties 2.Denial of use right
 3.Exclusion from the resource 4. Trespassing of borders and expansion beyond borders
 5. Others (specify) _____
3. Which groups are engaged in conflicts over the forest resource? ☐
 1. Government v_s. Monastery 2.Community v_s. Government
 3.Monastery v_s. community 4.PA v_s. Monastery 5.others (specify) _____

4. Dose the forest land has a clearly demarcated or recognized border? ☐
 1. Yes 2. No 3. I don't know
5. If yes, who trespasses the borders? _____

Vii. Perceptions on conservation measures

1. What conservation measures had been carried out in the area? (Multiple answers are possible)
1. Eviction 2.Area closure with demarcated borders 3. Penalties and patrolling

4. Afforestation 5. Education on the value of the forest 6. All
7. Others (specify) _____ ☐
2. What do you feel regarding these measures? (Multiple answers are possible)
1. They are important 2. They have aggravated deforestation 3. They have caused anger among community members 4. It is a measure that excluded the people 5. It made the people the enemy of the forest 6. Others (specify) _____ ☐
3. What measures of conservation would be practical?
1. Terracing at the foot of the mountain for agriculture 2. Agro-forestry (Gesho, coffee, etc...) 3. Establishing fuelwood plantation 4. Resettlement
5. Afforestation 6. Other (specify) _____ ☐
4. In what way can the community use the forest resource, without causing deforestation?
1. By engaging in tourism 2. By selling medicinal plants 3. By selling wild animal products 4. By establishing Apiculture 5. Others _____ ☐

Viii. Issues regarding the value given to the forest by the community

1. Do you want the area to be a forestland? ☐
1. Yes 2. No
2. Why? _____ ☐
3. What kind of land use would you like to be practiced here? ☐
1. Cultivation of cereals 2. For Agro-forestry 3. For forest conservation
4. For grazing livestock 5. Others (specify) _____ ☐
4. If the forest remains untouched by man, what benefit will it give? ☐
1. Environmental benefit (saves the soil from erosion, flooding, etc...) 2. It could alter the micro- climate (bring rain) 3. It can bring aesthetic value 4. Others (Specify) _____ ☐
5. Does the forest cause any problem? ☐
1. Yes 2. No
6. If yes, what are the problems? _____

IV. Environmental Issues

1. What problems have you observed in your environment? (Multiple answers are possible)

- | | | | |
|------------------------------------|------------------------|-----------------|--------------------------|
| 1. Declining fertility of the land | 2. More erosion | 3 More flooding | |
| 4. Drying up of springs | 5. Decline in rainfall | 6. All | |
| 7. Others (specify) _____ | | | ☐ |
2. If you have observed some problems; what do you think are the factors that brought about these problems?
- | | | | |
|--------------------------------|------------------|--------------------|--------------------------|
| 1. God's wrath against our sin | 2. Deforestation | 3. Climatic change | |
| 4. other(specify) _____ | | | ☐ |
3. What should be done to avoid these problems?
- | | | | | |
|----------------|------------------|-----------------------|-----------------|--------------------------|
| 1. Pray to God | 2. Afforestation | 3. stop cutting trees | 4. Others _____ | ☐ |
|----------------|------------------|-----------------------|-----------------|--------------------------|
4. What would happen if all the forest gets destroyed?
- | | | | | |
|---|------------|---------------------------------------|--------------------------|--------------------------|
| 1. Environmental problems | 2. Nothing | 3. Loss of access to charcoal or fuel | | |
| 4. Loss of income from selling the wood | | | 5. Other (specify) _____ | ☐ |

Checklist for focus group discussion

General Questions

1. What was the condition of the forest on the mountain slope in the pre- 1966 E.C, post- 1966 E.C and post-1983 periods?
2. What was the major cause that led to the current state of deforestation?
3. Have you perceived any environmental deterioration and developmental challenges on the mountain and the inhabitants?
4. What measures have been taken in the area to promote conservation and resource management?
5. What are the outcomes of the measures?
6. Are there traditional conservation methods? If yes, explain them?
7. What measure can bring a better resource conservation and management in the area?

I) Focus group discussion checklist for the Woreda agricultural and rural development bureau

1. What is the major cause that brought about deforestation in the area?
2. What conservation measures have been taken on the area?
3. What are the reasons and objectives behind each conservation measures?
4. Has there been any conservation measure that evolved the surrounding communities?
5. Does the situation here indicate an intentional deforestation caused by a conservational practice that excluded the rural community?
6. What is your perception in the area regarding environmental degradation and underdevelopment?
7. What solutions would you suggest?

II) Focus group discussion with the Woreda administration (bureau of natural resource conservation)

1. What has the Woreda done to stop the deforestation and implement a better conservation measures?
2. Are there success stories?
3. Are there failure stories?
4. What hindered the Woreda administration from stopping the deforestation?
5. What alternative solutions can the administration offer to achieve conservation?

III) Focus group discussion with the elders of the farming community

1. What should be done to get any benefit from the forest?
2. What kind of land use would the farming community prefer on the place?
3. What would the community suggest to stop the deforestation and apply conservation?
4. What is the general feeling the farming community had developed to the forest on the slopes?

IV) Focused group discussion with the Monks of St. Gebre Menfes Kidus Monastery

1. What is the historical background of the mountain in times before the establishment of the monastery and after its establishment?

Questions on loss of fauna and flora

2. What was the situation of the flora and fauna and the condition of the forest?
3. What is the land size and land use in the monastery?
4. What types of wild animals are found in the natural forest? (mention type , value and population in range)
5. What types of wildlife dominate the area now? (Compare it with deferent periods like; pre1966 E.C, post1966 E.C to1983E.C and after 1983E.C)
6. Which animals have disappeared from the area?
7. Have you observed a change in the types of trees growing in the forest through out the years?
8. Which tree species have become scarce or have disappeared from the area?
9. What efforts have the church made to conserve the forest?
10. Is deforestation a resent phenomenon or it stayed for so long?

V. Discussion guide with key informants

1. What is the cause of deforestation in the area?
2. What was the situation of the forest during the three governmental administrative periods, starting from pre-1966 E.C?
3. What is the situation of biodiversity loss?
4. What would be the means to conserve the resources?

Annex two

