



ADDIS ABABA UNIVERSITY
SCHOOL OF GRADUATE STUDIES
COLLEGE OF EDUCATION

KNOWLEDGE, ATTITUDE AND PRACTICES OF PREPARATORY STUDENTS
ABOUT LAND DEGRADATION: THE CASE OF EASTERN WOLLEGA
ZONE OF OROMIA REGIONAL STATE

BY:
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APRIL, 2010

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**KNOWLEDGE, ATTITUDE AND PRACTICES OF PREPARATORY
STUDENTS ABOUT LAND DEGRADATION**

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Acronyms

CSA - Central Statistical Authority

EPA -Environmental Protection Authority

EWZARDO -East Wollega Zone Agriculture and Rural Development Office

EWZIPRO - East Wollega Zone Information and Public Relation Office

FAO - Food and Agricultural Organization

FDRE - Federal Democratic Republic of Ethiopia

GDP - Gross Domestic Product

KAP - Knowledge, Attitude and Practices

MoARD - Ministry of Agriculture and Rural Development

MoE - Ministry of Education

SNNP - Southern Nations, Nationalities and Peoples

SWC - Soil and Water Conservation

UNEP - United Nations Environmental Program

UN - United Nations

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Abstract

The goal of environmental education is producing responsible citizens by equipping them with adequate environmental knowledge, attitude and skills. With the intention that as future scientists, land managers and policymakers, the students will be able to provide knowledge based solutions to the environmental problems, this study aimed at investigating their knowledge, attitude and practices about land degradation.

The research design was a descriptive type of study utilizing survey method. The subjects of the study were 330 students from three preparatory schools who were selected by using proportionate stratified random sampling methods. For data collection environmental knowledge test, attitude scale and rating scales on frequencies of students' participation in environmental practices were used.

Data analysis was made by using frequencies, percentage, mean, standard deviation, T-test and correlation coefficient. For variables of the study, comparisons were made in terms of gender, place of residence and academic streams.

The findings of the study illustrated that students' environmental knowledge and attitude is fair but generally poor in environmental practices. Environmental practices were not inline with their level of knowledge and attitude. Concerning academic stream there is no significant difference in their environmental knowledge and attitude. In accordance with other researches, males and rural students were more knowledgeable about land degradation. The relationship among students' environmental knowledge, attitude and practices were found to be weak. Finally ways of improving students environmental practices such as maintaining the proportionality of the objectives of environmental knowledge, attitude and practices, organizing fieldtrips and giving due attention for practical parts were recommended.

CHAPTER ONE

1. Introduction

1.1 Background of the Study

People have been deteriorating the environment (particularly land) through unsustainable interference with the immediate environment to fulfill their short-term benefit without considering its long-term impact on it. This is contrary to the concept of sustainable development which ensures the rights of future generation to use the same resource. Without taking urgent measures, we can no longer continue exploiting or degrading the land at a present rate. To reverse the situation, it is important, among others, to improve students' environmental knowledge and attitude towards the environment and their participation to minimize the problem of environmental degradation. In order to achieve the goal of sustainable development, environmental education shall constitute an integral part of the development process and cannot be considered in isolation from it.

UNEP, 1992 (cited in MoARD, 2007:2) defines land degradation as a reduction of a resource potential by one or a combination of processes including both water and wind erosions and a long-term reduction in the amount or diversity of natural vegetation. Thus, land degradation can be defined as the process that lowers the quality of land to be productive mainly because of human activities that come from lack of appropriate environmental knowledge, attitude and practices. It is caused by a combination of natural and human processes. The human processes that cause land degradation are a result of inappropriate land use practices namely over cultivation, overgrazing and deforestation (Gaim, 1996: 34). Land degradation, a decline in land quality caused by human activities, has been a major global issue during the 20th century and will remain high on the international agenda in the 21st century (Eswaran et al., 2001).

Most of land degradation is the result of human activities. In Ethiopia land is a source of income and means of production on which the livelihood of 85 percent of the population depends. Due to this the development and welfare of the population is directly linked with the exploitation of land. The irony is that the natural resource base is central to the livelihood of a high proportion of Ethiopia's population and distinctively critical to the national economy. Eighty five percent of Ethiopian populations depend on land for survival. Agriculture accounts for 50 percent of GDP and 85 percent of foreign exchange earnings (MoARD, 2007:1).

Because of these complex and interrelated problems, land degradation in Ethiopia is increasing at a rapid rate. The pressure of population on land pushes landless peasants into forest to cultivate marginal lands that are not suitable for agriculture and this in turn accelerates the rate of deforestation and soil erosion. This is true almost in all parts of the country.

Like the other parts of the country, in the study area land degradation is increasing at a faster rate by over cultivation, overgrazing, deforestation and soil erosion. Currently, deforestation is a serious problem in the study area caused by clearing lands for expansion of agricultural land exacerbated by resettlement program. Because of this, the population of the study area is increasing at a faster rate causing an increasing demand for arable land, firewood and grazing land.

Despite this fact, systematic research is not conducted in the study area concerning the problem in question. Since students are future land managers and decision makers, they can play an important role in providing solutions for land degradation by improving the knowledge, attitude and practices of their community. The researcher has therefore aimed at investigating students' present knowledge, attitude and practices related to land degradation in Eastern Wollega Zone of Oromia Regional State.

1.2 Statement of the Problem

Education in general and environmental education in particular should be geared towards a better understanding of the interaction between humans and their immediate environment.

Education can play a key role in situations where some rural people in developing countries destroy the natural resources with the intention of freeing themselves from starvations and poverty (Elias, 2004).

If appropriate knowledge, attitude and environmentally sound practices are instilled in learners, they can provide knowledge-based solutions for the prevailing environmental degradation in general and land degradation in particular. Sustainability also requires a population that is aware of the goals of a sustainable society and has knowledge and skills about it to contribute to those goals (Aklilu, 2006). Land degradation is one of the major environmental problems in Ethiopia.

However, in Ethiopia the environmental crisis is deepening. This crisis is considered to be a result of degradation of land, water and air of which land degradation is the major one (Teferi, 1999:375).

The researcher feels that this is the result of lack of knowledge, attitude and practices about land degradation or else lack of practical application on land degradation though they may have the knowledge and good attitudes towards land degradation. Population pressure coupled with large number of livestock put great pressure on arable land. This pressure leads to the clearance of forests for the expansion of arable land and for biomass fuel consumption. Because of this, the fertile topsoil is exposed to erosion and has become severely degraded particularly in the highlands. The decline in production due to land degradation is aggravating the problem of food security which in turn forces poor people to overexploit the land more.

Accelerated population growth without change in the traditional land use practices, coupled with the recurrent drought in many parts of the highlands have led to serious land degradation, low productivity and the accompanying human misery (Daniel, 1988:61).

The Ethiopian Highland Reclamation Study (EHRS) estimated that in the mid 1980's 27 million hectares (almost 50 percent of the highland area) were significantly eroded; 14 million hectares of farmland were beyond reclamation. Erosion rates were estimated at 130

tons per hectare each year for cropland and 35 tons per hectare per year for all land in the highlands. If rates of erosion remained unchanged, the study projected that by 2010 about 100,000 square kilometers (about 18 percent of the highland area) would be bare rock (MoARD, 2007). In many areas of the country, land is being over cultivated, fallow period become shortened or completely abandoned and crop residue and animal dung being used for fuel all contributing to land degradation.

To reverse the situation, early intervention is crucial. To this end, many efforts were made to combat the challenges of environmental problem. The first step is the integration of environmental education into different subjects mainly geography and biology. One of the general objectives of the educational policy is to bring up citizens who can take care of and utilize resources wisely, who are trained in various skills, by raising the private and social benefits of education (MoE, 1994). The second is the establishment of the Ethiopian Environmental Protection Authority (EEPA) with one of its objective being to address challenges of environmental problems through education and awareness (EPA, 1997). The other effort is incorporation of environmental objectives in the constitution of the country. Article, 92/4 states that government and citizens shall have the duty to protect the environment (FDRE, 1995). Despite all these efforts, in Ethiopia land degradation is increasing from time to time. This clearly shows that there is a gap between the environmental education objectives and its implementation.

On the other hand, the goal and objectives of many country's environmental education programs have included developing students' knowledge, skills, positive attitudes and creating motivation to take action to prevent environmental problems. Awareness, knowledge and attitude have been identified as the three most important objectives in environmental education (Palmer, 1998). As future scientists, land managers, leaders, policymakers and voters today's students will be responsible for environmental problems arising from present day actions. Therefore, students' environmental knowledge, attitude and actions are particularly important and it appears that to assess their knowledge, attitude and practices are crucial to take corrective measures.

Even though the degree of land degradation is severe in the northern part, no region of the country is free from the threat of land degradation. Thus, the main purpose of this study is to assess students' knowledge, attitude and practices about land degradation in East Wollega Zone of Oromia Regional State.

1.3 Objectives of the Study

The main objective of the study is to assess knowledge, attitude and practices of preparatory students about land degradation in Eastern Wollega Zone of Oromia Regional State. The more specific objectives of the study are the following:

- To investigate the knowledge of students about land degradation.
- To assess the attitude of students towards land degradation.
- To examine the practical contribution of students to reduce land degradation.
- To investigate the relationship between students' environmental knowledge, attitude and practices.
- To examine the differences between groups of students in terms of gender, academic stream and place of residence regarding environmental knowledge, attitude and practices.

1.4 Basic Research Questions

The study sought to provide answers to the following leading research questions.

- ❖ What is the level of knowledge of students about land degradation?
- ❖ What is the attitude of students' towards land degradation?
- ❖ How often do students involved in efforts to reduce land degradation?
- ❖ Is there any relationship among students' environmental knowledge, attitude and practices?

- ❖ Is there any difference among students in terms of gender, academic stream and place of residence regarding environmental knowledge, attitude and practices?

1.5 Significance of the Study

Since this research sets out to investigate students' knowledge, attitude and practices about land degradation, the findings of the study would have the following significance.

- It creates awareness on the level of students' knowledge, attitude and practices about land degradation and could thus be used to take remedial actions based on the findings.
- It generates useful information for environmental education planners and environmental protection organizations working to combat land degradation and related environmental problems.
- It could also be used as a baseline for those researchers who want to conduct further research on the problem.

1.6 Research Design and Methodology

The research design was a descriptive type of study utilizing survey method. The survey method gathers data from a relatively large number of cases at a particular time (Best, 2003:117). Descriptive research deals with the relationships between variables, the development of generalizations and surveys are also used in descriptive research studies (Best, 2003:115-116).

1.6.1 Data Sources

In this study both secondary and primary data sources were used. Primary data was gathered from target students. Secondary sources were reviewed from policy documents, related researches, relevant books, journals, content analysis and online sources.

1.6.2 Instruments for Data Collection

Three types of instruments were used for data gathering. These were environmental knowledge test, attitude scale and environmental practices, which measure the frequency of students' practical engagement in their local environment. These instruments were prepared by focusing on the problem of land degradation, its causes, consequences, cures and other environmental problems relevant in Ethiopian context on the bases of review of literature and environmental content analysis. First the instrument was prepared in English. Then it was translated to Oromo language. The translation was done by two graduate students of Oromo language and by one Oromo language instructor. Then the instruments were distributed to experts of natural resource conservation and their comments were included.

1.6.2.1 Environmental Knowledge Assessment

To assess students' basic environmental knowledge concerning land degradation and related environmental problems twenty-five questions were developed (see Appendix A). The first part of the questions consists of five true/false statements, while the remaining consisted of twenty multiple-choice questions. A score of 4 was given for a right answer and zero for a wrong answer. Thus, it was evaluated out of 100 with lowest possible total score of zero and the highest possible score of 100 (4x25). A high score shows high environmental knowledge while the low score reveals the opposite. Scores 80 and above show high environmental knowledge, 50-79 average and scores below 50 show low environmental knowledge. Students with scores of 80% and above were considered as having adequate knowledge in environmental issues (Melaku, 1994 and Asmare, 2007).

1.6.2.2 Environmental Attitude Inventory

This part consists of 20 statements, with a response format of a five points Likert scale ranging from strongly agree to strongly disagree (see Appendix B). The statements focus on the causes, consequences, cures of land degradation and other environmental issues.

The responses were scored using a Likert scale assigned as 5 (strongly agree), 4 (agree), 3 (undecided), 2 (disagree), 1 (strongly disagree). In scoring unfavorable statements, the

weights were reversed. The statements were coded according to their numbers in the questionnaire. Ten of the items were worded in such a way that students would agree with or in such a way that they reflect a definite favorableness or positive attitude (1, 3, 5, 7,9,11,13,15,17 and 19). The other 10 statements were worded to reflect a definite disagreements or negative attitude or in such a way that students would disagree with (2, 4, 6, 8, 10, 12, 14, 16, 18, and 20). The highest possible score was 100 (20x5) and the lowest possible score was 20. Scores of above 60 show favorableness (positive attitude), equal to 60 is neutral and below 60 show unfavorableness (negative attitude) towards land degradation and other environmental issues. Some authorities stated that using the score allotted to 'undecided' as a dividing line, the attitude one has can be categorized as favorable or unfavorable (Best and Kahn, 1989, in Dessalegn, 1998). In this case $3 \times 20 = 60$ was used as a dividing line.

1.6.2.3 Environmental Practice Inventory

To investigate how much the students' practically involve in efforts to reduce land degradation and other environmental problems 15 statements that reflect practical activities were developed (see Appendix C). The statements were coded according to their numbers in the questionnaire. The responses were scored using a four point scale ranging from never to always assigned as 0=never, 1= rarely, 2= sometimes, 3= often and 4=always. Thus, the highest possible score is 60 (15x4) while the lowest possible score is zero. The highest score (always and often) shows that the respondents are actively engagement in related activities while the lowest score shows the reverse. The responses always and usually were considered as positive or acceptable and seldom and never were considered as negative or unacceptable (Asmare, 2007).

1.6.3 Sample Size and Sampling Procedure

East Wollega Zone of Oromia regional state has seven government preparatory schools. The research was conducted in three preparatory schools (42.85%) - Arjo, Nekemte, and Sire. Purposive sampling method was employed to select these sample schools because of different environmental realities (Nekemte from urban, Arjo and Sire from rural environments). These schools have 420, 1376 and 404 students respectively and the total

population of the study were thus 2200. To determine sample size, sample size calculator was used from (<http://www.raosoft.com/samplesize.html>) with margin of error 5%, confidence level 95%, population size 2200 and response distribution 50%. The result shows that the

recommended sample size is 328. Then the researcher took 330 (15%) of the students to avoid fraction by using proportionate stratified random sampling method.

Table1.1 Distribution of participants by gender

Schools	Total population			Sample		
	Male	Female	Total	Male	Female	Total
Arjo	327	93	420	49	14	63
Nekemte	656	720	1376	98	108	206
Sire	280	124	404	42	19	61
Total	1263	937	2200	189	141	330

Table1.2 Distribution of respondents by academic stream

Schools	Total population			Sample		
	Natural	Social	Total	Natural	Social	Total
Arjo	288	132	420	43	20	63
Nekemte	745	631	1376	112	94	206
Sire	287	117	404	43	18	61
Total	1320	880	2200	198	132	330

Table1.3 Distribution of respondents by place of residence

Schools	Total population			Sample		
	Rural	Urban	Total	Rural	Urban	Total
Arjo	240	180	420	36	27	63
Nekemte	736	640	1376	110	96	206
Sire	244	160	404	37	24	61

Total	1220	980	2200	183	147	330
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1.6.4 Methods of Data Analysis

The data gathered from the questionnaires were tabulated, analyzed and interpreted. In order to analyze the data, appropriate statistical tools like percentage, standard deviation, mean, T-test and Pearson's correlation coefficient were used. Mean and standard deviation were used to investigate students' average scores with respect to the variables under investigation; T-test was used for comparison and analyzing significance of difference between the mean scores of the respondents and correlation coefficient to examine the relationship among students' environmental knowledge, attitude and practices.

In this study, alpha value of 0.05 was used to show statistical significance with degree of freedom N_1+N_2-2 (where, N_1 =number of sample one and N_2 is number sample two).

1.6.5 Variables

Variables are the conditions or characteristics that the researcher manipulates, or observes. The independent variables are the conditions or characteristics that the researcher manipulates or controls in his or her attempt to ascertain their relationship to observed phenomena. The dependent variables are the conditions or characteristics that appear, disappear or change as the experimenter introduces, removes or changes independent variables (Best, 2003:162-163).

In this study, the independent variables were gender, academic stream (natural/social science), place of residence (rural/urban), while the dependent variables were environmental knowledge, attitude and practices.

1.6.6 Validity of the Test

Validity is the ability of an instrument to measure what it is designed to measure (Kumar, 1999). Three experts in the field of natural resource conservation and land management and two geography and environmental education instructors confirmed the validity of the instruments through review. Revisions and necessary corrections were made based on their valuable comments and suggestions.

1.7 Definition of key Terms

Land degradation – is the process that lowers the quality of land to be productive.

Environmental knowledge – is the understanding and awareness of environmental issues acquired from observation, social interaction and schools.

Environmental attitude – is reflecting favorable or unfavorable views about the environment.

Environmental practice – refers to engagement or involvement in environmental protection activities to reduce the problem.

Urban - refers to woreda or zone town where the economic activity is dominated by non agricultural activities

Rural - refers to rural kebeles where the economic activities are dominated by agriculture.

1.8 Organization of the Study

The study was organized into five chapters. The first chapter includes background of the study and research methodology. The second chapter presents review of related literature. Chapter three highlights background and description of the study area. Chapter four deals with presentation and analysis of findings and the final chapter presents summary, conclusion and recommendation.

CHAPTER TWO

2. Review of Related Literature and Conceptual Framework

2.1 Conceptual and Theoretical Framework

2.1.1 Land Degradation

Land degradation has been defined in several ways. Some of the definitions are very general and include all types of processes leading to a negative change in productivity of land under all types of uses. It is sometimes taken as synonymous with soil degradation. Strictly speaking, land degradation is more than degradation of the soil and soil degradation is just an aspect of land degradation; in agrarian countries such as Ethiopia (Woldamlak, 2003).

Land degradation is a broad, composite, and value-laden term that is complex to define but generally refers to the loss or decline of biological and/or economic production. It is a concept in which the value of biophysical environment is affected by one or more combination of human-induced processes acting upon land. Soil degradation is a narrower term and a component of land degradation. It refers to a process that lowers the soils current and/or potential capacity to produce goods and services. Soil erosion is the wearing away of land surface by the action of water or wind. Six specific processes are recognized as the main contributors to soil degradation: water erosion, wind erosion, water logging, excess salts, chemical degradation, biological degradation and physical degradation (MoARD, 2007:2). Land degradation refers to the process of soil degradation through water erosion and loss of vegetative cover leading to reduced productivity of the land in the densely settled or exploitatively used regions of Ethiopia (Daniel, 1988:59).

Most cost estimates of land degradation do not distinguish between soil erosion, soil degradation and land degradation and many studies have misused soil degradation and soil erosion to be synonymous with land degradation. Because these studies neglect the impact from lost vegetation, chemical and/or biological soil degradation and other processes (where they exist), their results only partially estimate the cost-and hence greatly obscure the true cost of land degradation. Understanding the contribution of each component of degradation to the total cost of land degradation is vital, not only for appreciating the type and degree of the problem but also for appropriate policy interventions (MoARD, 2007).

Another conceptual issue is related to aggregating or scaling up the cost of land degradation. On-site costs of land degradation are always estimated at a small scale, such as the plot, farm, or village and then scaled up to the farming system, regional or national level (MoARD, 2007).

In the land degradation-conservation discourse, three major perspectives have recently emerged: classic, populist and neo-liberal (Biot et al, 1995 cited in Woldeamlak, 2003). According to the classic approach, the problem of land degradation can be overcome by technocratic solutions, thus tending to ignore the socio-economic side of the problem. On the other extreme, the populist approach puts emphasis on the role of local knowledge and land management practices and underscores the importance of stakeholders' participation in conservation activities. In this perspective, the link between poverty and land degradation is critical; policy formulation and action towards conservation should base itself on local peoples' knowledge and land use practices. Taking the middle ground position, the neo-liberal approach draws from both the classic and the populist approaches. It acknowledges the classic approach in its view that technology is available to control land degradation that can be adopted or adapted wherever and whenever required. Acknowledging the populist view, the neo-liberal approach puts emphasis on empowerment of people for their adoption or adaption of the technologies at the farm level. On other ways, the argument on major causes of land degradation incorporated in this neo-liberal view is centered on institutional failures and lack of adequate incentives for the adoption/adaption of conservation technologies among land users.

2.1.2 Population

The population resource relation has always been controversial and it still remains so (Aklilu, 2006). A significant number of studies from Africa have also presented the optimistic view that population increase leads to intensification of production, tree planting and conservation activities. Furthermore an empirical review of the relations between population and productivity in developing countries have indicated that population growth can lead to land degradation or land enhancement or aspects of both (Yohannes, 1999).

There are four theoretical propositions in connection to population, agriculture and environment nexus. Broadly interpreted, the four theories view the relations optimistically

or pessimistically, or take a neutral position and ground much of the argument within the roles played by population pressure or economic development (Kates, 1993 cited in Muluneh, 2003:4).

1. Neo-Malthusians have negative expectations and consider that population has potential to out strip food production. Accordingly, Neo-Malthusians assert that rapid population growth has the potential to exceed the growth of agricultural production.
2. On the contrary, Boserupians have positive expectations in connection with population growth in societies of subsistence economy. They regard population growth as a stimulus to agricultural intensification.
3. A third more neutral view is that population growth is neither strongly positive nor negative.
4. Finally, the revisionist or technological position asserts that, technological progress counters the effects of diminishing returns and leads to income growth through discovery of new resources and improvements of resources (Muluneh, 2003:6).

Though there are controversial arguments regarding population growth and environmental degradation many studies support the idea that fast population growth causes environmental degradation. Increasing rate of population growth and the subsequent search for more land for cultivation or grazing are believed by many to be root causes of the ever worsening rate of deforestation in Africa (Aklilu, 2001: 31).

2.1.3 The Role of Environmental Education in Developing Students Environmental Knowledge, Attitude and Practices

The goal of environmental education is to develop a world population that is aware of and concerned about the environment and its associated problems, and which has the knowledge, skills, attitudes, motivations and commitment to work individually and collectively toward solutions of current problems and the prevention of new ones (UNESCO-UNEP, 2000:3).

The objectives of environmental education are:

- Awareness: To help individuals and social groups acquire an awareness and sensitivity to the total environment and its associated problems.
- Knowledge: To help individuals and social groups acquire basic understanding of the total environment, its associated problems and humanity's critically responsible presence and role in it.
- Attitude: To help individuals and social groups acquire social values, strong feelings of concern for the environment and motivation for actively participating in its protection and improvement.
- Skills: To help individuals and social groups acquire the skills for solving environmental problems.
- Participation: To provide social groups and individuals with an opportunity to be actively involved at all levels in working towards resolution of problems.

Environmental education is a process of developing a world population that is aware of and concerned about the total environment and its associated problems, and which has knowledge, skills, attitudes, motivations and commitment to work individually and collectively toward solutions of current problems and prevention of new one (Lavega, 2004).

Environmental education is seen as the only way of developing an awareness of the environment and a sense of responsibility for its protection, and hence it is the most effective vehicle for persuading the human race to adopt a rational attitude towards the natural environment and to avoid the deterioration of human life as a result of unwise exploitation and misuse of nature (Otiende et al., 1997).

According to Lucko et al. (1982 cited in Aklilu, 2006), environmental education is a process aimed at producing a citizenry that is:

- Knowledgeable about the biophysical and the socio-cultural environments of which man is a part.

- Aware of environmental problems and management alternatives of use in solving those problems and
- Motivated to act responsibly in developing diverse environments that are optimal for living a quality life.

Environmental education can, therefore, be said to have concern with understanding the skills and attitudes necessary for enhancing environmental conservation and must be seen as not merely a strategy for creating awareness of the environment, but also as a means towards developing positive concern for maintaining the quality of our life on earth (Otiende et al., 1997).

Palmer (1998) presented an integrated model of environmental education that reflects the relationship between:

- Education about the environment
- Education for the environment and
- Education in/from the environment

At the center of this model are the learning processes and curriculum elements driven by knowledge and understanding, concepts, skills and attitudes. According to Palmer, this model requires appropriate tasks that provide students with experiences in problem solving, decision making and participation in decisions concerning the environment with considerations based on ecological, political, economic, social, aesthetic and ethical aspects.

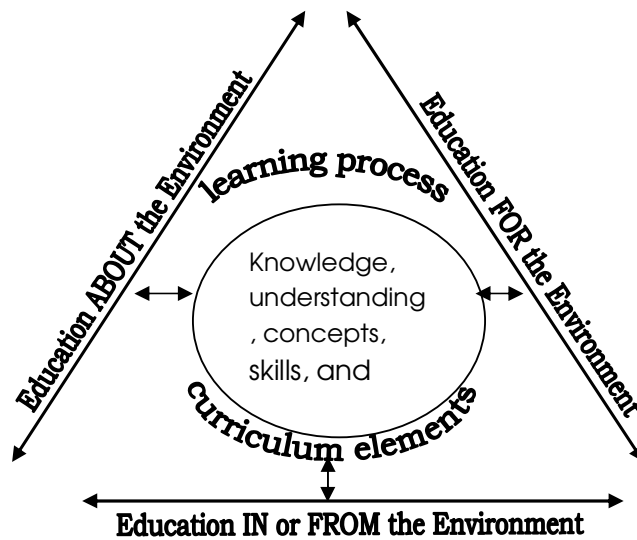


Figure 2.1 Interrelated components of environmental education (Palmer, 1998: 144).

In addition, Packer et al. (1996) stated that neither knowledge based nor a values-education approach in isolation is adequate to fulfill the aims of environmental education. Rather, environmental educators need to consider the adoption of a more holistic approach to teaching/learning that recognizes the interrelatedness of environmental knowledge, attitude/values, and behaviors and seeks to promote informed, environmentally positive behavior through the development of appropriate environmental conceptions.

A person's conception of an ecosystem would include the integration of knowledge (ecological balance, food chains, feedback loops, energy flow) with attitudes (people should live in such a way that their actions have as little impact upon ecosystem as possible) and behavior (developers must adopt an integrated environmental management approach in the planning process). The relationship between conception and knowledge, attitude /values, and behavioral orientations is a two-way, or mutually dependent, relationship.

A focus on environmental conceptions would not only enable the integrated development of environmental knowledge, attitudes/values, and behavior but also provide a way of addressing students' commitment to environmentally responsible behavior.

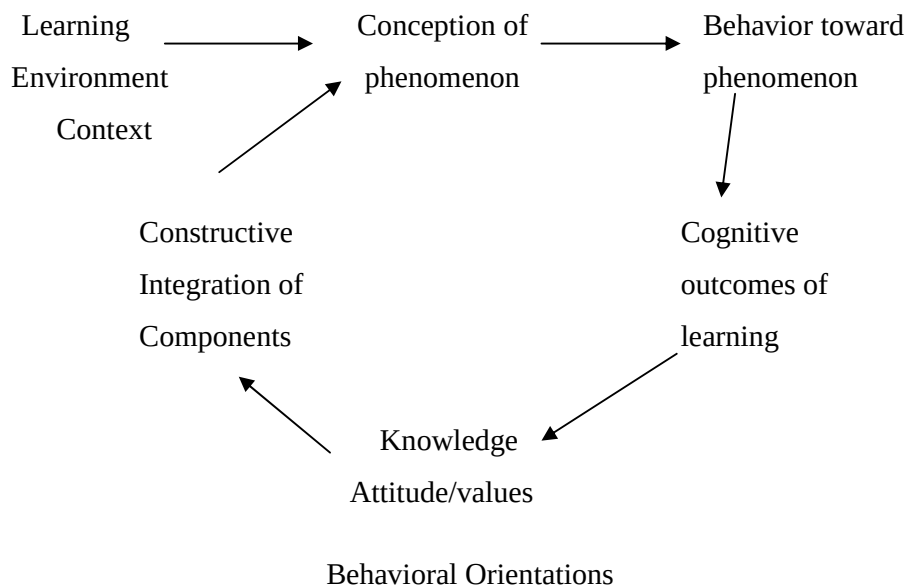


Figure 2.2 Environmental conceptions as the integrative link between the learning environment and its cognitive and behavioral outcomes (Packer et al., 1996: 28)

2.1.4 Environmental Knowledge

Traditionally, it was believed that we could change behavior by making people more knowledgeable about the environment and its associated issues. The underlying assumption is that the more we know, the more aware we are, and that we then become motivated to act toward the environment in more responsible ways (Evans, 1998). This shows us environmental knowledge is positively correlated with appropriate environmental attitude and practice/behavior.

As a basis for making informed judgments about the environment, pupils should develop knowledge and understanding of:

- The natural process which take place in the environment.
- The impact of human activities on the environment.
- Different environments, both past and present.
- Environmental issues such as the greenhouse effect, acid rain and air pollution.

- Local, national and international legislative controls to protect and manage the environment; how policies and decisions are made about the environment.
- The environmental interdependence of individuals, groups, communities and nations.
- How human lives and livelihood are dependent on the environment.
- The conflict that can arise about the environmental issues.
- How the environment has been affected by past decisions and actions.
- The importance of planning, design and aesthetic considerations.
- The importance of effective action to protect and manage the environment (Palmer, 1998:140).

2.1.5 Environmental Attitude

Attitude refers to inclination to react in a certain way to certain situations; to see and interpret events according to certain predispositions; or to organize options into coherent and interrelated structure. Values are inextricably related to attitudes (Badran, 1995). According to Bradley et al., (1999), Eagles and Demares (1999 in Ehrampoush, 2005) environmental attitude of young people appears to be crucial as they ultimately play a direct role in providing knowledge based solutions to incoming environmental problems.

Environmental attitude is defined as a learned belief, which develops from an individual's knowledge and value about the environment and governs action to support or sustain the environment (Vitto et al., 2005 cited in Cheru, 2008:31).

According to Shultz et al. (2000) in Taye (2008), there are different types of attitudes and that two people can be equally concerned about environmental problems but for very different reasons:

- Egoistic concerns are focused on the individual and reflect a concern about environmental problems for self. These concerns include personal health, financial well-being, quality of life and availability of resources.

- Altruistic concerns focus on people rather than self, including friends, family, community, future generations or humanity.
- Biosphere concerns focus on all living things, including plants, animals, ecosystems and biosphere.

Wals (1992) in Packer et al. (1996) analyzed school students' perception of pollution and environmental problems and classified their responses into three distinct ways of thinking about environmental issues:

- The personality view: Environmental problems are mostly perceived as physical problems that are a direct result of individuals polluting behavior and subject to individual control.
- The technocratic view: In this broader, global view, environmental problems are perceived as an inevitable result of industry and modern lifestyle, to which new technologies are expected to provide a solution.
- The politicized view: Environmental problems are global issues representing problems of conflicting interests, choices, and values that can be addressed only by a change of lifestyle.

Ballantyne (1995) in Packer et. al. (1996) analyzed in-service teachers' responses to the question "why do you feel that protection of the environment is important?". Again, three main groups of conceptions were identified that approximately parallel to Wals's categories described above:

- The egocentric conception: Protection of the environment is important to preserve individual health, safety, or quality of life. Concerns about environmental problems are immediate and local. The environment is seen as something to be used.
- The guardianship conception: Protection of the environment is important for the future of one's children and the survival of the planet. Individuals have a responsibility to ensure that future generations will be able to enjoy the environmental benefits that exist at present. Concerns about the environment are long-term and global. The environment is seen as something to be managed to ensure a sustainable future.

- The ecocentric conception: Humankind is seen as an equal or interdependent part of the environment. The environment is seen to have inherent worth and a right to exist, not merely because of its necessity for human life. People are not perceived as superior or separate from the environment but rather harmony and balance in people-environment interactions are emphasized as essential for ensuring the future survival of both people and the environment.

Generally environmental attitude is a concern one reflects for the well being of the environment and it emanates from environmental knowledge. Promoting positive attitudes to the environment is essential if pupils are to value it and understand their role in safeguarding it for the future. Encouraging the development of attitudes and personal qualities contribute to appreciation of and care and concern for the environment and for other living things (Palmer, 1998:140).

2.1.6 Environmental Practice

A good knowledge of environmental concept is not sufficient. Knowledge of environmental issues, skills, analysis, attitude and values related to taking action are also necessary for the individuals to take action and to act responsibly (Engleson, 1985 cited in Taye, 2008). Environmental attitudes are pre-conditions for ecological behavior, perception, in turn, grounds on knowledge. Behavior is influenced by intention, attitude, norms and factual knowledge (Cheru, 2008).

2.1.7 Environmental Knowledge, Attitude and Practice Framework

Several studies indicate that environmental attitude emanates from environmental knowledge, which in turn leads to responsible environmental practice. Thus environmental knowledge is a precondition for environmental attitude and environmental attitude is a pre-condition for appropriate environmental practice. According to Melaku (1994), positive significant relationships were obtained between environmental knowledge and attitude. However, no significant correlation was observed between environmental knowledge and skills and between environmental attitude and skills.



Figure 2.3 The nexus between environmental KAP (adopted from Taye, 2008).

Thus, this study was based on the premises that good environmental knowledge leads to positive attitude toward environmental conservation, which in turn leads to appropriate environmental practice to alleviate environmental problems.

2.2 Review of Related Literature

2.2.1 Problem of Land Degradation in Ethiopia

Environmental degradation is most severe in the highlands, especially in the northern half of the country due, in part, to the following reasons:

- Long history of settlement
- Primitive land-use practices, which include clearing of vegetation cover for farming and fuel, and lack of innovation in farming practices
- Vague legal environments of land ownership and uncertainty of tenure with the resultant fragmentation of land-holdings
- Government policies, including a move toward collectivization in the 1980's and 1990's which deprived rural citizens a sense of ownership and entitlement to the land they farmed
- Rapid growth in population numbers
- Climate change, drought and the resulting population dislocation
- Cultural animal husbandry involving the overstocking of grazing land as well as use of dung and crop residues for fuel
- Several decades of war and conflict (northern Ethiopia)
- Lack of capital resources for investment in environmental rehabilitation

Source:

<http://www.ethiodemographyandhealth.org/PopEnvironmentAynalemAdugna.pdf>

According to Alemeneh (1990), in Ethiopia, there are three predominant human activities invariably identified as contributing to the vicious cycle of environmental degradation, drought and famine; these are overgrazing, over cultivation and deforestation. The highlands, which include over 90 percent of the cropland and are center of the nation's economic activity, suffer from massive land degradation due to soil erosion.

Intensive cultivation, overgrazing, deforestation, overpopulation and the political and economic forces that relate to peasant agriculture have exerted enormous pressure on the ecosystem. These factors have resulted in soil loss, a substantial loss of vegetative cover, and soil compaction, which have severely reduced soil fertility and crop yields.

According to Berry (2003), root causes of land degradation in Ethiopia are:

- The impact of natural conditions especially periodic drought, inaccessibility of rural areas due to topographic constraints
- Lack of rural infrastructure and markets
- Lack of participation of stakeholders in management decisions especially at the local level
- Weak extension services
- Low technology agriculture, leading to risk aversion and reliance on cattle as wealth

2.2.2 Land Degradation: An Overview

Land degradation, a decline in land quality caused by human activities, has been a major global issue during the 20th century and will remain high on the international agenda in the 21st century. The importance of land degradation among global issues is enhanced because of its impact on world food security and quality of the environment (Eswaran et al., 2001).

Causes of land degradation are the agents that determine the rate of degradation. These are biophysical (land use and land management, including deforestation and tillage methods), Socio economic (land tenure, marketing, institutional support, income and human health), and political (incentives, political stability) forces that influence the effectiveness of process and factors of land degradation (Ibid).

Table 2.1 Estimates of all degraded lands (in million km²) in dry areas

Continent	Total area	Degraded area	% degraded
Africa	14.33	10.46	73
Asia	18.81	13.42	71
Australia	7.01	3.76	54
Europe	1.46	0.94	65
N. America	5.78	4.29	74
S. America	4.21	3.06	73
Total	51. 6	35.93	70

Source; Eswaran et al. (2001) from
<http://soils.usda.gov/use/worldsoils/papers/land-degradation-overview.html>

While at the global level deforestation, overgrazing and agricultural activities have relatively similar incidence, at the regional level patterns differ remarkably. Overgrazing dominates in Australia and Africa, agricultural activities in North America and deforestation in other regions. Domestic over use of vegetation is negligible in developed regions but quite significant in Africa.

Table 2.2 Incidence of the five causative factors of land degradation by region
(percentage of degraded area)

Region	Defore- station (%)	Overgrazing (%)	Agricultural activity (%)	Over exploitation of vegetation (%)	Industrial activity (%)	¹ Total (%)
Africa	14	49	24	13	*	100
N/C America	11	24	57	7	*	99
S. America	41	28	26	5	-	100
Asia	40	26	27	6	*	99
Australia	12	80	8	*	*	100
Europe	38	23	29	*	9	99
World	29	35	28	7	1	100

Source: UN, 1995. Retrieved on May 6, 2009 from
<http://www.un.org/popin/fao/land/land.html>.

One of the greatest challenges in the Ethiopian economy is linked with the problem of rural environment which supports more than 85% of the total population of about 67 million people (Muluneh, 2003). Thus land degradation is the major environmental problem in Ethiopia. Land degradation is expressed in many ways including soil removal by sheet and gully erosion, nutrient depletion by biomass burning including dung and crop residues resulting in a break of nutrient cycle. Dung and crop residues are used as sources of domestic fuel because of lack of wood (Shibru et al, 1998).

Land degradation involves both soil erosion and loss of soil fertility, especially in the highlands. While the soils in Ethiopian highlands have a high inherent fertility, the continuous removal of nutrients without replacement as well as the steep and dissected terrain with extensive areas of slopes of over 15%, coupled with the high intensity of rainfall have led to accelerated soil erosion reaching up to 400 tones /ha/ annum (Gedion, 2003). About 20,000 to 30,000 ha of cropland are being abandoned annually since cropping can no longer be supported by the soils (Ibid).

¹ The researcher added the column for the total

The peasant agriculture sector comprises 90% of the Ethiopian population and contributes to 50% of the gross domestic production and 90% of the nations export earnings. In a society so dominated by peasant agriculture, survival is inextricably linked to the exploitation of the land (Alemneh, 1990).

2.2.3 Causes of Land Degradation

Table 2.3 A classification of factors of land degradation

Human actions		Natural conditions
Enabling factors	• Deforestation • Allow overgrazing • Extensive use of vegetation • Ploughing slopes • Removing grass for cultivating	• Topography • Soil texture • Aridity, drought • Vegetation cover • Hydrographic regimes
Direct factors	• Use of machines • Driving cattle • Shortening fallow • Excessive water in put/ insufficient drainage • Excessive acid fertilization • Excessive use of chemicals/manure • Domestic/industrial waste disposal	• Strong rains • Floods • Strong winds

Source: UN, 1995 from <http://www.un.org/popin/fao/land/land.html>

The main causes of land degradation are very complex and attributed to both biophysical and socio-economic factors. Many empirical studies have indicated that the main facets of land degradation such as deforestation, overgrazing, cultivation of marginal lands and soil fertility depletion can be attributed to population pressure (Yohannes, 1999).

Environmental (natural) factors that have aggravated the problem of land degradation in the highland of Ethiopia include the nature and characteristics of the terrain, rainfall and type of soil. Within the highlands of the country the terrain is characterized by high relief, high slope angles exceeding 30% in more than 70% of the highlands and long slope

length. These have made many parts of the highlands prone to soil erosion once the natural vegetation cover is removed (Muluneh, 2003).

The causes of land degradation can be divided into natural hazards, direct causes and underlying causes. Natural hazards are the conditions of physical environment, which lead to the existence of a high degradation hazards, for example steep slopes as a hazard for water erosion. Direct causes are unsuitable land use and inappropriate land management practices. Underlying causes are the reasons why these inappropriate types of land use management are practiced, for example, the slopes may be cultivated because the landless poor need food and conservation measures not adopted because these farmers lack security of tenure (FAO, 1994).

The main cause of land degradation in Ethiopia is soil erosion. The erosion in Ethiopian highlands, amounting to nearly one billion tons of soil lost each year is due to natural causes exacerbated by human activities, particularly overgrazing, over cultivation and deforestation. In addition, Yohannes (1999) reported that many environmentalists, policy makers and researchers agree that land degradation mainly caused by soil erosion has been one of the chronic problems in Ethiopia. This seriousness of land degradation by soil erosion seems due to the topography of the country exacerbated by unsustainable human activity. Generally major causes of land degradation that are relevant in Ethiopian context are discussed below.

2.2.3.1 Soil Erosion

Soil erosion is one of the major factors of soil degradation in Ethiopia (Hurni, 1986). The most common form of erosion is the loss of topsoil under the action of water or wind. Worldwide, water erosion is accountable for 56 percent of land degradation followed by wind erosion causing 28 percent (Aklilu, 2001: 30). Johnson et al., (1995) stated that the most ubiquitous cause contributing to agricultural land degradation was soil erosion. Soil erosion on the highlands is aggravated by the continuing extensive deforestation through clearing and by fire (Daniel, 1988:62).

Soil erosion is a phenomenon, which occurs mainly in the highlands of Ethiopia. Here the surface is rugged, steep and deeply dissected, and slopes exceeding 15% are commonplace. In addition the rainfall is often torrential in many parts thus exacerbating erosion. More than 5000 years of cultivation has taken its toll on the resources of Ethiopia

causing extensive land degradation. Over this long period of cultivation the natural vegetation of the country has imperceptibly been eroded from North to South (Shibru, 1998).

According to the Ethiopian highland reclamation study around half of the highlands or 27 million hectares are already significantly eroded, of which 14 million hectare of agricultural land is seriously eroded (EEA, 1999/2000). Accelerated soil erosion was specifically mentioned causing a progressive annual loss in grain production estimated to have been 40,000 tons in 1990 and to reach 170,000 tones in 2010. It was estimated that between 1985 and 1995 some 2 million hectare of pastureland would have been destroyed by soil erosion (Bekure, 2003). Erosion rate assessment in the 1980, at the national level has shown that the country losses 1.9 billion tones of soil each year. Generally crop-producing highlands of central and northern part of the country were found to be major areas of degradation (Ibid).

The major form of soil erosion is water induced. There is very little, if any, replenishment of the soil nutrients taken by crops in the traditional agricultural system, thus resulting in loss of soil fertility. It is estimated that Ethiopia loses 400 tons/ha of topsoil every year. The severity of the rate of soil erosion could have been limited had it not been for the serious deforestation and removal of biomass cover that have been occurring for centuries and which in turn have accelerated in the last 30 years (Shibru et al., 1998). Thus deforestation is accelerating the problem of soil erosion.

2.2.3.2 Deforestation

A study by Food and Agriculture Organization (FAO) reported that during the decade from 1980 to 1990, the world's tropical forests were reduced by an average of 15.4 million hectares per year (0.8% annual rate of deforestation). The area of land cleared during the decade is equivalent to nearly three times the size of France. At the end of 1990, Africa had an estimated 528 million hectares, or 30% of the world's tropical forest. In several sub-Saharan African countries, the rate of deforestation exceeded the global annual average of 0.8 percent (Agyei, 1998).

At the turn of 20th century, 40% of the Ethiopia's land surface had been covered with forest (Solomon, 1994). Deforestation is a major issue in Ethiopia since it is one of the main causes of prevailing land degradation. Ethiopia's forest at present is only 2.4%

compared to the estimated 40% initial coverage. The primary causes of natural forest destruction are agricultural expansion and the demand for increasing amounts of construction materials, fuel wood and charcoal. Deforestation and poor land husbandry practices have resulted in accelerated run-off, reduction on the recharge of groundwater reserves, increased sediment load of rivers, siltation of reservoirs and increased incidence in the degree of flooding (Shibru et al., 1998: 11).

Researchers seem to agree that deforestation has been a continuous phenomenon in the country, the rate and extent being higher to date than in the past. The underlying causes of deforestation are, however, closely linked with the vicious cycle of mutually reinforcing factors, i.e. poverty, population growth, poor economic growth and the state of environment (Gedion, 2003).

In 1994, it has been estimated that high forests covered less than 2.7% of the country. With the reported annual loss of high forests estimated at 150,000 -200,000 ha, it has been projected that the area covered by high forests may be reduced to scattered minor stands of heavily disturbed forests in inaccessible parts of the country within a few decades (Ibid).

The destruction of forests is caused for most part by land clearance for agricultural purposes. The other cause of destruction of the vegetation cover is its overuse by households, mainly from fuel wood collection. To cover vital energy needs, most households in developing countries resort to “free” gathered biomass fuels including crop residues and animal dung but most of all, fuel wood (UN, 1995).

In 2000, the estimated annual rate of destruction of natural high forest for agricultural expansion is estimated to about 65,540 ha per annum in the three main forested regional states of Oromia, SNNP and Gambella. In the three main forested regions, the analysis indicated that approximately 1.24 million ha of natural high forest would be destroyed by the expansion of agriculture between 1990 and 2014. The highest total losses occur in the Oromia Region because of the higher population pressure and the larger area of forest (MoARD, 2005).

2.2.3.3 Biomass Fuel Consumption

Developing countries rely heavily on fuel wood, the major energy source for cooking and heating. In Africa, the statistics are striking: an estimated 90 percent of the entire continent's population uses fuel wood for cooking, and in sub-Saharan Africa, firewood and bush supply approximately 52 percent of all energy sources (Agyei, 1998).

A 1984 estimate indicates that 94.8% of the total energy consumption in Ethiopia was made up of biomass fuels consisting of fuelwood, animal dung and crop residue. Fuel wood use makes up 81.8% of these traditional sources while animal dung and crop residue make up 9.4 and 8.4% respectively. Traditional fuels make up 99.9% of rural energy consumption and the rural population consumes 86.7% of total net energy (EFAP, 1993 cited in Shibru et al., 1998:8).

The loss in soil is in part due to the use of animal dung and crop residues as fuel as a result of scarcity of fuel wood. The uses of these items for energy represent a loss in crop production of 700,000 tons of grain (Gedion, 2003).

Table 2.4 Wood lost to clearing for agriculture compared with burning of fuel wood above the sustainable supply

Region	Wood clearing for agriculture (tons)		Wood burning as fuel wood above the sustainable supply (tones)	
	2000	2010	2000	2010
Oromia	2,715,398	2,183,428	7,834,736	16,775,483
SNNP	428,483	369,416	2,835,933	9,790,104
Gambella	93,130	129,957	0	0
Benishangul Gumuz	236,317	984,334	6,660	48,713
Total	3,473,328	3,667,135	10,677,329	26,614,300

Source: (MoARD, 2005: 83)

The table indicates that for Oromia and SNNP regions wood burnt as fuel exceeds by a considerable margin. Furthermore, the difference between the two processes is increasing.

2.2.3.4 Overgrazing

Degradation of grazing land refers to decrease in its capacity to support livestock. In Africa as a whole, overgrazing is the major factor accountable for half (49%) of the soil degradation (Aklilu, 2001: 32). While livestock does not necessarily cause environmental problems, overgrazing can be a major factor in land degradation, causing half of the damage assessed in Africa and one fourth in other developing regions. Cases such as the damage caused by goats in the Mediterranean area and elsewhere are well known (UN, 1995). When more and larger herds compete for the same rangelands, they may exceed the natural productivity of the area and destroy the vegetal cover, accelerating erosion.

Livestock pressure and stock management (mainly based on the free grazing system) are major sources of land degradation, only 25 percent of Ethiopia's high livestock population which includes 35.3 million cattle-graze in the rangelands (the lowland areas of Afar, Somali and Borena), while the remaining 75 percent graze in the highlands, leading to serious overgrazing of areas already under high agrarian pressure (EPA 2005, cited in MoARD, 2007). In the highlands the expansion of grazing beyond the land's carrying capacity occurs at the expense of the remaining natural vegetation and further land degradation. The scarcity of grazing land and livestock feed has forced the widespread use of residues to feed livestock (MoARD, 2007).

2.2.3.5 Land Tenure

Land tenure is one of the factors that explain lack of wide spread use of environmental management practices in degraded parts of the country. Under the three successive regimes starting from Haile Sellassie government and even before, many rural farm households have never been sure whether they would have same plots of land to use in the coming year (Muluneh, 2003).

The revolution of 1975 brought about a radical change in the land tenure situation. By virtue of proclamation No. 31 and No. 47, both of 1975, all rural and urban land was nationalized to become the collective property of the Ethiopian people. Under this land tenure regime, the general criteria of a maximum of ten hectares of rural/farm land and

500m² of urban land per family were laid down. The administration of rural land was vested in the peasant associations, which had the power to distribute land and, generally, administer it. Frequent reallocation of plots of farmland led to reluctance on the part of the farmers to invest their time and effort in land improvement. In addition, the land tenure policy denied farmers the right to lease land, to transfer it by inheritance and to be compensated fully in case of expropriation. Farmers were also not allowed to freely sell their produce since there was a policy of price control (Shibru et al., 1998: 39).

Currently the FDRE government adopted constitutional provision concerning land ownership and use. Article 40/3-6 states that:

The right to ownership of rural land, as well as of all natural resources is exclusively vested in the state and in the peoples of Ethiopia. Land is a common property of the Nation, Nationalities and Peoples of Ethiopia and shall not be subject to sale or to other means of exchange (FDRE, 1995).

The Ethiopian government has been undertaking a program of rural land registration since 2003 and by 2006 more than half of the country's farm households had received land certificates. The main objective of the program is to address the problem of tenure insecurity and to establish an effective framework for land administration at the local level. Peasants do not have rights of ownership over the land they have, only use right. Land registration and certification merely confirms the right to use of the land for the households livelihood and the documents handed out to peasants are strictly speaking user certificates and not land certificates in the proper sense of term (Dessaegn, 2008).

Many studies agree that insecure land tenure and frequent redistribution of land cause land degradation by restricting farmers from investing on their plot of land. Insecure land tenure affects the quality of land by killing farmer's interest to invest on land (Aklilu, 2001: 46).

2.2.3.6 Lack of Awareness as Factor for Land Degradation

Land degradation is a long-term and subtle process. Its effect and spread are hardly noticeable until they are manifested through drought and/or famine. The subtlety of the process explains why the problem received so little attention before the 1973-74 droughts. In addition, land degradation is often presented in mechanical terms, for example, tons of

soil lost per hectare per annum, or hectares of forest depleted – statistics that policy makers do not especially appreciate. Among policy makers, it is the loss of productivity and socio-economic impacts of degradation that strike a cord. The use of agricultural inputs, even without proper land management practices can sometimes mask the effects of land degradation, especially in areas with relatively better and deeper soils. For this reason, most decision makers regard land degradation as a problem only in highly degraded areas. This lack of appreciation of the problem reflects the absence of information on the costs of land degradation and benefits of sustainable land management practices (MoARD, 2007: 43)

Another very important misunderstanding, not only among policy makers but also among many practitioners, is that soil and water conservation (SWC) measures are a panacea for land degradation. The integration of different sustainable land management practices and technologies to make SWC measures more effective and enhance soil productivity is seldom considered (MoARD, 2007).

Another study argues that the magnitude and seriousness of the problem of natural resource degradation are duly recognized both by government and non-governmental organizations. There are divided views as to whether the problem is well recognized by the grassroots population (Aklilu, 2001: 46). Some studies and observations at specific areas indicate that people have good knowledge of the hazard of resource degradation. Other studies indicate, to the contrary, that the problem of land degradation is either not appreciated at all by the farmers or not given priority (Ibid). This misunderstanding among many sectors of the society also causes land degradation or exacerbates the problem.

2.2.4 Consequences of Land Degradation

According to MoARD (2007:1), land degradation has direct and indirect costs.

Direct costs include:

- The cost of nutrients lost through topsoil erosion (or the cost of replacing these nutrients).
- The production that is lost because of nutrient and soil losses.
- The costs of forest removal.

- The loss of livestock carrying capacity.
- The decline in cropped area.

Indirect costs mainly include:

- The loss of environmental service.
- The silting of rivers and dams.
- Increasing irregularity of streams and rivers.
- Reduced ground water reserves.
- Flooding
- Other costs, related to social and community losses from malnutrition, poverty and migration.

2.2.5 Measures against Land Degradation

According to (Aklilu, 2001: 50-51), some of the main strategies relevant to Ethiopia are:

Afforestation and Reforestation – Vegetation has a curative value.

Conservation Oriented Crop Combination and Land Management:-

Certain farming practices, which are believed to conserve the natural resource base and at the same time raise productivity, are noted (Blackwell, 1999; Wood, 1990 in Aklilu, 2001). These include intercropping, crop rotation, integration of livestock farming with arable cultivation, the cut and carry method of using degraded pasture, controlled grazing and wide spread use of semi-permanent crops like enset (false banana) and cassava or self-seeding and volunteering crops, such as legumes and sweet potatoes.

Agro-forestry: - It is a collective term for land-use systems and technologies where woody perennials (trees, shrubs, palms, bamboo, etc) are deliberately used on the same land management units as agricultural crops or animals, in some form of spatial arrangement or temporal sequence. The advantages of agro-forestry are many fold including conserving and enriching the soil, protecting crops and animals against wind and extreme temperatures, and provision of wood, fuel and fodder.

Ensuring Right of Tenure – As insecure land tenure kills farmers' interest to invest on their farmland; security of ownership is believed to encourage them to use the resources in a sustainable manner.

There is a serious "need not only for educating peasants to be aware of future consequences of further land degradation but also to demonstrate to them that conserved and afforested areas belong to them and their children's children".

2.2.6 Environmental Knowledge, Attitude and Practices

Developing conceptions in environmental education involves the use of a range of strategies designed to integrate an individual's environmental knowledge, attitudes/values and behavior (Packer et al., 1996). There is a widespread belief that teaching positive environmental attitudes and values is important in bringing about change in environmental behavior than the teaching of environmental knowledge is. In support of this, it has been argued:

Whereas knowing how to improve environmental quality is important, possessing such knowledge certainly does not ensure that one will be motivated to take action. Moreover, one may not necessarily use such knowledge to select the environmentally sound or responsible choice from among the many possible alternatives (Packer et al., 1996:29).

Increased knowledge about the environment and its associated issues leads to favorable attitudes...which in turn lead to action promoting better environmental quality (Palmer, 1998:105). If the teaching of attitudes/values is emphasized at the expense of an adequate and accurate knowledge base, there is a danger that students' environmental behavior may be driven by misconceptions. To address environmental knowledge without reference to attitudes and values held by students will limit the extent to which such knowledge is translated into action (Packer et al., 1996).

Studies by various scholars have demonstrated that the quality of environment depends critically on the level of knowledge, attitude, values and practices of people (Schulitz and Oskam, 1996; Mansary and Abijoye, 1998 cited in Said M. et al., 2003). Knowledge, attitude and practice constitute a triad of interactive factors characterized by dynamism and unique interdependence (Badran, 1995).

Several studies conducted on the subject reveal that awareness, motivation and positive attitude towards environmental issues are significantly high among school children while the actual commitment of the students in environmental problem solving is found to be low such a difference between intentions and commitment creates the rhetoric-reality gap in environmental education programs (Elias, 2004:39).

Similarly a study that assessed students' environmental literacy at Bahir Dar University showed that students have a moderately favorable environmental attitude (62.3%) followed by nearly moderate environmental knowledge (52.4%) but below average in environmentally friendly practices engagement (46.1%) (Taye, 2008). The relationships of environmental knowledge, attitude and behavioral practices are found to be very weak (Ibid).

Another study that assessed grade 11 students practice of disseminating environmental education in Eastern Wollega Zone showed that the students seem to be familiar with the basic environmental education issues and expressed a favorable attitude toward the conservation of resources with less practice. Seen in relation to their awareness and attitude, students' practices in both transmission and practical activities were found to be low (Dessalegn, 1998).

A study that assessed learners and academic staffs' environmental knowledge, attitude, intention and behavior at Adama University showed that, there is a strong tie between instructors' environmental knowledge and practice and environmental knowledge and attitude. The relationship between students' environmental attitude and practice shows strong relationship, preceded by moderate relationship of their environmental intention and practice. Both groups experience an infrequent habit of environmental activities. Therefore many studies agree that students' environmental practices are low compared to their knowledge and attitude.

2.2.7 Factors Influencing Students Knowledge, Attitude and Practice (KAP)

Factors like curricular focus and teaching strategy, age/grade level, sex, academic stream, source of information and place of residence are known to influence knowledge and attitude towards environmental issue and the behaviors they demonstrate subsequently (Aklilu, 2006: 44).

Academic Stream

University students majoring natural science were known to have more environmental knowledge and have shown more emotion about the environment than those majoring social science (Gifford et al. 1982 cited in Aklilu, 2006). Contrary to this, the study that assessed students' environmental literacy showed that social science streams had higher scores than that of natural science (Taye, 2008).

Gender

There is more agreement between researchers in regard to the relationship between environmental knowledge and attitude on one hand and sex on the other (Blum, 1987 cited in Aklilu, 2006). As reported in Aklilu (2006), Roth and Perez (1989) disclosed that student's knowledge and attitude were significantly related to sex, with males consistently out scoring females. Atlabachew (2007) and Asmare (2007) came up with a similar finding that males were found to be more knowledgeable than females.

The study that assessed Malaysian students perception of the environment contents in their English language classes found out that both male and females seem to share similar perceptions of the environment, they indicate a positive attitude towards the environment regardless of gender, all students are concerned about the environment and say they take steps not to damage it and want to conserve it for future generations. Female students are more concerned about protecting the environment than males (Thang, 2006).

Place of Residence (Rural/Urban)

Students in rural areas had relatively better knowledge and skill in environmental education but with poor attitude compared to urban students (Asmare, 2007).

As reported by James (1980 in Aklilu, 2006) rural students were found to be statistically more perceptive of environmental issues than urban students. This disparity in perceptive scores between these two groups was explained in terms of rural students' proximity to and greater interaction with the outdoors. Berengue and others (2005 in Taye, 2008) also substantiated a similar finding that in Spain, people living in the rural context show more positive attitudes of environmental responsibility. A study that assessed grade 11 students practice of disseminating environmental education in Eastern Wollega Zone showed that rural students expressed more favorable attitude and exhibited more frequent practices than urban students (Dessalegn, 1998). Some studies have argued that environmental concern is higher in cities (Van Liere and Dunlap, 1981 cited in Taye, 2008) that urban residents are more concerned about over exploitation of natural resources. Even though there were different findings many studies agree that rural students are more concerned about the environment than urban students.

2.2.8 Environmental Issues in Selected Textbooks

To see from where the students can get information about land degradation and other related environmental problems the contents of geography and biology textbooks of secondary schools were reviewed (see table 2.5). Agriculture, biology, chemistry, geography, home economics, religion, etc. are some of the carrier subjects of environmental education (biology and geography being of particular importance) (Akillu, 2006:24).

Table 2.5: Topics related to environmental education covered in secondary school geography and biology textbooks

Grade Nine Geography	Grade Ten Geography
• Environment • Resources: Renewable and non-renewable resources. • Soil: Formation of soil, soil composition, types of soils. • Soils in Ethiopia • Traditional methods of maintaining soil fertility: Contour ploughing, terracing, keeping the land fallow, crop rotation, manuring (using cow dung), green manuring, etc. • Modern methods of maintaining soil fertility: Strip cropping, mulching, artificial fertilizers. • Soil degradation in Ethiopia. • Measures for controlling soil erosion: Afforestation and reforestation, building check dams, contour ploughing, controlled grazing, education, terracing, shelterbelts or wind breaks. • Natural vegetation • Deforestation in Ethiopia: Clearing forests for agricultural land, cutting trees for fuel purpose, over grazing, burning. • Consequences of deforestation. • Environmental hazards. • Drought in Ethiopia: Causes, consequences and combating measures. • Environmental policies and programs of Ethiopia.	• Drought in Ethiopia: Causes and consequences, history of drought in Ethiopia, drought prone areas in Ethiopia. • Population of Ethiopia. • Population size and trends. • Impact of rapid population growth on the socio-economic development of Ethiopia. • Components of population change in Ethiopia. • Measures of population change in Ethiopia. • Population structure of Ethiopia. • Population distribution. • Urbanization in Ethiopia. • Population policies and programs. • Population policy of Ethiopia. • Major economic activities of the world. • Agriculture in Ethiopia. • Forestry. • Economic and ecological importance of forest resources. • Forestry in Ethiopia. • Sustainable use of forest resources.

Grade Nine Biology	Grade Ten Biology
• What is environment? • Ecosystem of the world major biomes. • Recycling in nature. • Factors, which limit the growth of population: Food, migration, overgrazing, and carrying capacity. • Human population and the earth's environment. • Human population and food problem. • Checking human population growth: Natural control, birth control methods, and population education.	• Natural resources • Soil conservation and the status of soil erosion in Ethiopia. • Soil erosion: soil erosion by water and wind. • Methods of controlling soil erosion: Terracing, contour farming, strip cropping, mulching, reforestation, windbreak, check dams. • Vegetation • Effects of man on natural vegetation: Deforestation, overgrazing, burning. • An overview of current Ethiopian vegetation. • Endemic plants of Ethiopia. • Methods of conserving vegetation: Reforestation, enclosure, controlled grazing, fire protection, awareness creation. • Consequences of rapid population growth on the environment.

Source: Grade 9 and 10 Geography and Biology student's textbooks, MoE, 2005

Chapter Three

3 Background and Description of the Study Area

3.1 Location

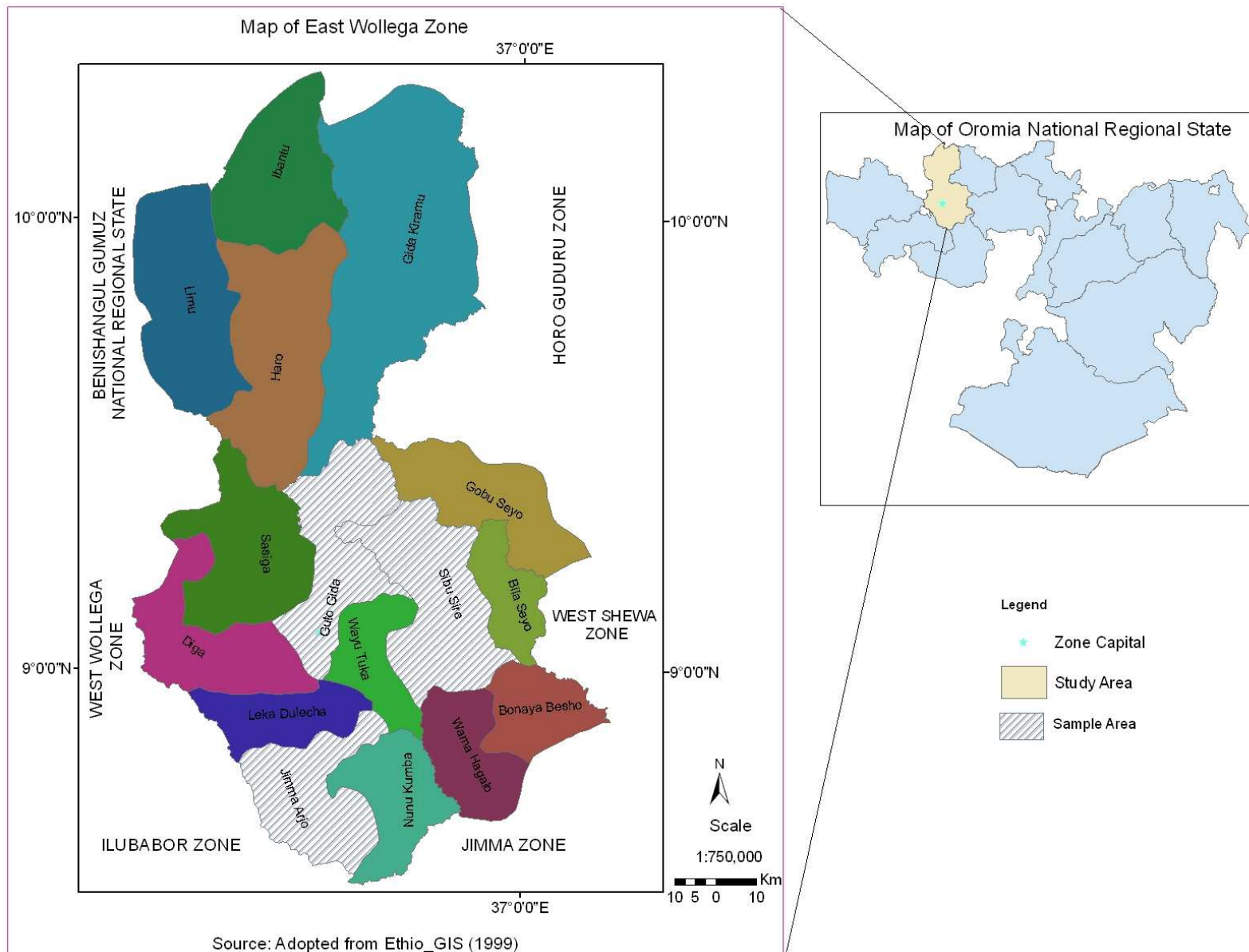
Oromia is one of the nine regional states of Ethiopia and stands first both in terms of population and land coverage. It is located in central part of Ethiopia extending from 3°20' N to 10° 35' N and from 34°05' E to 43°11' E with total land area of 353,690 km². It constitutes about 31.15 % of the total land size of the country making it the largest of all regions (Bezuayehu, et al. 2002). It has a total population of 27,158,471 with 2.9 annual growth rate (CSA, 2007). The highlands host more than 80% of the total population and 70% of the livestock population in the Region and account for over 90% of the cropland. Almost 90% of the economic activities of the Region are concentrated in the highlands.

The Region has common borders with six national regional states and Sudan and Kenya. It shares the longest border (1860km) with the Southern Peoples' Nation and Nationalities Regional State followed by the Somali Regional State (1410km) (Bezuayehu et. al, 2002).

Geographically Eastern Wollega Zone is bordered by:

- West Shewa and Horo Guduru Wollega in the East
- West Wollega Zone and Benishangul Gumuz Regional State in the West.
- Benishangu Gumuz and Amhara Regional States in the North.
- Illubabor and Jimma Zones in the South.

Astronomically, the study area is located between 8° 31' 52" and 10° 19' 44" North latitudes and 36° 07' 5" to 37° 11' 52" E longitudes. It has a total area of 14,252.73 km² and it covers 3.39 % of Oromia and has 1, 230,402 population (EWZIPRO, 2008).



3.2 Physical Features

According to the data obtained from Zone agriculture and rural development office, 2008, the physical landscape of Eastern Wollega Zone is quite diversified.

Altitude ranges from 750masl at the confluence of Wama and Didessa rivers to 3020 masl at the summit of the Chalchis Mountain.

Table 3.6 Topographic Categories

No.	Topographic Category	Coverage in hectare
1	Mountains	92,061.31
2	Plains	795,401.73
3	Steep slopes	244,464.34
4	Valley	77,253
5	Others	46,754.28
Total		1,255,935.65

Source: Zone Agriculture and Rural Development office (2008)

3.2.1 Climate

The climate type of East Wollega Zone is divided into three. These are Dega 4.91%, Woina Dega 53.17% and Kola 41.92%. More than half of the Zone experiences Woina Dega climate (EWZIPRO, 2008).

3.2.2 Temperature and Rainfall

The temperature of the study area varies from place to place. It ranges between 10.9⁰c and 18⁰c in Dega, between 18⁰c and 27.4⁰c in Woina Dega and ranges between 27.4⁰c and 33.9⁰c in Kola. The hottest months are February, March and April.

Even though the amount of rainfall is varies from place to place the total annual rainfall ranges from 1000 mm-2400 mm and the area gets maximum rainfall from June to September (EWZIPRO, 2008).

3.2.3 Type of Soil

According to EWZARDO (2008), the major soil types are sandy soil, clay and loam. Loam and clay cover large an area constituting 41.73% and 33.07% respectively. Population pressure leads to more rapid degradation of the soil as more and more marginal land is brought under cultivation and an increasing amount of woodland is cut down to meet the demand for firewood.

3.2.4 Vegetation

The extent of the natural vegetation in the area has been much reduced. Cutting for fuelwood and arable land expansion is disturbing most of the woodland.

Table 3.7 Vegetation cover in the zone

Type	Coverage in hectare
Indigenous forest	46302.05
Public (communal)	1001.65
Schools	1499.98
Religious institution	1377.27
Prison	1.5
Government	4379.33
Private	7948.88

Source, EWZARDO, 2008

3.2.5 Arable Cropping

Cropping patterns vary from woreda to woreda but are dominated by maize, sorghum and teff, which together account for 60-80% of the cropped area. Farming is at subsistence level and only few modern inputs (fertilizers, improved seeds, agro-chemicals) are used (MoARD, 1989). Livestock form an essential part of farming system as much of the land preparation is done with ox-drawn ploughs.

CHAPTER FOUR

4 Presentation and Analysis of Findings

In this chapter the analysis and interpretation of data regarding students' knowledge, attitude and practices about land degradation have been made. Comparisons have been made in terms of gender, place of residence and academic streams. To check whether there was statistically significant difference or not between the students' mean scores, a t-test was employed.

4.1 Analysis of Students Environmental Knowledge

To investigate students' environmental knowledge about land degradation, a questionnaire containing 25 items meant to measure students' basic knowledge about land degradation was employed and scored out of 100% giving a weight of 4 for each item.

Table 4.1.1 Mean scores of students' knowledge about land degradation

No	Sum of scores	Mean	Above mean		Below mean		SD	Variance
			No	%	No	%		
330	27,060	82	201	61	129	39	14.10	198.85

Source, Own survey, 2009

As shown in the table above, the score of each individual was summed up to yield a total score of 27,060. The mean score of the students' knowledge about land degradation is 82 and 201 (61%) of them scored above the average score while 129 (39%) of them scored below the average. This shows that the majority of the students 201(61%) scored above the mean score. From this one can conclude that the level of students' knowledge about land degradation is high. One can also assume that this may lead to favorable environmental attitude and responsible environmental behavior. Increased knowledge about the environment and its associated issues lead to favorable attitudes, which in turn lead to actions promoting better environmental quality (Palmer, 1998).

Table 4.1.2 Environmental knowledge test performance by interval

Score interval	Frequency	%
<50	18	5.5
50-59	15	4.5
60-69	21	6.4
70-79	30	9.1
80-89	141	42.7
90-100	105	31.8
Total	330	100

Source: Own survey, 2009

As it can be seen from the above table only 18 (5.5%) of the students scored below 50%, 15 (4.5%) of the students scored between 50-59%, 21 (6.4%) scored between 60-69%, and 30 (9.1%) scored between 70-79%. The majority of the students 246 (74.5%) scored 80% and above. From this, one can conclude that students' knowledge about land degradation and other environmental problems is promising to reverse the problem of land degradation. However, possessing such knowledge certainly does not ensure that one will be motivated to take action (Packer et.al, 1996). In previous studies, students with scores 80% and above were said to have the required knowledge in environmental issues (Malaku, 1994 and Asmare, 2007).

Table 4.1.3 Gender difference in environmental knowledge

Gender	No	Sum of Scores	Mean	SD	Variance	t-obtained	t-value
Male	189	16,368	86.6	9.5	90	6.9	1.96
Female	141	10,692	75.83	16.7	277.34		

$P < 0.05$

Source: Own survey, 2009

As one can see in table above the mean scores of male and female students' environmental knowledge is 86.6 and 75.83 with standard deviation of 9.5 and 16.7 respectively.

In order to find out whether there is a difference between the students mean score, t-test was done. Since t-obtained (6.9) is greater than t-value (1.96), there is statistically significant difference between male and females in their environmental knowledge. According to this result, it could be said that male students are more knowledgeable about land degradation than female students. This clearly shows that there is gender difference in environmental knowledge.

This finding is consistent with the findings of (Aklilu, 2001, Atlebachew, 2006 and Asmare, 2007), which indicate that males are knowledgeable than females in their environmental knowledge.

Table 4.1.4 Results of t-test for students' knowledge about land degradation based on place of residence

Place of residence	No	Sum of Scores	Mean	SD	Variance	T-obtained	T-value
Rural	183	15,282	83.5	13.24	175.32	2.223	1.960
Urban	147	11,778	80	14.96	223.78		

$P < 0.05$

Source: Own survey, 2009

The above table reveals that the mean scores of rural and urban students environmental knowledge is 83.5 and 80 with standard deviation of 13.24 and 14.96 respectively. In order to check whether there is a difference between students mean score in their environmental knowledge based on place of residence, t-test was employed. As a result t-obtained was found to be statistically significant. Thus, it is likely that rural students are more knowledgeable about land degradation than urban students. The difference could be explained due to rural students' proximity and access to the outdoor environment as a result of agricultural activity. The result of this finding is consistent with the findings of (Atlebachew, 2006).

Table 4.1.5 Results of t-test for students' knowledge about land degradation based on academic stream (natural/social)

Academic stream	No	Sum of Scores	Mean	SD	Variance	t-obtained	t-value
Natural	198	16,284	82.24	14.08	198.36	0.379	1.96
Social	132	10,776	81.64	14.12	199.50		

P<0.05

Source: Own survey, 2009

As it can be seen from table above the mean scores of natural and social science students' knowledge about land degradation is 82.24 and 81.64 with standard deviation of 14.08 and 14.12 respectively. In order to find out if there is significant difference between students mean score regarding academic stream, t-test was done. The t-obtained was found to be statistically insignificant. This shows that there was no significant difference between natural and social science students in their knowledge about land degradation and related environmental problems. Both natural and social science students seem to have similar knowledge about land degradation regardless of academic stream. This might be due to the incorporation of environmental issues into both natural and social science curriculums. This finding is in contrast with the findings of Taye (2008), which indicate that students of social science stream had higher score than those of natural science.

4.2 Students Attitude towards Land Degradation

To investigate the attitude of students towards land degradation a Likert type attitude scale was employed. The scale ranges from 5 (strongly agree) to 1 (strongly disagree). In scoring unfavorable statements, the weights were reversed.

Table 4.2.1 Mean score and standard deviation of students' attitude towards land degradation

No	Sum of scores	Mean	No of respondents above mean		No of respondents below mean		SD	Variance
			F	%	F	%		
330	25,545	77.41	222	67.3	108	32.7	8.32	69.19

Source: Own survey, 2009

As it is indicated in the table above, the score of each individual is summed up to yield a total score of 25,545. The mean score is 77.41 with a standard deviation of 8.32. The majority of the students 222 (67.3%) have scored above the mean score, while 108 (32.7%) of them have scored below the mean. In order to decide whether the students have positive or negative attitude towards land degradation, it needs to have a dividing line. With regard to this, some writers state that using the score allotted to “undecided” as a dividing line, the attitude one has can be categorized as favorable or unfavorable (Best and Kahn, 1989 in Dessalegn, 1998). Accordingly, the average score is 60 (3x20) when average equals 3.0 on the scale which is a neutral position. Therefore, scores greater than 60 are considered as resulting from positive attitudes while scores less than 60 imply negative attitudes towards land degradation. Since the mean score of the students is 77.41, from this one can deduce that the students have positive attitude towards land degradation and related environmental problems. The finding of the study is consistent with the findings of Taye (2008), which indicate that students have a moderately favorable environmental attitude (62.3%) and the findings of Aklilu (2001) and Dessalegn (1998) which indicate that the students expressed a favorable attitude towards conservation of resources.

Table 4.2.2 Mean scores of students' attitude about land degradation on each item

	Items																				
Items	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	mean
Score	1599	1455	1443	1299	1347	969	1176	531	1395	1467	1374	1479	1161	447	1452	1320	1452	1332	1440	1407	
Mean	4.8	4.4	4.4	3.9	4.1	2.9	3.7	1.6	4.2	4.4	4.2	4.5	3.5	1.4	4.4	4.0	4.4	4.4	4.4	4.3	

Source: Own survey, 2009

As the value of mean may be affected by extreme scorers, an investigation of students' attitude on each individual item was made. The mean score of students on individual item is 3.87 and they have scored above average in 17 of the 20 items, when average for attitudinal scale is 3.0. Thus, this also confirms that the students have a favorable attitude towards land degradation. One can assume that this might lead to taking actions to reduce land degradation.

Table 4.2.3 Students' attitude towards favorable statements about land degradation

Items	Attitudinal scale									
	Positive attitude				Neutral		Negative Attitude			
	Strongly Agree		Agree				Disagree		Strongly disagree	
	F	%	F	%	F	%	F	%	F	%
1	306	92.7	15	4.5	–	–	–	–	9	2.7
3	216	65.5	60	18.2	27	8.2	15	4.5	12	3.6
5	180	54.5	69	20.9	33	10	24	7.3	24	7.3
7	153	46.4	61	15.5	24	7.3	33	10	69	20.9
9	231	70	30	9.1	21	6.4	9	2.7	39	11.8
11	174	52.7	96	29.1	24	7.3	12	3.6	24	7.3
13	147	44.5	42	12.7	42	12.7	33	10	66	20
15	216	65.5	66	20	24	7.3	12	3.6	12	3.6
17	249	75.5	27	8.2	15	4.5	15	4.5	24	7.3
19	222	67.3	54	16.4	24	7.3	12	3.6	18	5.5
Total	2,094	63.46	510	15.46	234	7.1	165	5	297	9

Source: Own survey, 2009

In the very beginning of item preparation, ten of the items were prepared assuming that the students will agree with. Therefore, in order to identify whether they agreed or not table 4.2.3 is separately prepared. Accordingly, the majority of the students 63.46% strongly agreed, 15.46% agreed; and this shows that 78.92% of them have a positive attitude towards land degradation. Only 7.1% of the students had neutral attitude with no clear position, while 14% of the students showed negative attitude. Since the majority of the students 78.92% showed a favorable attitude, one can state that students have positive attitude towards land degradation and related environmental issues.

Table 4.2.4 Students attitude towards unfavorable statements about land degradation

[illegible]

Source: Own survey, 2009

The above table reveals that the majority of the students 18.61% disagreed, 45.63% strongly disagreed; and a total of 64.24% of them disagreed with the unfavorable statements and demonstrated their favorable attitudes towards the issues under discussion. Only 4.55% of them took the middle position without having clear position while 31.18% of them agreed to the unfavorable statements about land degradation showing negative attitude towards the issue. Since the majority of the students

disagreed to the negative statements, this shows that the students have positive attitude towards land degradation.

Table 4.2.5 Results of t-test for students' attitude towards land degradation based on gender

Gender	No	Sum of scores	Mean	SD	Variance	T-obtained	T- value
Male	189	15,000	79.37	6.31	39.75	4.87	1.96
Female	141	10,545	74.79	9.81	96.21		

$P < 0.05$

Source: Own survey, 2009

As it can be seen from the table above, the mean scores of male and female students was 79.37 and 74.79 with standard deviation of 6.31 and 9.81 respectively.

In order to find out whether there is a significant difference between the students mean scores in their attitude based on gender, a t-test was done. The t-obtained was found to be statistically significant. This shows that there was 4.87-point difference between male and female students' score infavour of boys. When within group difference was observed by standard deviation, there is a high variation among females than that of males. Therefore, according to this result, male students have relatively more favorable attitude about land degradation than females. The difference could be explained in terms of males having more access to outdoor environment than females. This finding was different from the finding of Thang (2006), which assessed the Malaysian students' perception of the environment and found that female students are more concerned about protecting the environment than males.

Table 4.2.6 Comparisons of students' attitude on each item by gender

Items		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	mean
Male	Score	936	846	840	741	807	573	696	312	828	840	798	894	666	252	846	810	840	837	837	849	3.96
	Mean	4.9	4.5	4.4	3.9	4.3	3.0	3.7	1.7	4.4	4.4	4.2	4.7	3.5	1.3	4.5	4.3	4.4	4.4	4.4	4.5	
Female	Score	663	609	603	558	540	396	480	225	567	627	576	585	495	195	510	510	612	597	597	558	3.7
	Mean	4.7	4.3	4.3	4	3.8	2.8	3.4	1.6	4.0	4.4	4.1	4.1	3.5	1.4	3.6	3.6	4.3	4.2	4.2	4.0	

Source: Own survey, 2009

The above table indicates the mean score of both male and female students for each item. The mean scores for each individual item for male and female students are 3.96 and 3.7 respectively. Male students have scored better in 16 of the 20 items while female students outsourced males in only 2 of the 20 items. This comparison shows that male students have relatively better performance in their attitude towards land degradation than female students

Table 4.2.7 Results of t-test for students' attitude towards land degradation based on place of residence

Place of residence	No	Sum of scores	Mean	SD	Variance	t-obtained	t- value
Rural	183	14,328	78.3	7.22	52.07	2.104	1.960
Urban	147	11,217	76.31	9.47	89.73		

P<0.05

Source: Own survey, 2009

As it can be seen from table above, the mean scores of rural and urban students are 78.3 and 76.31 with standard deviation of 7.22 and 9.47 respectively. To judge whether there is a significant difference between the mean scores of rural and urban students in their attitude towards land degradation based on place of residence, t-test was done. Thus, statistically significant difference was found between rural and urban students in their attitude towards land degradation. This shows that rural students have relatively more favorable attitude than urban students towards land degradation. The difference might be due to the proximity and interaction of rural students to the outdoor environment. The result of the finding is consistent with the findings of Atlebachew (2006).

Table 4. 2.8 Comparison of students' attitude by place of residence on each item

Items		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	mean
rural	Score	894	840	804	711	756	552	639	366	771	828	783	840	564	234	816	738	813	759	819	801	
	Mean	4.9	4.6	4.4	3.9	4.1	3.0	3.5	2.0	4.2	4.5	4.3	4.6	3.1	1.3	4.5	4.0	4.4	4.1	4.5	4.4	3.9
Urban	Score	705	615	645	474	591	423	537	252	624	639	591	639	597	213	636	579	642	573	636	606	mean
	Mean	4.8	4.2	4.4	3.2	4.0	2.9	3.7	1.7	4.2	4.3	4.0	4.3	4.1	1.4	4.3	3.9	4.4	3.9	4.3	4.1	3.8

Source: Own survey, 2009

The mean score of rural and urban students for each individual item is 3.9 and 3.8 respectively. Rural students have scored 14 of the 20 items higher than urban students who have scored only 3 of the 20 items higher. Thus, the comparison of the two groups on individual items also reveals that rural students have relatively performed better in attitude scale. Therefore, rural students have relatively more favorable attitude towards land degradation than their urban classmates.

Table 4.2.9 Results of t-test for students' environmental attitude based on academic stream

Academic stream	No	Sum of scores	Mean	SD	Variance	T-obtained	T- value
Natural	198	15,225	76.89	9.15	83.73	1.47	1.960
Social	132	10,320	78.18	6.78	45.96		

P<0.05

Source: Own survey, 2009

The above table shows that the mean scores of natural and social science students are 76.89 and 78.18 with standard deviation of 9.15 and 6.78 respectively. In order to find out whether there was a significant difference between students attitude about land degradation, t-test was calculated. The result shows that there was no statistically significant difference between natural and social science students. The two groups seem to be similar in their attitude towards land degradation regardless of their academic stream. This finding does not conform with the findings of Taye (2008), which indicates that students of social science stream had higher scores than those of natural science.

Table 4.2.10 Comparison of students' attitude on individual items by academic stream

Items		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
Natural	Score	957	903	858	783	792	576	672	288	840	885	816	879	678	258	873	789	870	798	864	846	Mean
	Mean	4.8	4.6	4.3	4.0	4.0	2.9	3.4	1.5	4.2	4.5	4.1	4.4	3.4	1.3	4.4	4.0	4.4	4.0	4.4	4.3	
social	Score	642	543	591	516	555	393	504	237	555	582	558	600	474	189	579	531	585	534	591	561	Mean
	Mean	4.9	4.1	4.5	3.9	4.2	3.0	3.8	1.8	4.2	4.4	4.2	4.5	3.6	1.4	4.4	4.0	4.4	4.0	4.5	4.3	3.9

Source: Own survey, 2009

The above table compares students' attitude about land degradation on each item based on academic streams. The mean scores for natural and social science students are 3.85 and 3.9 respectively. The scores of social science students are better than those of natural science students in 11 of the 20 items. Natural science students demonstrated more favourable attitude in only 3 of the 20 items. Even though social science students seemed to have a more favourable attitude on individual items than that of natural science students, the t-test result from table 4.2.9 showed that the difference is not statistically significant. Therefore, both groups have similar attitude towards land degradation regardless of their academic streams.

4.3 Students Environmental Practices

To evaluate students environmental practice 15 statements which request them to rate the frequency of their participation in their respective local environments (assigned as never= 0, rarely= 1, sometimes= 2, often= 3, always= 4) were employed.

It was evaluated out of 60 with the maximum possible score of 60 showing high participation and zero the lowest possible score which reveals non-participation in environmental activity.

Table 4.3.1 The mean score of students' environmental practice performance

No	Sum of scores	Mean	Above mean		Below mean		SD	Variance
			F	%	F	%		
330	9,699	29.39	159	48.2	171	51.8	11.97	143.16

Source: Own survey, 2009

The score of each individual was summed up to yield the total score of 9,699. As it can be seen from the table above, the mean score of students environmental practice is 29.39 in which more than half of the students 171(51.8%) scored below the average and 159 (48.2%) were scored above average.

Therefore, the finding of the study shows that students' environmental practice is low. The low score in students' environmental practice might be attributed to the focus of environmental contents on theoretical part, the absence of field trip in the school and the failure of environmental protection club to function properly. The finding of the study is consistent with the findings of Dessalegan (1998), Atlebachew (2006) and Taye (2008), which show that students' practical activities were low.

Table 4.3.2 Students' environmental practice

No of items	Frequencies of participation									
	Never		Rarely		Some times		Often		Always	
	F	%	F	%	F	%	F	%	F	%
1	27	8.2	108	32.7	84	25.5	54	16.4	57	17.3
2	45	13.6	99	30	108	32.7	39	11.8	39	11.8
3	15	4.5	45	13.6	90	27.3	93	28.2	87	26.4
4	66	20	57	17.3	81	24.5	87	26.4	39	11.8
5	54	16.4	69	20.9	84	25.5	48	14.5	75	22.7
6	57	17.3	93	28.2	57	17.3	66	20	57	17.3
7	128	38.8	81	24.5	63	19.1	34	10.3	24	7.3
8	60	18.2	75	22.7	111	33.6	57	17.3	27	8.2
9	69	20.9	87	26.4	78	23.6	54	16.4	42	12.7
10	51	15.5	81	24.5	84	25.5	87	26.4	27	8.2
11	81	24.5	93	28.2	72	21.8	48	14.5	36	10.9
12	51	15.5	81	24.5	69	20.9	63	19.1	66	20
13	78	23.6	57	17.3	78	23.6	60	18.2	57	17.3
14	45	13.6	78	23.6	78	23.6	66	20	63	19.1
15	24	7.3	27	8.2	57	17.3	60	18.2	162	49.1
Total	851	17.19	1131	22.85	1194	24.12	916	18.51	858	17.33

Source: Own survey, 2009

As indicated in the table above, 17.19% of the students never participated in the stated environmental activities, 22.85% of them rarely participated while 24.12% of them took the middle position and only 35.84% of the students participated in an acceptable manner (those rated often and always). This indicates that students' environmental practice is generally low.

According to Asmare (2007), responses always and usually were considered as acceptable while seldom and never as unacceptable.

Table 4.3.3 Gender difference in environmental practice

Gender	No	Sum of scores	Mean	SD	Variance	T-obtained	T-value
Male	189	5,574	29.49	12.22	149.22	0.45	1.960
Female	141	4,125	29.26	11.62	135.04		

P<0.05

Source: Own survey, 2009

The above table shows that the mean scores of male and female students' environmental practices are 29.49 and 29.26 with a standard deviation of 12.22 and 11.62 respectively. In order to check whether there is significant difference between the mean scores of male and female students' environmental practices, t-test was done. Thus, the result showed that there was no statistically significant difference between the two groups. In addition, within the group, the standard deviation revealed that there is similar variation within the two groups. Therefore, the results of the finding showed that both male and female students seem to have similar environmental practices regardless of their gender. This shows that there is no gender difference in students' practices related to land degradation.

Table 4.3.4 Students' environmental practice by gender for each item

Item	Male		Female	
	Score	Mean	Score	Mean
1	372	2.0	294	2.1
2	372	2.0	216	1.5
3	498	2.6	354	2.5
4	396	2.1	240	1.7
5	390	2.1	294	2.1
6	342	1.8	291	2.1
7	231	1.2	171	1.2
8	306	1.6	270	1.9
9	312	1.7	261	1.9
10	360	1.9	258	1.8
11	273	1.4	252	1.8
12	375	2.0	297	2.1
13	375	2.0	246	1.7
14	399	2.1	285	2.0
15	573	3.0	396	2.8
Total/mean	5574	1.96	4125	1.95

Source: Own survey, 2009

The above table compares male and female students in their environmental practice on each item. The mean scores for both male and female students are 1.96 and 1.95 respectively. Male students performed better in 7 of the 15 items while females outscored males in 6 of the 15 items. As the result is consistent with result in table 4.3.3, this also shows that both male and female students have similar environmental practices regardless of their gender.

Table 4.3.5 Results of t-test for students' environmental practices based on place of residence

Place of residence	No	Sum of scores	Mean	SD	Variance	T-obtained	T-value
Rural	183	5,721	31.26	10.08	101.54	3.18	1.960
Urban	147	3,978	27.06	13.28	176.29		

P<0.05

Source: own survey, 2009

As it can be seen from the above table, the mean scores of rural and urban students' environmental practices are 31.26 and 27.06 with standard deviation of 10.08 and 13.28 respectively. In order to judge whether there is statistically significant difference or not between the mean scores of rural and urban students in their environmental practice, t-test was computed. A statistically significant difference was found between the two groups in their practices about land degradation.

The standard deviation also revealed that the variation within the two groups was high among urban students than rural students. Therefore, rural students are engaged more in environmental practices than urban students. This difference might be due to rural students' proximity to and interaction with the outdoor environment and practical engagement in environment related activities.

Table 4.3.6 Students' environmental practice on each item by place of residence

Items	Rural		Urban	
	Score	Mean	Score	Mean
1	393	2.1	273	1.9
2	360	2.0	228	1.6
3	483	2.6	357	2.4
4	396	2.2	246	1.7
5	417	2.3	261	1.8
6	342	1.9	303	2.1
7	237	1.3	165	1.1
8	348	1.9	228	1.6
9	348	1.9	228	1.6
10	333	1.8	285	1.9
11	297	2.6	228	1.6
12	411	2.2	261	1.8
13	369	2.0	252	1.7
14	405	2.2	279	1.9
15	582	3.2	384	2.6
Total/mean	5,721	2.1	3,978	1.8

Source: Own survey, 2009

The above table compares the mean scores of students on each item. The mean scores for rural and urban students are 2.1 and 1.8 respectively. Rural students have performed better in most (13 of the 15 items) compared to their urban classmates. As already discussed in table 4.3.5 the analysis of individual items also revealed that rural students have been engaged more in practices towards land degradation than urban students.

Table 4.3.7 Results of t-test for students' environmental practices about land degradation based on academic stream

Academic stream	No	Sum of scores	Mean	SD	Variance	T-obtained	T-value
Natural	198	6,186	31.24	11.74	137.94	3.59	1.96
Social	132	3,513	26.61	11.32	128.14		

P<0.05

Source: Own survey, 2009

The above table shows that the mean scores of natural and social science students' in their practices related to land degradation are 31.24 and 26.61 with standard deviation of 11.74 and 11.32 respectively. In order to determine whether there is statistically significant difference between the mean scores of natural and social science students in their environmental practice, t-test was done. Thus, the result showed that there is statistically significant difference between the two groups. Therefore, the finding of the study shows that natural science students demonstrated relatively higher practices than social science students. This difference might be due to the incorporation of more environmental practical activities in natural science curriculum than that of social sciences.

Table 4.3.8 Students' environmental practices about land degradation on each item by academic streams

Item	Natural		Social	
	Score	Mean	Score	Mean
1	432	2.2	237	1.8
2	351	1.8	234	1.8
3	525	2.7	327	2.5
4	426	2.2	213	1.6
5	438	2.2	237	1.8
6	396	2.0	249	1.9
7	246	1.2	156	1.2
8	360	1.8	216	1.6
9	360	1.8	216	1.6
10	390	2.0	228	1.7
11	342	1.7	183	1.4
12	456	2.3	216	1.6
13	402	2.0	222	1.7
14	453	2.3	228	1.7
15	609	3.1	351	2.7
Total	6,186	2.1	3,513	1.8

Source: Own survey, 2009

The comparison of the students in their practices related to land degradation based on academic streams on each items revealed that natural science students scored better than social science students in 13 of the 15 items. The mean scores for natural and social science students are 2.1 and 1.8 respectively. This also confirms that natural science students have a better performance on their practice related to land degradation than social science students. The difference might be due to the exposure of natural science students to environmental practice and the incorporation of more environmental practices into natural science curriculums.

Table 4.3.9 Comparison of students' in their environmental knowledge and attitude

Item	No	Sum of scores	Mean	SD	Variance	t-obtained	t- value
Knowledge	330	27,060	82	14.10	198.85	5.1	1.96
Attitude	330	25,545	77.41	8.32	69.19		

P<0.05

Source: Own survey, 2009

As seen in the above table, the mean scores of students' environmental knowledge and attitude are 82 and 77.41 with standard deviation of 14.10 and 8.32 respectively. To find out whether there is a significant difference or not between students' environmental knowledge and attitude, a t-test was computed. The result shows that there is statistically significant difference between the mean scores of students in their environmental knowledge and attitude where the students' score is higher in environmental knowledge than that of environmental attitude. Therefore, the results of the findings revealed that students have more environmental knowledge than attitudes towards land degradation. This implies that possessing high environmental knowledge may not necessarily lead to having more favorable environmental attitudes towards land degradation. The standard deviation also revealed that there is high variation among the students in their knowledge than their attitude towards land degradation.

Table 4.3.10 Comparison of students' environmental knowledge and practices

Item	No	Sum of Scores	Mean	SD	Variance	T-obtained	T- value
Environmental knowledge	330	27,060	82	14.10	198.85	25	1.960
^{2*} Environmental Practice	330	16,015	48.53	19.92	397		

P<0.05

Source: Own survey, 2009

As seen in the above table, the mean scores of students' performance in environmental knowledge and practice are 82 and 48.53 with standard deviation of 14.10 and 19.92 respectively. In order to check whether there is a significant difference between the mean scores of students' environmental knowledge and practice, t- test was done. It revealed that there is statistically significant difference between the scores of students' environmental knowledge and practice. Therefore, the finding of the study communicates that students' environmental knowledge is better than their practical activities related to land degradation. The standard deviation also reveals that there is high variation among the students in their environmental practice than their environmental knowledge. This implies that having environmental knowledge may not necessarily lead to taking environmentally appropriate actions.

^{2*} Environmental practices scored out of 60, but here it is changed to 100% for the sake of comparison convenience.

Table 4.3.11 Comparison of students' environmental attitude and practices

Item	No	Sum of Scores	Mean	SD	Variance	T-obtained	T-value
Environmental attitude	330	25,545	77.41	8.32	69.19	24.3	1.96
*Environmental practice	330	16,015	48.53	19.92	397		

P<0.05

Source: Own survey, 2009

As seen in the above table, the mean scores of students' environmental attitude and practices are 77.41 and 48.53 with their standard deviations 8.32 and 19.92 respectively. The results of t-test revealed that there is statistically significant difference between the mean scores of students' attitude and practices about land degradation. Thus, the finding of the study shows that students' attitude towards land degradation is better than their practices. This implies that favorable environmental attitude may not necessarily lead to taking action to combat the problems. This finding is consistent with the findings of Dessalegn (1998) which indicates that students expressed a favorable attitude towards the conservation of resources with less practice. The standard deviation also reveals that there is high variation among the students in their environmental practices than their attitude towards land degradation.

Table 4.3.12 Summary of students' knowledge, attitude and practices about land degradation

Variables	No	Sum of scores	Mean	SD	Variance
Environmental knowledge	330	27,060	82	14.10	198.85
Environmental attitude	330	25,545	77.41	8.32	69.19
*Environmental practice	330	16,015	48.53	19.92	397

Source: Own survey, 2009

As presented in the above table, the mean scores of students' knowledge, attitudes and practice about land degradation are found to be 82, 77.41 and 48.53% with their respective standard deviation of 14.10, 8.32 and 19.92 respectively. The result of the study shows that students' performance in environmental knowledge about land degradation is relatively higher than their performance in attitude towards land degradation and in turn their performance in attitude is higher than their practices towards land degradation. The finding of the study is consistent with the findings of Elias (2004) which found that awareness, motivation and positive attitudes towards the environmental issues are significantly high among school children while the actual commitment of the students in environmental problem solving is found to be low. This implies that having environmental knowledge and attitude may not necessarily lead to positive environmental practices. It also appears to confirm the findings of Dessalegn (1998), which found that, comparing with awareness and attitude; students' environmental practices were low.

4.4 Relationship among Students' Environmental Knowledge, Attitude and Practices

To examine the relationship among the students' environmental knowledge, attitude and practices correlation coefficient was computed as follows.

Table 4.4.1 Correlation of environmental knowledge, attitude and practices

Variables	Knowledge	Attitude	Practices
Knowledge	1.0	-	-
Attitude	0.56	1.0	-
Practices	0.04	0.27	1.0

Source: Own survey, 2009

The above table shows that the relationship between students' environmental knowledge and attitude are moderately positive, while the relationship between students' environmental knowledge and practices as well as students' environmental attitude and practices are weakly correlated. Therefore, the relationship among students' environmental knowledge, attitude and practices are weak. This is contrary to the assumptions that increased knowledge about the environment, leads to favorable attitudes which in turn leads to actions promoting better environmental quality (Palmer, 1998). It implies that possessing environmental knowledge and attitude may not necessarily lead to actions. The finding of the study consistent with the findings of Melaku (1994), which indicates positive relationship between environmental knowledge and attitude and no significant correlations between environmental knowledge and skills. The relationships of environmental knowledge, attitude and behavioral practices are found to be very weak (Taye, 2008).

Chapter Five

5 Summaries, Conclusion and Recommendation

5.1 Summary and Conclusion

The study was aimed at investigating student's knowledge, attitude and practices about land degradation and related environmental problems. It was also intended to see these variables in terms of gender, place of residence and academic stream. To achieve the intended objectives of the study relevant literature and research findings concerning environmental knowledge, attitude and practices were thoroughly reviewed and included in the review of literature. Environmental knowledge test, attitude scales and environmental activities, which require the students to rate their frequency of practical involvement in their locality, were employed to collect data for the purpose of the study. To analyze the data, percentage, mean, standard deviation, variance, correlation coefficient and T-test were used. T-test was employed to determine the difference in the mean scores of students' knowledge, attitude and practice in terms of their gender, place of residence and academic streams. In this study, $p < 0.05$ was used to show statistical significance. The size of the sample for the study was 330 students selected using proportionate stratified random sampling techniques.

Generally, the finding of the study shows that:

- The level of students' knowledge about land degradation and related environmental problem is relatively high.
- Male and rural students are more knowledgeable and have more favorable attitude towards land degradation and other related environmental issues.
- Both natural and social science students have similar environmental knowledge and attitudes regardless of their academic stream
- Students have positive attitude against land degradation and related environmental problems
- Students' environmental practice related to land degradation is low.

- Male and female students have similar environmental practice.
- Rural and natural science students have demonstrated better practices related to land degradation.
- The comparison of the three variables illustrated that students have performed higher in environmental knowledge than in environmental attitude. In addition, they have performed better in environmental attitude than in environmental practices.
- Generally, students' environmental practices were not in concert with the level of their knowledge and attitude.
- Weak relationships were obtained among students' environmental knowledge, attitude and practices.

5.2 Recommendation

Based on the findings of the study, the following points are recommended:

1. The shaping of attitudes, values, commitment and skills to protect and preserve the environment begins at an early age. Since environmental education is an instrument to equip students with efficient knowledge, attitude and positive environmental practices, it should be considered as lifelong educational program starting from preschool to higher educational programs.
2. A strong linear relationship is expected to exist between student's environmental knowledge, attitude and practices. Despite this fact, the findings of the study revealed that, the relationships among these variables are found to be weak. Therefore, while designing environmental education, curriculum experts should take into account the proportionality of environmental knowledge, attitude and practices.
3. Since environmental education is education about the environment, for the environment and in the environment, positive environmental practices are more developed outdoor than inside the classroom. Therefore, field trips should be organized and projects should be given so that students can apply their theoretical knowledge into practices.
4. Students' environmental practices were not in concert with the level of their knowledge and attitude. In order to enhance students' environmental practices the existing environmental clubs should be strengthened, environmental corners should be established in schools and the school mini-media should play its role in order to replicate positive environmental practices.
5. A single subject alone is not sufficient to equip students with efficient environmental knowledge, attitude and practices. Therefore, teachers should make connections between the subject matter and the environment.
6. The findings of the study communicates that there is a significant difference between rural and urban students in their environmental knowledge, attitude and practices. Since environmental problem is different from country to country and even within the same country from region to region as well as from place to place, while teaching environmental

education teachers should take into account this reality to avoid the disparities existing between rural and urban students in their environmental knowledge, attitude and practices.

7. The comparison of the three variables revealed that students have relatively better environmental knowledge followed by environmental attitude and lowest performance in environmental practices. A good environmental knowledge alone is not sufficient to reverse the existing environmental problems; therefore, while teaching environmental education teachers should give emphasis in developing positive environmental practices rather than simply instructing students on facts. Method of presentation should not let the subject remain as an academic knowledge, but should be systematic to empower students with problem solving skills.
8. Since students are future scientists, land managers and policymakers their environmental knowledge, attitude and practices are particularly important to reverse the prevailing environmental problems. Therefore, it is advisable to conduct further research to equip them with these variables.

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APPENDIXES

Addis Ababa University

School of Graduate Studies

College of Education

Department of Geography and Environmental Education

General Direction

The main objective of the study is to investigate knowledge, attitude and practices of preparatory students about land degradation.

The information you provide is highly valuable for the success of the study. Therefore, the success of the study is based on the accurate information you provide. The information you provide serves only for academic purpose. Therefore, you are kindly requested to answer all the items. No need of writing your name.

Thank you in advance!

Part one: personal information. Put tick mark (✓) in the appropriate box.

1. Sex: Male ☐ Female ☐
2. Place of residence: Rural kebele ☐ district town (Zone Urban) ☐
3. Academic stream: Natural science ☐ Social Science ☐

Appendix A

Part Two

Environmental Knowledge Assessment

The main objective of this part is to assess students' basic knowledge about land degradation and other environmental problems. This part consists of two parts and twenty-five items. The first part contains five true/ false items and the second part consists of twenty multiple-choice items.

2.1 For the following items write “True” if the statement is correct and “False” if the statement is incorrect

- _____ 1. Land degradation is the process that lowers the quality of land.
- _____ 2. The occurrence of land degradation in Ethiopia is entirely due to natural causes.
- _____ 3. Persistent exploitation of land leads to irreversible land degradation.
- _____ 4. The main outcome of land degradation is a substantial reduction in the productivity of land.
- _____ 5. Elements of the natural environment are interdependent.

2.2 For the Following Questions Write the Letter of your choice

- _____ 6. The following are manifestations of environmental degradation in Ethiopia except
- A. The continuous occurrence of droughts
 - B. The reduction of productivity of land
 - C. The loss of biodiversity
 - D. The enhancement of quality of the environment

- _____7. The main and visible environmental problem in Ethiopia include
- A. Soil erosion
 - B. Degradation of soil fertility and decrease in productivity
 - C. Deforestation and soil exposure D. All
- _____8. The mechanisms of addressing Ethiopian environmental problems include
- A. Making effort to prevent further population growth
 - B. Protecting farmlands
 - C. Covering the land with vegetation D. All
- _____9. In which part of Ethiopia is land more degraded?
- A. Eastern B. Western C. Northern D. Southern
- _____10. One of the following is not a cause of land degradation
- A. Fallowing B. Overgrazing
 - C. Soil erosion D. Deforestation
- _____11. Which one of the following is the consequence of land degradation?
- A. Poverty B. Migration and displacement of people
 - C. Drought and desertification D. All
- _____12. The most serious cause of deforestation in rural Ethiopia is
- A. Clearing the land for agriculture
 - B. Cutting trees for fuel wood
 - C. Cutting trees for construction materials D. Urbanization
- _____13. The major environmental problem in rural Ethiopia is

- A. Urbanization B. Industrial pollution
C. Land degradation D. Water pollution

_____ 14. Which one of the following is not true?

- A. Soil erosion leads to decline in productivity.
B. Overgrazing accelerates soil erosion.
C. Over cultivation results in sustainable land management.
D. Vegetation cover reduces soil erosion.

_____ 15. Which one of the following is the direct cost of land degradation?

- A. The decline in production due to nutrient losses.
B. The loss of livestock carrying capacity.
C. The decline in cropped area. D. All

_____ 16. The following are methods of maintaining soil fertility except

- A. Contour ploughing B. Crop rotation
C. Manuring D. Deforestation

_____ 17. Which one of the following is modern method of maintaining soil fertility?

- A. Strip cropping B. Mulching
C. Artificial fertilizers D. All

_____ 18. The following are measures for controlling soil erosion except

- A. Afforestation and reforestation B. Terracing
C. Controlled grazing D. Overgrazing

_____ 19. High population growth results in

- A. Degradation of soil B. Over-use of cultivable land
C. Shortage of cultivable land D. All

_____ 20. Which one of the following is a cause of soil erosion?

- A. Terracing B. Crop rotation
C. Intercropping D. Deforestation

_____ 21. Which one of following is improper land management?

- A. Cultivation of fragile soils B. shortening fallowing period
C. Excessive use of chemical fertilizers D. All

_____ 22. Farming practices that are used to conserve the land include

- A. Intercropping B. use of semi-permanent crops like enset
C. Use of legume crops D. All

_____ 23. One of the following factors of land degradation is not a human factor

- A. Overgrazing B. Over cultivation
C. Topography D. Deforestation

_____ 24. The method by which a much used and over cultivated land allowed
to rest is

- A. Manuring B. Crop rotation C. Fallowing D. Mulching

_____ 25. Covering the land with grass and crop residue to reduce evaporation
and erosion is

- A. Strip cropping B. Fallowing
C. Mulching D. Crop rotation

Appendix B

Part Three

Attitude towards Land Degradation

For the following statements, please indicate how you feel about it by putting tick mark (✓) in the column that best indicate your agreement or disagreement.

Strongly agree=5, Agree=4, Undecided=3, Disagree=2, strongly agree=1

☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	
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☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5					
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Muummee Ji'oogiraafii fi Barnoota Naannoo

Afan Oromo Version of the questionnaires

Qajeelfama Dimshaashaa

Kaayyoon qorannoo kanaa inni guddaan beekumsa, ilaalchaa fi raawwii barattoonni mana barumsaa qophaa'inaa waa'ee manca'iinsa lafaa irratti qaban adda baasuudha. Odeefannoo ati dhimma kana irratti kennitu galma ga'iinsa qorannoo kanaaf baay'ee barbaachiisaadha. Kanaafuu, galma ga'iinsi qorannoo kanaa odeefannoo sirrii ati kennitu irratti hundaa'a. odeefannoo ati kennitu kun dhimma barnootaa qofaaf oola. Kanaaf gaaffilee kanneen hunda akka ati amanamummaan deebisu abdii guddaan qaba. Maqaa kee barreessuun immoo hin barbaachisu.

Galatoomi !

Kutaa Tokkoffaa: Odeefannoo dhuunfaa. Saanduqa sirrii ta'e keessatti mallattoo kana(✓) kaa'uun agarsiisi.

1. Saala: Dhiira ☐ Dhalaa ☐
2. Bakka jireenyaa: Baadiyyaa ☐ Magaala Aanaa ykn Godinaa ☐
3. Istiriimii Barnootaa: Saayinsii uumamaa ☐ Saayinsii Hawaasaa ☐

Kutaa Lammaffaa

Madaallii Beekumsa Naannoo

Kaayyoon kutaa kanaa beekumsa bu’uuraa barattoonni waa’ee manca’iinsa lafaa fi rakkoolee naannoo uumamaa biroo irratti qaban madaaluudha. Bar-gaaffiin kun kutaalee lamaa fi gaaffilee 25 qaba. Kutaan jalqabaa gaaffilee dhugaa fi sobaa shanii fi kutaa lammaffaan immoo gaaffilee filannoo 20 qaba.

2.1. Gaaffilee armaan gadii yoo sirrii ta’e “Dhugaa” yoo sirrii hintaane immoo “Soba” jechuun deebisi.

- _____1. Manca’iinsi lafaa adeemsa xaa’ummaa lafaa hir’isudha.
- _____2. Itoophiyaatti manca’iinsi lafaa irra caalaa kan dhufu sababoota uumamatiin.
- _____3. Osoo wal-irraa hin kutiin yeroo dheeraaf garmalee lafatti fayyadamuun manca’iinsa lafaa dandamachuu hin dandeenye fida.
- _____4. Dhiibbaa guddaan manca’iinsa lafaa bu’aan lafa irraa argamu hir’achuudha.
- _____5. Wantoonni naannoo uumamaa keessatti argaman kan walirratti hirkatanidha.

2.2. Gaaffilee armaan gadiitiif deebii sirrii ta’e filadhu

- _____6. Itoophiyaatti kanneen armaan gadii keessaa tokko agarsiistota manca’iinsa naannoo uumamaa miti.
 - A. Gogiinsi walitti fufiinsaan dhufuu
 - B. Bu’aan lafarraa argamu xiqqaachuu
 - C. Lubbu qabeeyyiin adda addaa baduu
 - D. Mijaa’inni naannoo uumamaa dabalaa deemuu
- _____7. Itoophiyaatti rakkoon naannoo uumamaa inni guddaa fi qabatamaan:
 - A. Dhiqama biyyee B. manca’iinsa xaa’ummaa lafaa fi hir’ina callaa
 - C. cirama bosonaa fi biyyeen lolaaf saaxilamuu D. hunduu deebiidha.
- _____8. Itoophiyaatti tooftaaleen rakkoolee manca’iinsa naannoo uumamaa hir’isuuf gargaaran:

- ___9. Kutaalee Itoophiyaa keessaa kan manca'iinsa lafaatiin irra caalaa hubame kami?
A. Bahaa B. Dhiha C. Kaaba D. Kibba
- ___10. Kanneen armaan gadii keessaa tokko sababa manca'iinsa lafaa miti.
A. Lafa bajjeessuu B. Garmalee dheechisuu
C. Dhiqama biyyee D. Cirama bosonaa
- ___11. Kanneen armaan gadii keessaa kan miidhaa manca'iinsa lafaatiin dhufu kami?
A. Hiyyummaa B. godaansa uummataa
B. Gogiinsaa fi gammoojjummaa D. hunduu deebiidha.
- ___12. Baadiyyaa Itoophiyaa keessatti sababa guddaan cirama bosonaa fidu kami?
A. Hojii qonnaaf bosona ciruu B. qoraaniif muka muruu
C. Hojii ijaarsaaf mukkeen muruu D. babal'ina magaalaa
- ___13. Baadiyyaa Itoophiyaa keessatti rakkoo guddaan manca'iinsa naannoo uumamaa kami?
A. Babal'ina magaalaa B. sababa warshaaleetiin faalamuu naannoo
C. Manca'iinsa lafaa D. faalama bishaanii
- ___14. Kanneen armaan gadii keessaa kan dhugaa hin taane kami?
A. Dhiqamni biyyee hir'ina callaa fida
B. Garmalee dheechisuun dhiqama biyyee fida
C. Utuu walirraa hin kutiin yeroo dheeraaf lafa qotuun kunuunsa lafaaf gaariidha.
D. Biqiloota dhaabuun dhiqama biyyee hir'isa.
- ___15. Kanneen armaan gadii keessaa miidhaa manca'iinsa lafaa kan ta'e kami?

A. callaan hir'achuu B. lafti beeladaaf marga biqilchuu dadhabuu

C. Lafti qonnaaf oolu xiqqaachuu D. hunduu deebiidha.

____16. Kanneen armaan gadii keessa tokko tooftaa xaa'ummaan biyyee ittiin eegamumiti.

A. Dalga qotuu B. sanyii jijjiiruun facaasuu

C. dikee looniitti gargaaramuu D. bosona mancaasuu.

____17. Kanneen armaan gadii keessaa tooftaan ammayyaa kan ittiin xaa'ummaan lafaa eegamu kami?

A. midhaan gosa adda addaa bo'oo bo'oon facaasuu

B. biyyee haafa adda addaatiin uwwisuu

C. xaa'oo nam-tolcheetti fayyadamuu D. hunduu deebiidha.

____18. Kanneen armaan gadii keessaa tokko tooftaa dhiqama biyyee to'achuuf gargaaru miti.

A. Lafa bosonaan uwwisuu B. bo'oo baasuu

C. qusannaan dheechisuu D. garmalee dheechisuu

____19. Kanneen armaan gadii keessaa kan sababa baay'ina uummataatiin dhufu kami?

A. Manca'iinsa biyyee B. lafa qonnaatti garmalee gargaaramuu

C. lafti qotamuu danda'u xiqqaachuu D. hunduu deebiidha.

____20. Kanneen armaan gadii keessaa sababa dhiqama biyyee kan ta'e kami?

A. Bo'oo baasuu B. sanyii jijjiiranii facaasuu

C. sanyii gosa adda addaa walkeessa facaasuu D. bosona mancaasuu.

____21. Kanneen armaan gadii keessaa kunuunsa lafaaf kan sirrii hin taane kami?

- A. Lafa qonnaaf hin mijooofne qotuu
- B. Yeroo lafa bajjeessuu xiqqeessuu
- C. Xaa'oo nam-tolchee hanga barbaachisuu ol fayyadamuu
- D. Hunduu deebiidha.

____22. Hojiiwwan qotiisaa armaan gadii keessaa kan lafa kunuunsuuf gargaaru kami?

- A. Sanyii gosa adda addaa walkeessa facaasuu
- B. Biqiloota umurii dheeraa hanga tokko qaban kanneen akka qochootti fayyadamuu
- C. Midhaan lafa xaa'omsanitti gargaaramuu.
- D. Hunduu deebiidha.

____23. Sababoota manca'iinsa lafaa armaan gadii keessaa kan gocha dhala namaa hin taane kami?

- A. Garmalee dheechisuu
- B. Lafa aaragalfii malee yeroo dheeraaf qotuu
- C. Teesuma lafaa
- D. Manca'iinsa basonaa

____24. Tooftaan lafa yeroo dheeraaf qotamaa ture qotuu dhiisuun aaragalfachiisan maal jedhama?

- A. Dikee loonii itti gatuu
- B. sanyii adda addaa jijjiiruun facaasuu
- C. bajjeessuu
- D. biyyeerra haafa afuu

____25. Wantoota adda addaan biyyee uwwisuun hurkaa fi lolaa ittiisuun maal jedhama?

- A. midhaan gosa adda addaa bo'o bo'oon facaasuu
- B. lafa bajjeessuu
- C. biyyeerra haafa afuu

D. Sanyii jijjiiranii facaasuu.

Kutaa Sadaffaa

Ilaalcha barattoonni manca'iinsa lafaa irratti qaban

Himoota armaan gadiitiif ilaalcha qabdu mallattoo ($\sqrt{\quad}$) roga sirrii ta'e keessa kaa'uun agarsiisi.

Hima eeyyeessaaf sirritti waliingala=5, Waliingala=4, Hinmurteessine=3, Waliingalu=2, Sirritti waliingalu=1, tartiibni kun himoota lakkisaaf faallaa ta'a.

Himoota	Sirritti waliingala	Waliingala	Hinmurtee-ssine	Waliingalu	Sirritti waliingalu
1. Hundi keenya kunuunsa lafaa irratti damaqinaan hirmaachuutu nurraa eegama.					
2. Manca'iinsi lafaa seera uumamaati.					
3. Namni hundumtuu manca'iinsa lafaa to'achuuf shoora olaanaa taphachuu danda'a jedheen amana.					
4. Baadiyyaa Itoopiyaatti bosona ciruun karaa ittiin abbaa qabeenyaa lafaa ta'an ta'ee fudhatamaa jira; kanaafuu, gochaan kun jajjabeeffamuu qaba.					
5. Naannoon uumamaa keenya sababa raawwii gochaa miidhaa qabuutiin manca'aa jira.					
6. Manca'iinsa lafaa eeguun dirqama mootummaati.					
7. Akkuma fedhii keenya har'aa guutachuuf garmalee lafatti gargaaramaa deemnuun qabeenya uumamaa dhaloota egereef gargaaru balleessa deemna.					
8. Manca'iinsi lafaa dhaloota egeree miidha; kanaafuu yaada'uu hin barbaachisu.					
9. Manca'iinsa lafaa ittisuuf oduu maayii hin baafnerra gochaan agarsiisuutu caala.					
10. Biyyeen yoo manca'eyyuu deebi'uu waan danda'uuf kunuunsuun barbaachisaa miti.					
11. Manca'iinsa lafaatiif furmaata argachuu dandeenya.					
12. Barnoonni naannoo kunuunsa lafaatiif bu'aa buusu hin qabu.					

13. Naannoo uumamaa keenya kenuunsuun dhimma jirachuu fi jiraachuu dhiisuuti.					
14. Qonnaan bultoonni kunuunsaa lafaa irratti itti gaafatamummaa fudhachuu qabu.					
15. Nuti barattoonni kunuunsaa naannoo keessatti shoora olaanaa taphachuu dandeenya jedheen amana.					
16. Manaca'iinsi lafaa rakkoo yeroo muraasaati.					
17. Lafa manca'iinsarraa oolchuuf hundi keenya itti gaafatamummaa fudhachuu qabna.					
18. Lafa dhaloota egereef qusachuura har'a itti fayyadamuutu caala jedheen amana.					
19. Namni hundumtuu bu'aa naannoo har'a jirutti dhaloonni egeree akka itti gargaaramu gochuuf ittigafatamummaa qaba.					
20. Qabeenya lafaatti sirnaan gargaaramuun nurraa hin eegamu.					

kutaa Arfaffaa

Madaallii gochaawwan barattoonni kenuunsaa naannoo irratti qaban

Himoota armaan gadii keessatti hanga hirmaannaa kee agarsiisuuf roga sirrii ta'e keessatti mallattoo (✓) kaa'uun agarsiisi.

0= gonkumaa 1= darbee darbee 2= yeroo tokko tokko
3= yeroo baay'ee 4= yeroo hundaa

Gochaawwan	Gonkumaa	Darbee darbee	Yeroo tokko tokko	Yeroo baay'ee	Yeroo hundaa
1. Fedhaan sagantaa kunuunsaa naannoo keessatti hirmaachuu.					

2. Fedhii fi dammaqinaan gochaawwan bo'oo baasuu irratti hirmaachuu.					
3. Duula biqiltuu dhaabuu keessatti hirmaachuu.					
4. Waa'ee miidhaa manaca'iinsa lafaafi sababoota isaa maatii ykn hawaasa naannoo barsiisuu.					
5. Duula kunuunsa biyyee keessatti hirmaachuu.					
6. Karaa gumii kunuunsa naannoo mana barumsaa kunuunsa lafaa keessatti hirmaachuu.					
7. Waa'ee manca'iinsa lafaa fi rakkoo naannoo uumamaa biroo gumii xiq-quunnamtii mana barumsaaf barreeffaman gumaachuu					
8. Waa'ee rakkoo manca'iinsa lafaarratti hiriyyootaa fi barsiisota wajjiin mari'achuu.					
9. Rakkoowwan naannoo ummamaarratti hawaasa naannoo wajjiin mari'achuu.					
10. Waa'ee rakkoolee naannoo uumamaa irratti barreeffamoota adda addaa dubbisuu fi sub-qunnamtii hordofuu.					
11. Manca'iinsa lafaa hir'isuuf qaamota dhimmi kun ilaalu kenneen akka hojjetoota misoomaa, gumii kunuunsa naannoo ykn dhaabbilee kunuunsa naannoo waliin hojjechuu.					
12. Waa'ee sababoota manca'iinsa lafaa hawaasa gidduutti hubannoo horuu.					
13. Naannoo keenya kunuunsuuf hawaasa naannoo fi barattota sadarkaa adda addaa irra jira dadamaqsuu.					
14. Hawaasa naannoo waliin tooftaalee kunuunsa lafaa hojiirra oolchuu					
15. Hawaasni naannoo akka bosona hin cirre gorsuu.					

DECLARATION

I am hereby to declare that this thesis is my work and all sources of materials used in this thesis have been duly acknowledged.

Name:

Teka Bekuma

Signature:

Date:

Place:

Advisor:

Dr. Aklilu Dalelo

Signature:

Date:
