DEMOGRAPHIC AND SOCIO ECONOMIC DETERMINANTS OF ENVIRONMENTAL KNOWLEDGE AND ATTITUDE TOWARDS ENVIRONMENTAL PROTECTION AND SOIL CONSERVATION ACTIVITIES, IN SAMRE DISTRICT, TIGRAY, ETHIOPIA

BY

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LIST OF ACRONYMS

AAU	Addis Ababa University
CSA	Central statistical agency
EHRS	Ethiopian highlands reclamation study
ESSS	Ethiopian soil science society
FAO	food and agriculture organization
FAOUN	united nation's food and agriculture organization
FGS	focus group discussion
KAP	knowledge attitude and practice
IPS	institute of population study
PPS	proportion of population size.
TLU	tropical livestock unit

ABSTRACT

The general objective of this study is to examine the demographic and socio-economic determinants of knowledge of head of the households on the environment and their attitude towards the environmental protection and soil conservation activities in the study area.

The source of data for this study was both primary and secondary. The primary source of data was a cross-sectional data on 450-sampled population, from five kebeles selected through systematic sampling with their proportional samples, through household survey using structured questionnaire, in-depth interview, focus group discussion and personal observation. The secondary source of data was collected through statistical abstracts, research reports, journals, Internet sources and related literatures.

The unit of analysis for this study was at the head of a household level. All kebeles were first studied their agro-ecological zones, elevation range, average temperature, average rainfall, soil conservation activities and other cultural heritages. Five kebelles with their proportion and a household were selected by systematic sampling.

A descriptive statistics, bi- variate and multivariate analysis was used. In the case of multi variate analysis, logistic regression model was used to examine the degree of strength of relation ships between the set of dependent and independent variables knowledge and attitude.

By using the binary logistic regression model there is a significant difference in the Environmental knowledge of the sampled population about the environment and soil conservation activities between male and female, literate and illiterate, those who have better income and those do not have, and between those who have media exposure and those do not have. On the other hand there is no significant difference of the respondents between the age group 40-65 and the reference category above age 65, between the currently married and the other group, house hold size and place of residence. The respondent's attitude towards soil conservation and environmental protection has also a significant difference among the age groups, between currently married and the others, place of residence, media exposure, literacy status and between those who take credit in the preceded two to three years or not. On the other hand sex, age group of 40-65, house hold size, remittance, off-farm activities, income difference and number of livestock has no significant attitudinal effect.

CHAPTER ONE

1. INTRODUCTION

1.1 BACK GROUND

Concerns about environmental degradation and sustainable development have grown steadily over the last few decades throughout the world. Especially as national economic growth and increasing population become increasingly dependent on the exploitation of natural/biological resources. The concerns stem from the fact that it is a global problem, even though the magnitude of the problem differs from region to region. In particular, in Africa, it is quite significant. This is partly because the majority of the population depends on natural resources for their survival. In addition, profound economic stagnation experienced by many countries in the sub-region, combined with weakening environmental governance, evidenced by the lack of environmentally sound policies, caused harm to sensitive ecosystems and resulted in degradation, lowered agricultural productivity and increased poverty (UNECA, 2002).

Land degradation is a major cause of poverty in rural areas of developing countries. The immediate consequence of land degradation is reduced crop yield followed by economic decline and social stress. Several years of exploitive traditional land use, aggravated by high human population growth and increasing number of livestock population density led to farming of uncultivable sloppy lands and overexploitation of resources. (Sanchez, et al., 1997).

In Ethiopia deforestation, accelerated soil erosion, and other types of land degradation are serious problems. These environmental problems are impairing the productive capacity of the natural resource. Population increases have aggravated the problem and resulted in extensive forest clearing for agricultural use, overgrazing, and exploitation of existing forests for fuel wood, fodder, and construction materials. Fertile topsoil is lost at an estimated rate of over one billion cubic meters per year (UNEP, 2008).

In Ethiopia, land degradation is a major contributor to low agricultural productivity. In realizing this problem certain soil and water conservation measures have been practiced in certain parts of Ethiopia (Million, 1992). To some extent the Ethiopian farmers have known the problems of land degradation and have attempted different practices to tackle the problem at certain level like: terraces, contour plowing, building trenches, bunds, ridges, fallowing for one to three years in order to restore the land's nutrients, rotation of cereals and legumes, afforestation, water harvesting and area closure, etc (Million, 1992;Engdawork, 2000 and Mulat et al., 2003).

1.2 STATEMENT OF THE PROBLEM

Land degradation is a major cause of poverty in many developing countries. Its immediate consequence is reduced crop yield followed by economic decline, social stress and the over all environmental chaos. The integrated process of land degradation and increased poverty has been referred to as the "downhill spiral of un sustainability" leading to the "poverty trap" (Greenland et al., 1994). According to ESSS (1998) reports, a total of 1.5 billion tons of soil loss per year in Ethiopia and FAO (1993) reported that about half of the highlands (270,000 Km^2) are already significantly eroded, of this 140,000 Km^2 are seriously eroded and have been left with relatively shallow soils.

The northern part of Ethiopia, particularly Tigray region, is one of the most degraded areas. It has been frequently facing problems of soil erosion, land and water scarcity, soil fertility decline and high population pressure. They are also vulnerable to climatic oscillations, mainly to erratic and un predictable rain fall. These all-cumulative effects have led to the deteriorating of land productivity and hence to displacement of some people from their villages (Yibabe 2002). The severity of soil erosion in the region is the result of demographic, socio-economic and institutional changes and the topographic feature of the terrain (Yibabe, 2002; John et al., 2007). Long history of human settlement in the region has also contributed to the environmental degradation at large. According to Hamilton (1977) deforestation started already in the region 2000 years ago. In many parts of Tigray, soil erosion has made cultivation impossible, as a result farmers have been forced to constantly cultivate new and more marginal areas (Yibabe, 2002).

In Tigray crop residues are commonly used as fodder for livestock, crop residue and cow dung is burned for heating and cooking thus removing virtually all-organic litter from the soils. The shortage of firewood has led to the utilization of straw and leaves for fuel. Sutcliffe (1993) found that nutrient losses due to removal of dung and crop residues from crop land, for use as an energy sources and the later for cattle feed is mach higher than soil erosion. This is driven by high population growth linked with poverty.

In response to the land degradation problems certain soil conservation efforts have been practiced in certain parts of the country including Tigray. The peasants have indigenous land management techniques, which can be broadly grouped as physical, vegetative and agronomic methods. These

measures are the result of a gradual learning process and emerge from a knowledge base accumulated by observation, experimentation, and a process of handling experience and wisdom (Kruger et al., 1996).

Several land management practices are commonly practiced in Tigray. The most common land investment programs are stone and soil bunds and other less common includes; constructing a fence or planting live fences and planting trees, contour plowing, burning to prepare fields, reduced tillage and intercropping or mixed cropping (John et al, 2007).

In particular aforestation and bench terracing programs were started in Tigray in 1997 under the USAID FFW program and later complemented by UN/FAO world food program Project (Yibabe, 2002). Recently the regional government of Tigray has also under taken a massive program of investment and resource conservation since 1991 (John et al, 2007).

Demographic and soico-economic variables are highly interrelated with land management measures. Population density, household size, access to roads, markets and farmers fields, income strategies like non-farm activities), ownership of livestock and other assets, human capital and social capital affects the land management systems in tigray (John et al., 2007).

Traditional land resource utilization in many parts of Tigray has followed on exploitative sequence consisting of clearing cultivation (Assefa, 1986). This unsustainable farming practice is linked to a lack of choice due to poverty rather than linked to neglect. According to Admassie et al (1985) reports, the Ethiopian farmers are aware of the problems of land degradation. Farmers in Tigray verify that they are, infact, concerned about the degradation of their land (unting, 1976 in Yibabe, 2002). However, there is apparently a wide spread apathy due to the fact that they are living barely on a subsistence level. They do not have the economic or labor capacity to implement necessary conservation measures, in some cases farmers are aware that some of their actions are actually damaging the land, but the immediate benefits of these actions seem more important than long-term degradation (Yeraswork, 2001). Loss of fertile topsoil due to land degradation leads to as reduced production capacity.

1.3 OBJECTIVES OF THE STUDY

The general objective of this study is to examine the demographic and socio-economic determinants of knowledge of head of the households on the environment and their attitude towards the environmental protection and soil conservation activities in the study area. The specific objectives of the study are:

✶ To assess knowledge of head of the households about the environment

✶To see knowledge variation of head of the households about the environment and soil conservation measures across the demographic and socio-economic variables.

✶To examine attitude of head of the households towards environmental protection and soil conservation activities.

✶ To assess variation in attitude of head of the households towards environmental protection and soil conservation activities across demographic and socio-economic variables.

1.4 SIGNIFICANCE OF THE STUDY

Development is an output of savior efforts including different researches in different disciplines across time horizon and levels. This study contributes some ideas about the determinants of knowledge and attitude on the environment and soil conservation activities in the study area in particular and in some other areas with similar socio-demographic level, development status, geographical settlement and arrangement, agro-ecological zones etc.

Therefore, having accomplished the study, it will create an awareness about the environment and environmental protection to concerned bodies especially those agricultural and environmental authorities, policy planners, NGOs program and project interventions to get a feed back about the phenomenon. Additionally, this research will provoke researchers for further researches and investigations.

ecological elements on an area reacting with the effects of man or other animals or the already disrupted ecosystems.

- **Knowledge** refers to the acquaintance with facts or familiarity, Perceptions, awareness and understanding of the society on the environment, environmental problems and environmental protection activities through soil conservation and other techniques.

- **Attitude** in this study refers to peoples' feeling or tendency towards the environmental protection through soil conservation and other related activities.

- **Environmental degradation**- is the deterioration of the environment through depletion of resources such as air, water and soil, the destruction of ecosystems and the extinction of wild life.

alternative idea came which considers population as an intermediate factor interacting with environment. A proponent of this alternative perspective point out that population growth is one among several factors stimulating change rather than acting as the sole factors (Gleav, 1994 in Markos, 1999).

Other organization like, UNESCO has come up with the poverty-population-environment (PPE) framework, in which it has attempted to model population and environment interaction in the developing world concentrating on multiple causality and multiple effects. The PPE framework depicts several ways in which higher population growth leads to poverty and poverty leads to higher population growth. It also directs that both increased population and poverty are bad for environment and that environmental deterioration contributes to poverty (UNESCO, 1992 in Markos, 1999). This theory used the relationship of PPE by using the formula:

I= (POP) (POV) (E) where, I=environmental impact, Pop=population factor Pov=poverty

E =environmental resources available to Support the impoverished multitudes.

The interactions are multiplicative to each other's impacts.

These impoverished people are usually dependent for their survival upon the environmental resource base of soil, water, forests, fisheries, and biota's that make up their main stocks of economic capital. At the same time, they see scant alternative to exploiting their environmental resource base at a rate they recognize is un sustainable; they feel obliged to miss use and over use their resource stocks today at cost to their prospects tomorrow. They thereby undercut their principal means of livelihoods, which further entrenches their poverty. In turn, this appears to reinforce their motivation to have large families (Keyfitz, 1990). As ultimate upshot, they face the prospect of ever tightening constraints.

The poor people cannot afford costly inputs such as high yielding seeds, fertilizer, irrigation and farm machinery. So these people become" Marginalized". They are further marginalized in that they generally lack economic, political, legal or social status.

terrain, the extensive areas with slopes, and the high intensity of rainfall lead to accelerated soil erosion. Furthermore, sociopolitical influences, especially insecurity of land- and tree tenure, have discouraged farmers from investing in soil conservation practices (Badege, 2001). Soil erosion is greatest on cultivated land, where the average annual loss is 42 tons/ha, compared with five tons/ha from pastures (Hurni, 1990).

Some 66 percent of the country was originally covered with forest or woodlands (Assefa, 1990). Over the last 3,000 years there has been progressive deforestation, which has accelerated tremendously during the last century (UNEP, 2008). Rapid population growth, extensive forest clearing for cultivation, overgrazing, movement of political centers, and exploitation of forests for fuel wood and construction materials without replanting reduced Ethiopia's forest area to 16 percent in the 1950s and to 3.1 percent by 1982 (UNEP, 1988). Further estimates of the distribution of forest and woodland areas based on information from landsat revealed that 2.8 percent of the land surface is under forest and woodland (MOA et al., 1991 in Badege 2001).

Deforestation and land degradation should be seen as the most important issues threatening the survival of Ethiopia. Floods, drought, desertification, drying of streams, and soil erosion are connected one way or another with the process of forest exploitation and destruction. (Badege, 2001).

2.2.1 SOME TYPES OF WATER AND SOIL CONSEWRVATION MEASURES

- Soil bund construction
- Stone bund construction
- Fanyajuu terrace construction
- Planting on bunds (trees/shrubs)
- Hillside terracing (standard)
- Cutoff drain construction
- Waterway construction (unpaved)
- Bench terrace construction
- Stone check dam construction (CD)
- Stone check dam maintenance
- Pitting
- Micro basin construction
- Herringbone construction (HB)
- Seed collection (tree seeds)
- Seeding planting
- Site guards for area closure
- Bunds Stone spillway + Apron
- Bund stabilization (grass and legumes)
- Hillside terrace + trench construction
- Waterway construction (stonepaved0
- Waterway check & drop + Apron structure
- Brushwood check dam construction
- Stone faced/soil bunds construction
- Gully Re-vegetation
- Sediment storage dam (SSdam)
- SSdam spillway construction
- Gully cut & fill/reshaping/leveling
- Compost making (pit: 4mlx2mwx1.5md)
- compost making (Heap)
- Eyebrow basin construction
- Trench construction
- Mulching of trenches/EB/HB
- Alley cropping
- Mulching of degraded land & long fallows
- Zai pits
- Grass stripes
- Grassland improvement

Source: the District's agricultural office.

The Ethiopian rugged topography and steep slopes affect soil erosion rate through its morphological characteristics. Two of these, namely gradient and slope length, are essential components in quantitative relationships for estimating soil loss (Wischmeier et al., 1978).

On steep slopes, soils are generally shallower and their nutrient and water storage capacities are limited. Thus, soils in these areas, when exposed to soil eroding agents, face greater degradation consequences compared to soils in flat areas. Increasing population has resulted in an increasing demand for cultivable land, which has increasingly moved on to steeper slopes previously covered (through cutting and burning) by forests.

2.4.1. DEMOGRAPHIC FACTORS

Man as an ecological factor and a manipulator of the environment alters the course of the normal soil process and can modify its properties (Engdawork, 1999).

Ethiopia is one of the most deforested country in Sub-Saharan Africa. This is mainly attributed to increasing demand for fuel wood, construction, demand for land for cropping and grazing, which are driven by population growth and market and policy failures (Mulat et al., 2003).

Gender relations and the divisions of labor are important factors in the economic development. Gender inequity, and its impact on resource management, is shaped by many factors including unequal access to basic facilities, such as education and health care, differences in income, the extent of social and political inclusion, as well as social and cultural factors. All these impact upon the choices and opportunities women have, and ultimately on how they use and manage natural resources (John and Berhanu, 2007; UNEP, *2008)*

Degradation, deforestation or the extension of prohibitions on resource extraction may further penalize women in rural areas who already have to travel long distances to collect water or fuel wood. Collection activities compete for time spent in food preparation, childcare and providing for the household's nutrition and reduce free time and thus limit the opportunity for women to pursue other interests. *(*UNEP, *2008)*

Sex is considered as one factor that substantially affects people's environmental knowledge and their attitude towards soil conservation activities. As Fiona (2003) noted out, "women possessed less knowledge than men concerning conservation, less a ware of the conservation benefit and were ignorant of long term benefit and gricultural crop yield are higher for male-headed than for female-headed households, because female-headed households lack the know-how to manage farms and soil as they are mainly confined to household chores by tradition in Ethiopia (Mulat et al., 2003). On the other hand, environmental problems are the result of men domination (Tiondi, 2000). Bernstein (1992) explained that many women retain considerable potential to manage assets with dedication and care in Zimbawe.

Age is one of the demographic factors that affect peoples' environmental knowledge and attitude towards the environmental protection through soil conservation activities and other related measures. People in the same cohort would have similar attitudes towards certain issues. Marital

level of education in ethiopia. Yield differences between the literate and the illiterate farmers have a great significance. Literacy status is expected to increase the probability of investment in soil conservation. Several studies have shown that farmers with basic education are more likely to adopt new technologies and attain higher degree of efficiency. Modern attitudes and values, conducive to development are largely created through education and urbanization. People holding modern attitudes are less resistant to change since they can easily see that it can be beneficial. Informed citizens identify with newer, larger entities of region and state and take interest in public and environmental affairs. The modern man's openness to new experience is reflected in his interest in technical innovation and willingness to work with people from different cultural and ethnic background.

POVERTY AND ENVIRONMENTAL DEGRADATION

The linkages between population, poverty and environmental quality have long been the subject of debate and concern. The relationship could hardly be direct since, as some have argued,low living standards in the rural areas contribute to increased pressure on natural resources, which in turn aggravates poverty (WCED, 1987 in Monticha, 2004). However, some argue that environmental degradation and rapid population growth are both consequence of poverty. In most developing countries, policies aimed at poverty reduction and economic and rural developments are generally focused on the broader issue of agricultural development, which has a direct relation to land degradation.

Poverty can affect peoples' environmental knowledge and environmental protection activities in different ways. For example, after famine episodes of the 1970s and 1980s in Ethiopia, farmers were mobilized to participate in the soil conservation projects through either campaign works on the incentive of food-for-work (FFW) and between the 1976 and 85, a total of 600,000kms of soil and stone bunds and about 600,000kms of hill side terraces were constructed and 80,000 hectare of steep slopes were closed for regeneration (Hoben, 1995; Yeraswork, 2000). Moreover, check dams were constructed along gullies over tens of thousands of kms and about 500 million free seedlings were planted over 180,000 hectare of land in the course of the decade. However, after a year, when the FFW incentive stopped, and coertion was relaxed, the construction was damaged and the farmers were them selves involved in the destruction in order to get paid the FFW incentive (Aklilu, 2001). This shows us that, the farmers' famine (poverty) enforces them even to destruct

CHAPTER THREE

METHODOLOGY

3.1. DESCRIPTION OF THE STUDY AREA

The study area, Samre is located in the northern part of Ethiopia at about 836 km north of Addis Ababa and about 59 km south of Mekelle, the capital city of Tigray.

MAP OF THE STUDY AREA

3.2 DATA SOURCE

When we decide what data to be collected for a given purpose we use a secondary data or a primary data source. The primary data source can also be either a cross sectional data or a time series (longitudinal) data source. The source of data for this study is, there fore, a cross-sectional primary source of data, which was obtained through a household survey method of 450 household head of sample population by using structured Questionnaire, in-depth interview (interviews for individuals, the Districts' administrative and agricultural office, NGOs and other concerned bodies), focus group discussions (FGDs) and personal observation. And a secondary data collected from different literatures, organizations and other concerned bodies.

3.3 SAMPLING DESIGN AND PROCEDURE

Five kebelles (from dekera 65, samre 135, addis alem 95, andi weyane 78 and from my tekli 77 house holds) were selected by systematic sampling and a proportional household was taken from each kebeles through systematic sampling. A household was also selected by systematic sampling method.

A total of 450 households were used for the study. The questionnaire was interviewed by trained enumerators, and an additional in-depth interviews and FGD was conducted with sample population.

3.4 SAMPLE SIZE DETERMINATION

In research findings an appropriate sample size is crucial in order to fit a model and for a meaningful data interpretation. In this study for a minimum sample size the following formula was taken and a 20% of the resulted calculation is also added to it.

To decide the sample size of the targeted population, the following formula was taken.

$n = ((p*(100-p)xZ^2)/e^2$

Where,

n = Sample size of the population.

a structured questionnaire was edited, coded and entered in to a computer program known as statistical package for social studies (SPSS).

In order to look in to the degree of association of each independent variable to the dependent variable, bi-variate linear regression was used.

In the case of multi variate analysis, logistic regression model was used to examine the degree of strength of relation ships between the set of dependent and independent variables because the dependent variable is dichotomous which can take values 1 and 0. The chi-square test of independency was employed to identify the possible association between the dependent variable and the explanatory variables. In order to assess the multicollinearity effect among the explanatory variables, VIP (variance inflation factor) Was used and shows no significant multicollinearity effect. To assess the overall binary logistic regression model fitting, Hosmer-lemeshow goodness-of-fit was used and shows it is a good fitting model.

Logistic coefficients are difficult to interpret if not coded meaningfully. The convention for binary logistic regression is to code the dependent class of greatest interest as 1 and the other class as 0. In addition to the encoding of the dependent variable, the predictor variables should also be encoded appropriately with a logical category or classification of the variables in to sub groups.

3.7 DEFIONITION OF VARIABLES AND WORKING HYPOTHESIS

DEPENDENT VARIABLES

knowledge is encoded as: those people who have knowledge are given the value 1 and those who do not have knowledge are encoded as 0.

Attitude is encoded as: those who have positive attitude are given 1 and those do not have positive attitude are given 0. This is to consider some people those who have neither positive nor negative or in between of the category.

All the independent variables or predictor variables are also encoded for a meaningful statistical analysis of the binary logistic regression (Table17). All the parameter coding have a reference category at the last of the parameter which are given the symbol RC.

Table 1 Definition of explanatory Variables and Coding system.

Variable name	Parameter classification	Explanation
AgeA(1) AgeA(2) ageA	age group 18-41 age group 42-65 age group >65(RC)	Age group of the head of households, classified in to 3 subgroups. The reference category is the age group Of above 65.
TLU1(1)	TLU<=5 TLU>5(RC)	Total livestock of the household in tropical livestock Unit, classified in to two. The reference category is TLU Greater than five. It is given 1 for TLU<=5, otherwise 0.
MS(1)	Currently married Others (RC)	Marital status of the household head, classified as Currently married and others (single, divorced,..). And the reference category is "others". It is given 1 for Currently married, otherwise 0.
Placeresidenc(1)	urban Rura(RC)l	Place of residence with reference category Rural. It is Given 1 for those living in urban otherwise 0.
media(1)	have have no(RC)	Media exposure with the reference category of "have no" And a reference category "have no". Urban is encoded as 1 otherwise 0.
literacy(1)	Literate Illiterate(RC)	Literacy status of respondents with reference category of
incomeI(1)	<5000 >=5000(RC)	Income of households with reference category 5000 and Above. Income less than 5000 is encoded as 1 otherwise 0.
Pnagri(1)	Yes No(RC)	Off-farm activities of respondents with reference category of Of those do not participate. 1 is for those participants and 0 otherwise.
Remittance(1)	yes No(RC)	Remittance of the households with reference category of Do not have remittance. 1 is coded for those who have Remittance and 0 otherwise.
Credit(1)	yes No(RC)	Whether the respondent obtained credit: 1 if he/she obtains And 0 otherwise.
SEX(1)	male Female(RC)	Sex of the head Of household. The reference category is Female. Male is encoded as 1 and 0 for female.

SEX

Sex as male and female, which are thought to be one of the variables for the differentiation of knowledge and attitude of the households on the environment and on soil conservation activities. Gender inequity and its impact on resource management is shaped by many factors including unequal access to basic facilities such as education and health care, differences in income, the

extent of social and political inclusion, as well as social and cultural factors (UNEP, 2008). Female-headed households lack the know-how to manage farms as they are mainly confined to household chores by tradition (Mulat et al. (2003). study conducted in Tanzania showed that women possessed less knowledge than men concerning Conservation, less aware of the conservation benefit (Flintan, 2003). This is due to the fact that females are usually restricted to house works and they have less access to education, training and any positions. Motherhood is also some of the determinants for the inequality between male and female in their environmental knowledge status. Thus: males are expected to have better environmental knowledge and positive attitude towards environmental protection and soil conservation activities than female.

AGE

Age is a variable that can determine knowledge and attitude of the households. This is due to the fact that cohorts of people may have same opportunities on same phenomenon at a given period and time. As Ervin (1982) said, younger and more educated peasants are more likely to perceive erosion as a problem and therefore perceives benefits from using conservation practices. Thus: Age is expected to have an influence on knowledge of the respondents and younger age groups have better environmental knowledge and have positive attitude towards environmental protection and soil conservation activities than the older ones.

MARITAL STATUS

Marital status may have an influence in knowledge difference about the environment and attitude towards environmental protection activities, across currently married and the other group as others, which consists of never married, divorced, separated and widowed. As Torgler (et al., 2003) reported, married people have better knowledge of the environment and better attitude towards the environmental protection than the single ones. This is because as people get married, they establish strong social network with in the community and they involve in community activities. Thus: Currently married people are more likely to have environmental knowledge than the other groups and are more likely to have better tendency of environmental protection and soil conservation activities than the other groups.

OFF-FARM ACTIVITIES

A farmer who participates in non-agricultural activities may be biased to the off-farm and hence may not give an attention to the environmental protection activities. Having off-farm income influences the willingness and ability to use improved soil conservation technologies and the level of soil conservation effort (Mbaga and Folmer, 2000) and Holden et al. (2003) said that off-farm income reduces farm household's incentives to invest in conservation activities. Therefore, farmers who participate in none agricultural activities have lower tendency towards environmental protection and soil conservation activities.

LIVESTOCK NUMBER

Livestock are household assets, especially of farmers. They are directly used as sources of income; their dung is used for fertilizer, for transportation, and can also use as a social capital. Farmers with a large numbers of livestock may neglect the soil conservation activities and other related environmental protection activities, because they may have a direct income from their livestock sold and they may also oppose area closure in favor of their livestock. There fore, it can be hypothesized that households with large numbers of livestock have negative attitude towards environmental protection and soil conservation activities than those who have small in number.

CHAPTER FOUR

DATA ANALYSIS AND INTERPRETATION

4.1 CHARACTERSTICS OF THE STUDY POPULATION

This research analyses knowledge and attitude of head of households on the environment and on soil conservation activities. The demographic and socio-economic characteristic of the sampled population is described as follows:

4.1.1 DEMOGRAPHIC CHARACTERSTICS

This study considers sex as male and female, which are thought to be one of the variables for the differentiation of knowledge and attitude of the society on the environment and on soil conservation activities. In a household, if the husband was not there at the time of the data collection, his wife gave the desired information and could be considered as head, and vice versa for the male. Out of the 450 head of households (59.1%) are male and (40.9%) are female (Table 2).

Table 2 shows the age category of sampled population. Marriage in Ethiopia is not legal under age 18 so minimum age of 18 is considered to be head of a household.

Table 2 Demographic frequency distribution of respondents

Demographic variable	Group	Frequency	Percent (%)
Sex	Male	266	59.1
	Female	184	40.9
	total	450	100
Age group	18-41	197	43.8
	42-65	172	38.2
	>65	81	18
	Total	450	100
Marital status	Currently married	309	68.7
	Others	141	31.3
	Total	450	100

Marital status is here categorized as currently married and the other group as others, which consists of never married, divorced, separated and widowed. This grouping system is designed because of the small proportion of single, widowed, separated and divorced people in the sample population. About 68.7% and 31.3% of the sampled populations were, therefore, currently married and others (Table2).

4.1.2 SOCIO-ECONOMIC CHARACTERSTICS

Socio-economic variables can influence and affects the knowledge and attitude of the society about their environment. Some of the socio-economic variables considered in the present study are indicated in Table3.

In most countries people live either in urban centers (towns, cities, megacities etc) or in rural areas. The factors that makes difference between urban and rural centers is due to the infrastructure accumulation or biased political and economic power towards urban than the rural areas. This make a difference in knowledge and attitude on the environmental issues and other related aspects. About 81.8% of the sampled households of the district live in rural areas (table3).

Table 3. Frequency distribution of respondents by their socio-economic variables

Socio-economic variables	Group	Frequency	Percent(%)
Place of residence	Urban	82	18.2
	Rural	368	81.8
Literacy status	Literate	236	52.4
	Illiterate	214	47.6
Income	<5000 birr	232	51.6
	>=5000	218	48.4
Media exposure	Have	249	55.3
	Have no	201	44.7
Credit	Yes	333	74
	No	117	26
Off-farm activities	Yes	146	32.4
	No	304	67.6
Remittance	Yes	81	18
	No	369	82
Tropical livestock unit	<=5	275	61.1
	>5	175	38.9

Sustainable development is mainly ensured through proper education. Education empowers knowledge of an individual, brings attitudinal changes, makes flexible and less resistant to change. In this study a person who can read and write in any means and any ways (through formal or non formal ways) is considered as a literate and if not as an illiterate. Based on the above criterion, out of the 450-sampled population, 52.4% of the population was literate and the rest 47.6% was illiterate (Table3).

In this study, economic level of the society was considered as one of the socio-economic factor that could have an influence on the knowledge and attitude of the society. To evaluate economic status of sampled households, their income was based on the yearly harvest and off-farm activity. These

include cereals, vegetables, fruits and sale of livestock and their products. Households with annual income of less than 5000 birr were 51.6% (table3).

Media is considered as a non-formal education through which information reach to individuals or societies or the whole nation. It has a power of influencing and can increase knowledge and awareness. For this, the respondents were asked whether they read news papers, magazines or any written materials which addresses about environment, listen to radio or watch television or not. Accordingly, if a respondent has accessed to one of the three media stated above, then he/she is considered to have media access. Accordingly about 55.3% has an access and the rest 44.7% have no any access to media (Table3).

Getting credit service is another socio-economic variable, which could have a possibility of influencing the attitude of the individuals. This might be due to the psychological influence that one incubates in, if he has taken a credit, in fear of not returning back the credit so he has to work hard and be active. In this case the individual may be active, responsive and well participant in every activity. Accordingly, about 74% have taken a credit in the last two-to three years and the rest 26% have not taken credit from any organization in the last three years (table3).

In a given area an individual may participate only in one kind of job and others may participate in different kinds of jobs. This off-farm socio-economic variable is mainly designed for farmers because non-farmers are obviously engaged in off-farm activities. It is supposed that a farmer who participates in non-agricultural activities may be biased to the off-farm and hence may not give an attention to the environmental protection activities. Out of the 32.4% of off-farm participants, 18.2% are almost the urban resident and hence 15.8% of the farmers are participants in the non-farm activities (table3).

The variable remittance is included in this study in thinking that an individual who receives a remittance may not have an interest to participate voluntarily on the environmental protection activities rather he/she may always wait the remittance and neglect the environmental issues. About 18% respondents received remittance from someone else and the majority of them (82%) do not received remittance (Table3).

4.2 FREQUENCY DISTRIBUTION OF RESPONDENTS' PERCEPTION ON KNOWLEDGE DETERMINANT QUESTIONS.

Questions were designed to assess the knowledge of the society on the environmental problems and on the soil conservation activities. All questions were an open ended type and no alternatives were given to the respondent even though there is some list of possible answers in the designed questionnaire. If the respondent gives his/her possible answers, the interviewer simply circles out what the possible answers are given by the respondent. To reach at a conclusion about the individual knowledge on the environment he has to say or answer some of the given questions by his/her own way. The basic questions designed to test the knowledge status of the respondents are given by their item type and the number of responses out of the 450 sample population is also given in each question item. For example, respondents were asked the question" what environmental problems did you observe around your area? "Then out of the 450 individuals about 87.8% have observed and understood that there is land degradation around their area whereas 8% of them have no any knowledge or observation on what is happening around their area (Table 4).

Table.4 Respondents observation on environmental problems in the study area.

Environmental problems observation	Responses	Percent (%)
Observation on land degradation	395	87.8
Observation on decreasing of water sources	406	90.2
Observation on decreasing of crop products	162	36
Observation on deforestation	414	92
Observation on weather exchange	108	24
I don't know	36	8

Source: Field survey of the study area, 2009

N.B: Due to multiple responses the percentage does not add up 100%.

Another basic and main filtering question for the knowledge of the society was to ask the causes of land degradation. Out of the 450 respondents about 32% of them know that topography can be one

of the causes for land degradation and about 30% of them said due to serious deforestation. Absence of soil conservation, Overgrazing, High population increase and new areas of settlement, Lack of environmental education and experts' assistance, Lack of government control was some of the mentioned causes of land degradation by the respondents (Table5).

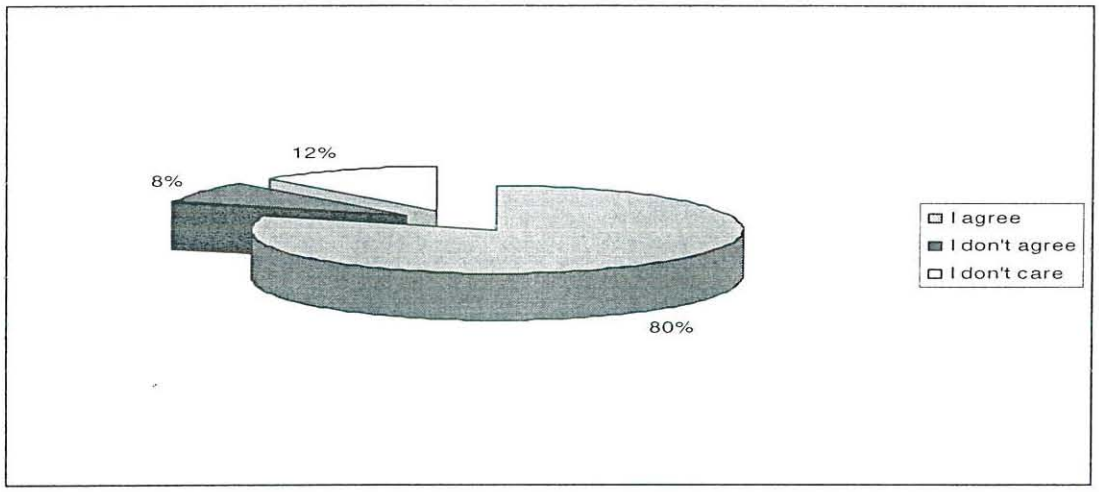
Table5. Respondents' answer on the causes of land degradation

Causes of land degradation	Responses	Percent
Topography of an area	144	32
Absence of soil conservation	243	54
Overgrazing	117	26
Serious deforestation	135	30
High population increase and new areas of settlement	270	60
Lack of environmental education and experts' assistance	207	46
Lack of government control	126	28
I don't know	27	6

K1. An open knowledge determinant question "why do we conserve soil and what is its advantage?" was asked to the respondents and most of them, except a few (4.5%) had an understanding of its advantage and said like: to prevent the environment, to increase the vegetation or forest coverage, to maximize crop yield by maintaining the soil fertility from degradation etc.

K2. Another open ended of knowledge determinant question "could you please mention some of the expected problems created if no soil conservation activity is taken place?"Was asked to the sampled population; accordingly most of the respondents know the consequence of land degradation. Poverty, water shortage, deforestation, decreasing of productivity etc were some of the expected problems created mentioned by the respondents. Only about 4.3% of them do not know the consequence of lad degradation. N.B: if the item question is jumped by a respondent, it is considered as not answered.

Fig.2 agreement or disagreement on the rule of punishment on those who do not participate in the soil conservation activities.



A2. Some people in the soil conservation activities may participate with interest and devotion and others may participate without their interest. Willingness of the society on soil and water conservation measures is very important and critical. It should be adapted to local conditions. It determines the ultimate success of soil and water conservation program (daba, 2003). To assess attitude of the society on the activities of soil conservation, the Question "had there was no punishment, would you participate in the soil conservation activities voluntarily?" was asked to them then about 80% of them agreed and shows their willingness to conserve soil even though there was no punishment but the rest 20% did not show their willingness. As one man said,

> " *Previously putting any stone (meaning stone bund) on the agricultural land was considered as making the land more fragmented and decreasing its area so we were not in favor of it; but nowadays we have seen and observed the advantage of soil conservation, most of the society, including me are conserving our own land and the communal land voluntarily*".

A3. Over grazing is one of the main factor contributing to the causes of land degradation and deforestation in the developing countries. In order to prevent overgrazing area closure was implemented in Tigray including the study area. The societies were asked whether they support area closure or not and accordingly about 67.8% of them have supported area closure where as

32.2% did not support it. In fact during the FGD of certain groups and an individuals in-depth interviews, some of them were strongly against area closure and even some of them have reached to say " area closure has no use at all except to be the host of wild animals" They claimed that the land must be free for grazing.

Those who did not support area closure give their claime by different reasons. For instance, a 57 years old woman said," *I can not eat tree, I prefer my livestock; on one hand the government encourages us to buy livestock on the other hand they are forced us to keep our cattle at home. We are in a problem".* And another 68 years old man said," *due to area closure implementation our land is becoming narrowed and land scarcity is happening so our cattle are in problems, how can we feed them?".* Another 47 years old man said," *we know the plan of government on the purpose of area closure; it is obviously designed to rehabilitate the degraded area. The grass and tree inside it helps to protect soil erosion, more over it prevents overgrazing. However, previously we sell our livestock and raise our children but now we can not have enough livestock because it is difficult to feed them at home so how can we lead and exist our live? As you can see there is no enough land and enough crop production. We are in great problem.".* As a 40 years old woman witnessed," *still now some people are violating the rule and are cutting trees from the area closure during night time"*

On the contrary many people were heartily supporting area closure irrespective of their different socio-economic burdens. For instance, to list some of the respondents' opinion they mentioned,

A 60 years old man said," *previously I had horses, camels, more than five oxen, and other more livestock but since area closure is being implemented around our area, I have already sold most of them and I am happy what I did because area closure is important to prevent land degradation*". Another 33 years old man said," *at first we did not support area closure because we don't like keeping our livestock at home but later we saw a rehabilitation in our area in a few years and gradually we got awareness about the environment so now we support it well".*

A4. When an area is considered for an area closure it should be kept from overgrazing by livestock and anybody should not cut trees from it. As a result of it, livestock has to be kept in a specific area

or at home. In the study area due to area closure implementation they were forced to keep their livestock at home or in a specific area. Hence in order to know their attitude whether they support it or not, they were asked about the rule and 58% of the respondents did not like to keep their livestock at home and about 42% of them were willing to keep their livestock at home in order to prevent overgrazing. Some people who care about the environmental problems were supporting the rule even though they have a number of livestock. They were selling their livestock in order to contribute their behalf for the environmental rehabilitation because it may be difficult to feed many livestock at home. On the other hand some of the people were not volunteer to keep their livestock at home or in a specified area and some of them considers as if it is designed just to minimize their livestock. As one old man said "I have never seen a government who do not like livestock ". In fact many people have said that it is difficult to have a large number of livestock and feed them at home since there is scarcity of resources.

4.4 DESCREPTIVE STATISTICS OF DEMOGRAPHIC AND SOCIO-ECONOMIC DETERMINANTS ON KNOWLEDGE AND ATTITUDE

In this study an individual is said to have knowledge or not if he/she is able to have few saying in majority of the questions designed for the purpose of knowledge determinants which are listed on table3-8 and on fig7 and from the open ended questions listed in the questionnaire. It was not uniform throughout each table to judge on the knowledge of the individual so a proportional wait has given to some item questions according to the value and content of the question and its answer. Accordingly tables 4, 5, 6, 7, 8, 9, and the open-ended questions symbolized as K1, K2, and K3 were the major questions designed for knowledge determinants. In addition to the above criteria, open-ended questions were also included in the decision of knowledge status of the respondents. During the time of interview the general situation of the respondents on how to explain on the questions given to them was also considered. Each question item is out of one mark then, if a respondent has got 4.5 and above out of the above six listed tables and three open ended questions (K1, K2, K3). And a good answers on the other related open-ended questions; he/she has knowledge on the environment and soil conservation activities. Otherwise have no knowledge.

Inline of assessing the knowledge status of the society the second aim of this study was also assessing their attitude towards the environmental protection and soil conservation activities.

Specific questions were designed in order to judge an individual has positive attitude or not. In this study attitude is categorized as positive attitude and not positive attitude. It is not well defining the category positive/negative attitude because some of the respondents may not have completely negative attitude rather it might be in between it. The positive/not positive attitudinal category is, therefore, thought in considering the more devoted and cautious people on the environmental issues, people who do not care about the environment due to lack of knowledge or other factor and to those people who do not care about it but not necessarily negative. The questions of attitude are listed on Fig.1, Fig.2, the symbols A1, A2, A3, A4 and Table10. Additionally, open-ended questions were also included to judge the attitude of the individuals. Each question has its value with its proportional content. Accordingly, a respondent is said to have positive attitude if in table9 all alternatives are on the side of agreement, fig.1 is to prevent the environment or both to prevent and to get payment, on the side of agreement, A1 is willing, A2=yes, A3=yes and A4=yes. Then after, if a respondent is able to answer a minimum of 3.5 and above out of the two listed figures, A1, A2, A3, A4 and table9 in the above, and other related open ended questions, he/she has positive attitude otherwise not positive.

4.4.1 DEMOGRAPHIC VARIABLES, KNOWLEDGE AND ATTITUDE

About 76.3% of male respondents have knowledge on the environment in general and on the soil conservation activities and the rest 23.7% have no knowledge. In congruent to this 61.3% of them have positive attitude where as 38.7% have no positive attitude. In the case of female respondents, out of the 184 respondents, 46.2% have knowledge where as majority of them (53.8%) have no knowledge. 56.5% have positive attitude but the rest 43.5 have no positive attitude (Table13).

Table 13. Relationships of demographic variables with knowledge and attitude

Demographic variabl		environmental Knowledge				Environmental Attitude			
		Have	%	Have no	%	Positive	%	Not Positive	%
Sex	Male	203	76.3	63	23.7	163	61.3	103	38.7
	Female	85	46.2	99	53.8	104	56.5	80	43.5
Age group	18-41	154	78.2	43	21.8	125	63.5	72	36.5
	42-65	94	54.7	78	45.3	92	53.5	80	46.5
	>65	40	49.4	41	50.6	26	32.1	55	67.9
Marital statu	Currentl married	212	68.6	97	31.4	181	58.6	128	41.4
	Others	76	53.9	65	46.1	61	43.3	80	56.7

78.2% of the age group 18-41 have knowledge where as 21.8% of them do not have and 63.5% have positive attitude where as the rest 36.5% do not have positive attitude. 54.7% and 49.4% of the age group 42-65 and above 65 respectively have knowledge where as 45.3% and 50.6% have not (Table13).

4.4.2 SOCIO-ECONOMIC VARIABLES, KNOWLEDGE AND ATTITUDE

Place of residence is one of the factor that creates a difference in the knowledge and attitude of the society. 73.2% of the respondents in urban areas have knowledge but only 39% of them have positive attitude. When we see the literacy status, it is categorized as literate and illiterate. Those people who can read and write are considered as literate and those who can't read and write are illiterate. Based on this idea, 78.8% of the literate people have knowledge and the rest 21.2% do not have (Table14).

Table 14. Relationship of socio-economic variables with knowledge and attitude

Socio economic Variables		Knowledge				Attitude			
		Have	%	Have no	%	Positive	%	Not positive	%
Place of Residence	Urban	60	73.2	22	26.8	32	39	50	61
	Rural	228	62	140	38	211	57.3	157	42.7
Literacy Status	literate	186	78.8	50	21.2	152	64.4	84	35.6
	Illiterate	102	47.7	112	52.3	91	42.9	123	57.1
Income	<5000	117	50.4	115	49.6	106	45.7	126	54.3
	>=5000	171	78.4	47	21.6	137	62.8	81	37.2
Media	Have	197	79.1	52	20.9	165	66.3	84	33.7
	Haven't	91	45.3	110	54.7	78	38.8	123	61.2
Remittance	Yes	-	-	-	-	36	44.4	45	55.6
	No	-	-	-	-	207	56.1	162	43.9
Off-farm Activities	Yes	-	-	-	-	85	58.2	61	41.8
	No	-	-	-	-	158	52	146	48
Credit	Yes	-	-	-	-	198	59.5	135	40.5
	no	-	-	-	-	45	38.5	72	61.5
TLU	<=5	-	-	-	-	137	49.8	138	50.2
	>5	-	-	-	-	106	60.6	69	39.4

Income of the society is divided into two income groups, those who have less than 5000 Ethiopian birr per annual and those with annual income of 5000 birr and above. From this income classification 50.4% and 78.8% of those people with annual income of less than 5000 birr and 5000birr and above respectively have knowledge and 45.7% and 62.8% of people with <5000 and >=5000 birr of annual income have respectively positive attitude (Table14).

Media exposure is one of the most influential variables on the knowledge and attitude of the society about the environment and soil conservation activities. Reading newspaper, magazines or some other written material, watching television and listening radio can be taken as media exposure. So if an individual has an access to one of the above listed it can be said that he/she has

accessed to media otherwise not. As a result, 79.1% of the people who have an access to media and 66.3% and 38.8% of the people with media access and with no media access have positive attitude respectively (Table14). In the study area some times newspapers and magazines is distributed to the society in certain interval, however, since a significant amount of them can not read and write, it can not serve as a source of information for some of the society.

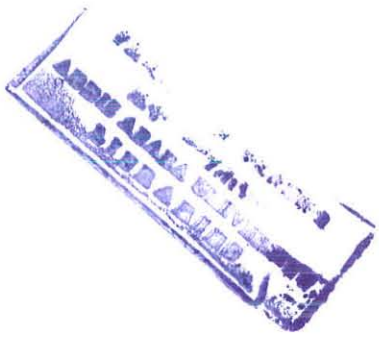
This study does not consider the variables remittance, off-farm activities, credit and livestock numbers as factors that could determine knowledge of the society so these three variables are supposed to have an effect only on attitude of the society. Hence from table13, 44.4% and 56.1% of those who receive remittance and do not receive remittance respectively have positive attitude; In the case of credit 59.5% of people who have ever taken credit in the last two to three years have positive attitude (Table14).

Livestock numbers are changed to TLU according to the type of the animal and it was categorized as those who have TLU of five and less than five and those who have greater than five. then accordingly, 54.5% of those with TLU five and less than five have positive attitude (Table 14).

4.5. BIVARIATE ANALYSIS TO SEE ASSOCIATION OF THE DEPENDENT AND EACH EXPLANATORY VARIABLES BY USING CHI-SQUARE MODEL

Table 15 Degree of association of knowledge and demographic and socio economic variables by using chi-square test

Variables	Chi-square value	Sig. Level (P value)
Sex	42.827	0.001
Age	31.211	0.001
Marital status	9.09	0.003
Place of residence	0.66	0.056
Income	38.288	0.001
media	55.288	0.001
Literacy status	47.266	0.001



N.B: chi-square is two tailed so significance level is at 0.025

place of residence have no significant correlation with the dependent variable, knowledge where as Sex, Age, marital status, income, media exposure and literacy status have positive association or correlation with the dependent variable Knowledge.

Table 16 Degree of association of attitude and demographic and socio economic variables by using chi-square test

Variables	**Chi-square value**	**Sig. Level (P value)**
Sex	13.806	0.020
Age	22.744	0.001
Marital status	8.926	0.003
Household size	2.032	0.154
Place of residence	9.239	0.002
Income	13.992	0.012
Media	33.76	0.001
Literacy status	21.637	0.001
Credit	15.368	0.001
Remittance	3.631	0.057
Off-farm activities	1.549	0.213
Livestock number in TLU	4.978	0.026

N.B: chi-square is two tailed so significance level is at 0.025

Sex, age, marital status, place of residence, Income, Media and Credit have positive correlation with the dependent variable, attitude where as the chi-square p value of household size, remittance, off-farm activities and number of livestock owning revealed that they have no significant association with the dependent variable attitude.

4.6. BINARY LOGISTIC REGRESION MODEL ANALYSIS

Making decision in the area of science about a targeted issue requires collection of data, organizing the collected data, analyzing and interpretation of the results. The descriptive statistics previously described could not lead us to the decision level of the population parameters so for an accurate decision for the population parameters from the sampled population we have to use the inferential statistics. Inferential statistics includes the methods used to find out something about a given population based on a sample population (Adem, 2005). It involves the procedures of reaching conclusions about a population based on the sample results.

Interrelationships among variables can be analyzed by multivariate analyses methods and for this study the binary logistic regression analyses method was used. Regression analysis refers to an estimating equation that is developed to describe the pattern of functional nature of the relationship that exists between variables. The dependent variable (or the response variable) is the variable to be estimated and the independent variables (or the predictor variables) are the variables that presumably exert an influence on the dependent variable or explain variation in the dependent variable.

4.6.1 PREDICTION OF ENVIRONMENTAL KNOWLEDGE

To determine knowledge and attitude of the sampled head of households, a binary logistic regression model fitting was performed. The dependent variable knowledge is encoded as those people who have knowledge are given the value 1 and those who do not have knowledge are encoded as 0. An interval variable can be changed to categorical variable if it is encoded so all predictor variables are listed as categorical variables, which are encoded on Table 17.

As an example, age is divided in to three age groups and each age group is given its own code. The age group greater than 65 is taken as the reference category. Media is divided in to two groups those who have an access to media and those who do not have and the last group (no media access group) is taken as the reference category. All groups with parameter coding value of zero are all taken as a reference category and they are given the symbol RC (Table17).

husbands. As it was observed during data collection most female were not volunteer to respond to questions they were asked. Some of them even said simply "I don't know, ask another people; I know nothing about what you are asking me". In fact this may be due to the existing cultural influence of the society on women. In most developing countries, women usually are more conservative in any occasions, meetings and even during an interview between two individuals because sometimes they think as if they are losing any social capital if they do it so. Therefore; the hypothesis regarding to environmental knowledge in sex difference is accepted.

Age is another expected variable that could make a difference in knowledge across the age groups of the society. Age difference is significant in the differential level of knowledge of the society. As Ervin (1982) said, younger and more educated peasants are more likely to perceive erosion as a problem and therefore perceives benefits from using conservation practices. In this finding, the likelihood of the society in the age group of 18-41 is 2.8 times more likely to have environmental knowledge as compared to the reference category age group of greater than 65 but when we see the age group of 42-65 there is no significant difference in their knowledge status in comparing with the age group of 65 and above (Table18). This is due to the fact that the age groups of 18-41 are relatively more literate and may have better information source. Therefore; the hypothesis on the environmental knowledge difference across age groups is accepted.

In the case of marital status of the respondents there is no significant difference between the currently married and the reference category others, Even though there is no significant difference currently married have a little more 1.34 times more likely to have environmental knowledge than the other group (never married, widowed and separated). Therefore; the hypothesis of marital status on environmental knowledge is rejected.

Place of residence is not significant in environmental knowledge difference between urban and the reference category rural residents of the society. However there is little difference between the groups; those who are urban residents are 1.4 times more likely to have better knowledge than the rural residents (Table18). Study in Costa Rica shows urban lower class feels more strongly the effects of environmental degradation than the rural groups (Holl et al., 1995). Therefore; the hypothesis regarding to place of residence is rejected.

annual income of less than 5000 birr are by 46% less likely to have environmental knowledge than those who have 5000birr and above per year. Study in Murangia district of Kenya shows, households with more income tends to grow more trees (Patel et al., 2001 in Mulat et al., 2003). Therefore; the hypothesis of environmental knowledge on income difference is accepted.

Media is also considered as one of the most determinant variable for the environmental knowledge difference of the society. In this study too, there is a significant environmental knowledge difference level among the society. The probability of the respondents who have an access to media is 2.13 times more likely to have better knowledge as compared to those who have no media access. Therefore; Hypothesis of environmental knowledge on media exposure is accepted.

4.6.2 PREDICTION OF ATTITUDE

In addition to assessing environmental knowledge status of the society, the second purpose of this study was to assess the attitude of the society towards the environmental protection and soil conservation activities. Attitude is encoded as positive attitude as 1 and not positive attitude as 0. This is to consider some people those who have neither positive nor negative or in between of the category so it is better to categorize as positive and not positive attitudinal category. In addition all the predictor variables are also encoded for a meaningful statistical analysis of the binary logistic regression (Table19). All the parameter coding have a reference category at the last of the parameter which are given the symbol RC.

Table 19 Categorical explanatory Variables Codings of attitude

		Frequency	Parameter coding	
		(1)	(2)	(1)
age	age group 18-41	197	1.000	.000
	age group 42-65	172	.000	1.000
	age group >65(RC)	81	.000	.000
Tropical livestock	TLU<=5	275	1.000	
	TLU>5(RC)	175	.000	
Marital status	currently married	309	1.000	
	Others(RC)	141	.000	
Place of residence	urban	82	1.000	
	Rura(RC)l	368	.000	
Media exposure	have	249	1.000	
	have no(RC)	201	.000	
Literacy status	Literate	236	1.000	
	Illiterate(RC)	214	.000	
Income	<5000	232	1.000	
	>=5000(RC)	218	.000	
Off farm activities	yes	146	1.000	
	No(RC)	304	.000	
Remittance	yes	81	1.000	
	No(RC)	369	.000	
Credit	yes	333	1.000	
	No(RC)	117	.000	
Sex of the head of household	male	266	1.000	
	Female(RC)	184	.000	

MAIN FINDINGS OF THE STUDY ON THE ATTITUDE OF THE SOCIETY

Gender wise, there is no significant difference to have positive or not positive attitude. This might be due to the low economic level of female respondents and hence they may need to get incentives of their work under the safety net program. Therefore; hypothesis related to sex is rejected.

Age difference has a significant difference in the attitude of the society. The probability of respondents in the age group of 18-41 years is 2.3 times more likely to have positive attitude as compared to those age group of 65 and above; but there is no significant difference in the age group of 42-65 to have positive attitude or not in comparing with those age groups of 65 and above. This may be due to the reason that those age groups of 18-41 are little better literate and

Getting credit is one of the variables considered as a determinant of attitude in the area. In the study area there is a significant difference in the attitude of the society between those who take credit and do not take credit. The probability of those people who take credit is 1.9 times more likely to have positive attitude than those do not take credit. In the study area, a person who participates in the safety-net program has a better access of getting credit; hence these people may become active participants in the soil conservation activities so as to return back their credit. Another study by Wagayehu and Drake (2003) in the Hunde-lafto area of Ethiopia indicates that getting credit did not influence plot-level conservation decision. Therefore; the hypothesis on acess to credit is accepted.

Remittance is one of the variables considered to have a factor on the attitude of the society towards the environmental protection or in particular towards soil conservation activities. This is because people who have remittance may not give much attention to the environmental protection activities. Since he/she is able to get ready made money from someone else so this may let them neglect the soil conservation issues. However, in this study, there is no significant difference between having positive attitude or not either those who get remittance or not. This may be due to the small proportion of people receiving remittance. Therefore; the hypothesis on remittance is rejected.

Similarly, Participating or not in none agricultural activities did not create any significant difference in their attitudinal level of the society in the area. This may also be due to the small proportion of non-agricultural participants in the area. A study in north pares and west usambara of Tanzania indicates that having off-farm income influences the willingness and ability to use improved soil conservation technologies and the level of soil conservation effort (Mbaga and Folmer, 2000) and Holden et al. (2003) said that off-farm income reduces farm household's incentives to invest in conservation activities. Therefore; the hypothesis on participating on non agricultural activities is rejected.

Economic status of society determines their interactions with environmental resources and protection. For example, in the Northern showa of Anthokia, due to the low level of household food security, forest was highly deforested from 50% of coverage in 1930s to less than 4% in 1994 (Degenu et al., 1999 in Paulos, 2001). As we have seen in the case of Income difference of the respondents on their knowledge there was a significant difference among the different people with

different income groups however when we assess their attitude towards soil conservation activities there is no significant difference I n the attitude of the society towards soil conservation and the environmental protection at all. Safety net is a five years program with the aim of eradicating extreme poverty of the society as well as rehabilitating the environment through different techniques and by soil conservation at large. The program is given priority to people who are economically weak hence the poor may participate in the activities with devotion so as to get of their work (similar to the concept of food for work). However even though it is not significant there is a slightly small difference and those who have an annual income of less than 5000birr are 31.1% less likely to have positive attitude in comparing with those who have 5000birr and above annual income. Therefore; hypothesis related to attitudinal difference across economic level of the society is rejected.

There is no significant difference created in attitude by livestock number. This is due to the reason that there were some people who were opposing area closure who had large number of livestock because they need the land made for area closure for grazing and spent their livestock there. Therefore; hypothesis on livestock number is rejected

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 SUMMARY

This study aimed to assess demographic and socio-economic determinants that affect knowledge and attitude of the society on the environment, environmental protection and soil conservation activities. Structured questionnaire, in-depth interview and focus group discussion were used to assess the respondents' knowledge and attitude. Descriptive statistics and binary logistic regression is applied for the analysis from 450 head of households.

The source of data for this study was both primary and secondary. The primary source of data was a cross-sectional data on 450-sampled population, from five kebeles selected through systematic sampling with their proportional samples, through household survey using structured questionnaire, in-depth interview, focus group discussion and personal observation. The secondary source of data was collected through statistical abstracts, research reports, journals, Internet sources and related literatures.

Out of the 450-sampled population 266 (59.1%) were male and the rest 184 (40.9%) were female respondents. The age group 18-41, 42-65, >=65 were 43.8%, 38.2% and 18% respectively. Currently married were 68.7% and others were 31.3%; urban residents were 18.2% and of 81.8% were rural residents; 52.4% of the sample population were literate or (able to read and write) but the rest 47.6% were illiterate; 78% were farmers and the rest 22% were non farmers; 51.6% of the respondents have an annual income of less than 5000 birr and the rest 48.4% have an annual income of 5000birr and above; 55.3% had an access to media but 44.7% of the sampled population had no access to media; 74% had taken credit usually from government organization in the preceded years of two to three years but 26% did not take credit; 32.4% participated in non agricultural activities where as the rest 67.6% did not participate; 18% of the respondents received remittance in the preceded recent years but the rest 82% had no received remittance and finally 14% of the respondents had ever taken training but majority of them which is 86%had never taken training in relation to environmental protection or soil conservation activities.

To decide whether a respondent has environmental knowledge or not key questions were designed through questionnaire and in-depth interviews. Respondents were first asked whether they have observed any environmental problems around their area or not (Table4), the causes of land degradation (see Table5), prevention of land degradation (see Table6), methods of soil conservation (see table7), causes of deforestation (see Table 8), on how to increase forest coverage in a given area (refer table9), advantages of soil conservation, problems created if no soil conservation is taken place, uses of vegetation and other related open-ended questions.

The same procedure but different questions were also designed to know the environmental attitude of the society. Some of the questions given to the respondents were; they were asked whether they agree if one cut trees from an area closure for different purposes is punished or not (Table10), why they are participating in the soil conservation activities, (refer Fig.1) whether they are volunteer to participate in the soil conservation activities in the future or not (A1), whether the respondents agree on the rule of punishment on those who are able to work but who do not participate on the soil conservation activities or not (Fig2), whether they participate voluntarily in the soil conservation activities if there was no punishment or not (A2) , whether they support area closure or not (A3) and they support keeping livestock in a specific area to minimize overgrazing or not (A4) and other related open-ended questions.

Therefore based on the above questions of knowledge determinants and their respective answers criteria is already put previously in order to say a respondent has knowledge or not. Accordingly, 76.3%, 46.2%, 78.2%, 54.7%, 49.4%, 68.6%, 53.9%, of male, female, age group of 18-41, 42-65 and above 65, currently married, others have respectively knowledge where as 23.7%, 53.8%, 21.8%, 45.3%, 50.6%, 31.4%, 46.1%, 29.1%, 39.4%of them respectively have no knowledge. When we also see the relationship of socio –economic variables with the knowledge of the society; 73.2% and 78.8% of urban residents, literate have knowledge but the rest 26.8% and 21.2% of them respectively have no knowledge. For more information we can see tables 13 and 14.

When we see the second dependent variable, attitude, of the respondents 61.3%, 56.5%, 39%, 64.4%, and 59.5% of male, female, urban residents, literate, and had ever taken credit in the last two to three years respectively have positive attitude where as the rest 38.7%, 43.5%, 69%, 35.6%, 3.2%, and 40.5% of them respectively do not have positive attitude. For more information we can refer tables 13 and 14.

However the above statistical data we used does not lead us to the level of inference about the knowledge and attitudinal level of the society based on the sampled population and we cannot reach at the conclusion part whether the observed knowledge and attitude difference across the demographic and socio economic variables is significant or not. Therefore we have to use another model that could enable us to reach at the conclusion level about the population from the sampled population with a confidence interval of 95% and in this study we have used the binary logistic regression model.

In the case of the dependent variable knowledge, at first it was encoded as 1 who has knowledge and zero otherwise. Similarly all the predictor variables were also coded with their parameters and a reference category was given to each parameter (refer Table 17) then sex, age, literacy status, income, and media has a significant difference in the knowledge of the society on the environmental protection and soil conservation activities where as age group of 40-65, marital status, household size and place of residence of the society have no significant difference in their knowledge with the reference parameter defined there (see more detail on Table 18).

When we see the dependent variable attitude, it was also encoded at first as 1 who have positive attitude and zero otherwise. The categorical variables used as predictors were also coded as for each parameters with a given reference parameter for each (refer yable19). Accordingly, age, marital status, place of residence, media exposure, literacy status and credit has a significant difference in having positive attitude where as sex, age group of 40-65, remittance, participation in non agricultural activities, income difference and number of live stock in TLU have no significant difference to have positive attitude or not positive attitude (Table 20).

5.2 CONCLUSION

Land degradation not only affects the quantity and quality of services produced by the ecosystems; but it also challenges their resilience. A continuous process of land degradation may not properly support life; as a result it may lead to a complete population transfer or mass migration permanently from their original area.

In the present study, about 75% of the sampled population participates in the soil and water conservation measures for the purpose of protecting the environment and getting payment, about 12% said to prevent the environment and the rest 13% for payment. About 67.8% of the respondents supported area closure where as the rest 32.2% did not support it. About 58% of the respondents did not need keeping their livestock in a specific area but the rest 42% were willing to keep their livestock from the area closure. And finally they were asked whether they observed environmental rehabilitation or not then 89% of the people have observed environmental rehabilitation, 6% said that there is no environmental rehabilitation and the rest 5% did not know the current environmental situations.

Using binary logistic regression model there is a significant difference in the knowledge status of the society about the environment and soil conservation activities between male and female, literate and illiterate, those who have better income and those do not have, and between those who have media exposure and those do not have. On the other hand there is no significant difference in their knowledge of the respondents between the age group 42-65 and the reference category above age 65, between the currently married and the other group, and place of residence. The respondent's attitude towards soil conservation and environmental protection has also a significant difference among the age groups, between currently married and the others, place of residence, media exposure, literacy status and between those who take credit in the preceded two to three years or not. On the other hand sex, age group of 42-65, remittance, off-farm activities, income difference and number of livestock has no significant effect in the difference of attitude of the society.

Majority of the society have observed the environmental problems mainly of severe land degradation and deforestation. They have almost good perception on the causes and prevention of environmental degradation; particularly land degradation and its impact upon their lives and the

methods how to prevent it. Majority of them well knows the advantage of conserving their area and hence are much devoted and interested towards environmental protection, especially towards soil conservation activities significantly. The over all integration of government, non-governmental organizations, donors and the societies is contributing to the rehabilitation of severely degraded area. Of course, gender equality is still low in the area. Male have superiority in several ways and this difference has created unequal knowledge status between male and female.

The main idea that could be considered in to mind is that all activities of environmental protection is, more or less due to the enforcement, effort and commitment of the regional government. Its sustainability and continuity of the current awareness still depends up on the government. Because, the society is still below poverty level and gives priority of searching a days food for existence instead of thinking to the future. In general, the major factor that determines knowledge of the society on environment and their attitude towards the environmental protection is more or less driven of the socio economic factors, in particular, the low economic level of the society. For marginal society, the idea of preventing future loss of soil may be irrelevant to present needs. Their low economic level is enforcing them to burn cattle dung for energy, rather than using it as fertilizer; some of them are against area closure because they don't have capacity to feed their livestock at home; some of them still cut trees from the area closure for energy, for charcoal to sell it in the urban areas or for other commercialization; and they are further marginalized to poor quality of new areas for agricultural expansion in the limited land which farther aggravates deforestation.

5.3 RECOMENDATION

Tigray has been experiencing severe land degradation for many years with little or no environmental protection and soil conservation efforts. Land productivity has been deteriorating from time to time and some people have changed their original places and moved to other areas. But after the fall of the derg regime in 1991, a wide range of area closure, soil conservation activities, and environmental protection have been exercised and a significant amount of environmental rehabilitation efforts is being seen in the region. In order to sustain the process, long lasting and well-established institution and political commitment is required. Ensuring the economy level, improving educational level, empowering women in different aspects, giving training and educating people about the environment, creating opportunities to have an alternative energy source, are some of the main and major issues that could be considered.

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ANNEXES

ANNEXES 1.

Code No_____

STRUCTURED QUESTIONAIRE

AREA IDENTIFICATIUON

Name of the kebele----------

Name of the locality----------

Completed questionnaire----------

Partially completed questionnaire--------- and reason----------

Rejected questionnaire---------- and reason ----------

Name of the enumerator (interviewer) ----------

Date----------signs----------

Name of the supervisor----------

Date----------signs----------

SECTION I BACK GROUND INFORMATION OF THE HOUSE HOLDS & HEAD OF THE HOUSEHOLDS.

No	List of the house hold members (Name optional)	Relation to HHH	101 age	102 sex	103 Marital status	104 education	105 Occupation		106 religion
							A year before	A year after	
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									

HHH=head of the house hold

Relation to HHH: head=0, spouse=1, son=2, daughter=3, others=4

Marital status: never married=1, currently married=2, divorced=3, separated=4

Widowed=5

Educational status: illiterate=1, read and write only=2, primary (1-8) =3,

Secondary (9-12) =4, tertiary (above 12 grade) =5

Religion: 1=orthodox 2= protestant 3=Muslim 4=catholic

5=others (please specify) ----------

Monthly income=total amount of birr earned assumed in any activities

107. Roof type of the house.

1=corrugated iron sheet 3= grass

2=muddy 4=others (please specify) ----------

108. Do you have and listen to radio? 1=yes, 2= no.

109. Do you have and watch television (for those who have an access of electricity only)?

1= yes, 2= no.

110. Do you read news papers, magazines and other written documents?

1= yes, 2= no.

111. Do you have any live stock? 1= yes, 2= no.

112. If 110 is yes, how many of the following live stock types do you have?

Live stock type	Cattle		sheep	horse	mule	goat	donkey	chicken	camel	Bee hives	Others	Total
	ox	others										
In number												
In TLU												

113. Do you have land for agriculture or grazing or forest (or for planting tree)?

1= yes, 2= no

114. If 112 is yes, how much of land do you have in hectare? --------

115. How did you obtain the land?

1= by land distribution 3=shared with relatives

2= by parent inheritance 4= by rent 5= others (please specify).....

116. What type of cropes, fruits and vegetables you produced during the last 12 months?

		Amount of harvest in quintal	Amount of harvest in cash(birr)
Cereals	…… …… …….. …… …….. ……		
Pulses	…… …… …… …….. …… …….. ……..		
Oil seeds	…… …….. …… …….. ……..		
coffee			
Fruits	…… …… …… ……		
vegetables	…….. …….. …… ……... ……		
Others Total			

117. Do you have any expectation of having more land to the future?

1= yes, 2= no

118. If 115 is yes, how could you get it?

1= to have more children 2= another land distribution

3= others (please specify) ----------

119. Do you have any hesitation that your land might be given to other else person?

1= yes, 2= no

4=lack of labor support from family members

5=unable to purchase technological inputs

6=others (please specify) ----------

312. In the last 12 months have you been trying to improve the fertility status of your land?

1=yes 2=no (why) ----------

313. If 312 is yes, which conservation practices do you use in order to maintain and Replenish the soil fertility of your cultivated land?

Fallowing(field rotation)	1-yes	2=no
Crop rotation		
Manu ring		
Chemical fertilizer		
Intercropping		
others		

314. If the answer for question No 305 and 308 is yes, is there any influence that enforces you to

Participate in the soil conservation activities

A) On your land? 1=yes 2=no

B) On others land? 1=yes 2=no

C) On communal land? 1=yes 2=no

315. If 314 is yes in all A or B or C, who?

1=the communities' cultural norm (discrimination) 2= Government officials

3= others (please specify) ----------

316. If 314 is no in all A or B or C, why are you conserving the soil?

1=to get payment (in cash or crop) by the program called food for work or safety-net.

2=to prevent the environment from degradation.

3= to get payment as well as to prevent the environment from degradation.

4=others (please specify) ----------

5=I don't know.

ANNEX 5

CHECKING MULTICOLLINEARITY EFFECT

Variables	VIP
Sex	1.001
Age	1.000
Marital status	1.120
Household size	1.011
Place of residence	1.212
Income	1.230
Media	1.031
Literacy status	10045
Credit	1.051
Remittance	1.245
Off-farm activities	1.351
Livestock number in TLU	1.118

N.B: When one independent variable is a linear function of another independent variable, the problems of multicillinearity will occur in logistic regression. Or multicollinearity effect is simply the effect of double counting effect.

N.B: Higher exp(B) indicates multicollinearity effect, usually if exp(B) has value of greater than ten.

Declaration

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

Student	Signature	Date

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

Advisor	Signature	Date