

Natural Resource Degradation and Famine in Ethiopia

Assessment of Students' Awareness and Views

By

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DEDICATION

*This work is dedicated to **my teachers** at*

Gerema,

Damboya and

Durame

primary and secondary schools

who laid a foundation for my further education.

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ABSTRACT

Natural resource (particularly land) degradation and famine are two of the most serious environmental problems wrecking havoc on the life of millions in Ethiopia. One aim of this study was to examine the extent of these problems and the way in which they have been addressed in the Ethiopian school curriculum. The second and major aim of the study was to investigate students' awareness of and views about natural resource degradation and famine.

Documents were gathered and analysed to secure information on natural resource degradation and famine (extent, causes, consequences and solutions). The geography curriculum was examined to see the extent to and ways in which these issues have been addressed in schools. An awareness test and attitude scale were developed and administered to students. More than 1100 students took part from junior and senior secondary schools of Kembata-Alaba-Tembaro zone, southern Ethiopia; and Awassa Teacher Training Institute.

The country is in a critical state of resource degradation and depletion. Forestland shrank to 2.4%. Annually, 150,000–200,000 hectares of forestland have been cleared mainly to secure farming land. Four fifths of the highlands have already been rendered fragile so much so that their future use depends on application of conservation methods of one sort or another. This resulted in effects that are quantifiable and non-quantifiable. Among the latter are depletion of surface and subsurface water resources; unemployment and out migration; fragmentation of farmland and long walking distances; shortage of food and malnutrition; and lack of fuel wood and building materials. Attempts were made to express the effects of natural resource degradation and depletion in economic terms. About 17% of the potential agricultural GDP is known to have been lost owing to physical and biological soil degradation. An annual decrease of 1.1 million tropical livestock units (TLUs) (due to the degradation of pasture land) has been registered. Cost of deforestation was estimated to reach 6-9% of the GDP.

Famine is a problem now widely considered a symbol of the country. During the last two or three decades, Ethiopia has suffered more than any other country. Climatic vagary is one accountable factor, with drought playing the prominent role. Among the socio-economic factors are the constant fall in food production in the face of the ever growing population; the traditional system of production; deterioration of household resources; shortage of alternative employment opportunities; taxes and payments; the market; and war and political instability.

Assessment of the place of issues related to the use and management of natural resources in the geography curriculum for Ethiopian schools shows that there are ample opportunities in the existing curriculum to address such issues. The way the issues were actually addressed is far from being acceptable. In the few instances where these issues were raised, discussions were politically motivated, figures outdated and concepts disintegrated with little or no logical flow. Investigation of students' awareness about such issues revealed a remarkable deficiency. Only one fourth of the participants were able to give three correct responses about the causes, consequences and solutions of land degradation. Student's awareness of some key issues like the impact of population growth was also found to be too low to be rated sufficient. Insufficient was also the students' awareness of the natural resource base of the country.

Participants of this study were found to have a favourable view as to the value of natural resources and the potential contribution of the community to natural resource management. Their view got sharply divided on the preservation of such resources for future generations. They seem to believe that it is meaningless to talk about future generations in Ethiopia. Natural factors are made most accountable to famine. About one fifth of the students considered laziness as one of the three major causes of famine in the country. Accordingly, students proposed hard work as the main solution.

Based on the findings of the study, it is recommended that an aim oriented education on use and management of natural resources be provided in Ethiopian schools and teacher training institutions. Such an education is expected to be comprehensive enough to cover issues ranging from the study of the principles governing the interrelationship between components of the ecosystem to the techniques of protection and preservation of resources. Issues related to the protection of the environment and management of natural resources are recommended to form the core of the curricula for geographic education at all grades.

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1 INTRODUCTION

1.1 BACKGROUND

1.1.1 Centuries of Continuous Degradation: The State of Natural Resources in Ethiopia

The northern and central highlands of Ethiopia have suffered for centuries from severe natural resource degradation. The result has been revealing itself either in the form of a general deterioration of the physical environment or more specific and easily noticeable events like scarcity of arable land and shortage of fuel wood. Frightening predictions have been made that in a decade or two, the country will have all her vegetation cut off and all the grazing land used up.

Natural Resource Degradation and Famine

The other problem which has made itself the symbol of the country is famine. At this very moment, government officials declared that 8.1 million people (about 14% of the total population) are threatened by famine. The social, economic and psychological evils inflicted by series of famines are too complex to measure and to express in conventional terms. Diverse factors have been put forth in an attempt to describe and explain famine in Ethiopia. Some relate it to natural hazards like drought that hit the country not only hard but repeatedly. Degradation of natural resources like soil has also been made accountable. Others put the blame on socio-political factors like the corrupt and inefficient political system. There are some who consider famine as a curse, a punishment from God for the sins committed by the inhabitants.

Are schools in Ethiopia Promoting Awareness about Natural Resource Use and Management?

A good deal of knowledge seems to have been existing about the problem of natural resource degradation and famine in Ethiopia. Recommendations have been made and practical measures taken to reverse the effects of environmental degradation in general and land degradation and famine in particular. There are some success stories recorded though the danger is far from being removed.

Whether the issue is equally appreciated by curriculum experts in Ethiopia and given its due place in the curriculum is yet to be seen. This study is primarily concerned with assessing students' awareness of and views about the problem of natural resource degradation and famine in Ethiopia. Besides, the syllabi of Geography, is thoroughly investigated to see the place given in the curriculum.

1.1.2 The Premise

This study was based on the premise that schools have a lot to contribute not only to the protection of the environment in general but also to the abatement of environmental problems. Schools, as centres of formal education, have the responsibility of preparing children for struggle against environmental degradation. They can carry out this responsibility by promoting a deeper understanding of the environment and environmental problems; and by encouraging their students to demonstrate concern and willingness (ALAIMO, 1978).

There is another possibility for schools to contribute to the protection of the environment. They can design and implement strategies aimed primarily at disseminating information and influence the attitude of parents via their children: “what is clear, at any rate, is that Environmental Education in schools appears to have beneficial effects not only on pupils, but also on their parents via the influence of the children” (GIOLITTO and SOUCHON, 1991:311). This was supported by another study. LEEMING, et al., (1997) reported that children who participated in a program related to environmental protection influenced their parents to adopt pro-environmental behaviours.

The strategy of using schools to reach the grassroots population is the most efficient one in less developed countries where the other means of reaching the grassroots population is weak or unattainable. Hence the argument that education, an extremely poorly developed public service in the rural areas of most developing countries, has a greater potential for reaching rural masses than most (in the case of Ethiopia perhaps all) of the other government networks (BERSTECHER, 1985). BERSTECHER (1985:53) argues further that education “has institutions and personnel within convenient reach of the large majority of the rural people and it is the only network whose personnel actually live in the villages they are supposed to serve”.

1.2 THE PROBLEM AND AIM OF THE STUDY

Schools of the developing countries are criticised of acting as dispensers of bookish knowledge, contributing ‘nothing’ to prepare young people for the real world, and thereby accelerating the drift of the youth to the towns where they find nothing but unemployment, slums and delinquency (UNESCO, 1980). Some twenty five years ago, when the idea of environmental education in schools was not widely spread, MALASSIS (1976) proposed a way of solving this problem. His argument was that young people be trained by a new kind of general education which enables them to face their present and future problems including population explosion, depletion of natural resources and the deterioration of the natural environment.

As far as Ethiopia is concerned, there are some indications that issues listed by MALASSIS are integrated into some of the traditional subjects (ICDR, 1992; KIFLE, 1995; ASSEFA and YOHANNES, 1995). Biology and geography, in particular, have been playing the leading role in addressing these issues. There is, however, serious paucity of information on students’ awareness of and views about environmental degradation. Such information is necessary for planning education at large and Environmental Education (EE) in particular at all levels ranging from policy making to classroom instruction. It was argued that adequate response, at the beginning of the planning process, to questions relating to students’ beliefs and attitudes toward the environment will not only provide a basis for assessing progress during the different stages of plan development but also enhance the ultimate success of any EE program (ROTH and PEREZ, 1989). A main objective of this study was therefore to answer the question as to whether students have the awareness of and favourable attitude towards the problem of environmental degradation, especially natural resource degradation.

The second objective of this study is related to famine. Ethiopia has long been considered a symbol of famine (HURNI, 1994). Nobody can argue that famine was and is not occurring in the country. There are divergent views as to why it is occurring and recurring. The range goes from the simplest view that reduces famine to ‘a symptom of

drought' all the way to complex explanations being put forth by experts and researchers in the social sciences. For the latter, famine is a result of an interplay between the natural, socio-cultural, political and economic forces operating at local, national and international levels (MESFIN, 1984, GIRMA and YACOB, 1988; DANIEL, 1990; HAREIDE, 1990; BAYLISS-SMITH and OWENS, 1994).

The understanding of the multiplicity of forces behind famine and the complex system in which they operate is a prerequisite to take any meaningful measure to control, or at least minimise evil effects. Schools are expected to create an awareness about these complex factors of famine. Ethiopian schools are all the more expected to do this job as they are operating in communities where the problem is severe. So far, not much is known about the views students have on famine and its prevention. The second major objective of this study was thus investigating students' views about famine in Ethiopia.

Objectives more Specified

The main aim of this study was the assessment of students' awareness of and views about the problem of natural resource degradation and famine. The more specific objectives are:

- 1) To investigate the extent and degree of severity of the problem of natural resource degradation and famine in Ethiopia;
- 2) To examine the extent to which issues related to the use and management of natural resources are covered in Geography syllabi for Ethiopian secondary schools;
- 3) To assess students'
 - awareness of and views about issues related to the use and management of natural resources; and
 - views about causes of and possible solutions to the problem of food insecurity and famine;
- 4) To identify factors determining students'
 - awareness of and views about issues related to natural resource use and management; and
 - views about the problem of food insecurity and famine.

1.3 VARIABLES AND HYPOTHESES

Variables

In this study five variables (three independent and two dependent) were identified for testing. These are:

Independent variables:

- Sex
- Grade level
- Academic stream

Dependent variables:

- Awareness about issues related to the use and management of natural resources
- Views about the causes of and possible solutions to the problem of natural resource degradation and famine

Hypotheses

Based on the review of literature on the state of environmental education in Ethiopia and elsewhere and reports on students' knowledge and attitude towards the diverse environmental issues, the following hypotheses were stated:

- 1) Students at all levels have 'basic awareness'¹ about the issues related to the use and management of natural resources.
- 2) There is a significant difference (5% significance level) between the following groups of students with regard to their awareness of and views about the use and management of natural resources and famine:
 - male and female students;
 - students of grades eight, eleven and trainees of TTI; and
 - students with and without geography background.

1.4 RESEARCH METHODOLOGY

This study involved two distinct methods of gathering data. First, information on the problem of natural resource degradation and famine in Ethiopia. The extent to which issues related to the use and management of natural resources have been addressed in geography syllabi for Ethiopian schools was gathered from secondary sources. Second, field research was carried out to assess students' awareness of and views about the problem.

1.4.1 Document Analysis

The documents prepared by the Ethiopian Environmental Protection Authority (EPA) and the Ethiopian Highlands Reclamation Study were, among others, used to determine the extent and severity of natural resource degradation. The way natural resource use and management is treated in the Geography syllabi for Ethiopian secondary schools was investigated using the curriculum. The analysis covered the syllabi, teachers' guide and all the students' textbooks prepared by the Ethiopian Institute of Curriculum Development and Research (ICDR). A check-list was developed (Table 1.1).

¹ This is to be measured through their response to the items in the questionnaire (the awareness test). Having 'basic awareness' is defined here as being able to give correct answers to at least half of the items in the questionnaire.

Table 1.1 Check-list for reviewing the place of ‘issues related to the use and management of natural resources’ in the syllabi and student textbooks of Geography for Ethiopian secondary schools

CHECK-LIST
<p>A. Objectives:</p> <ol style="list-style-type: none"> 1. To what extent are issues related to the use and management of natural resources reflected in the objectives? 2. Do the objectives cover the different domains: knowledge, skills, attitude, and a favourable change in behaviour as related to natural resource use and management?
<p>B. Content:</p> <p>Does the content include the following issues related to the use and management of natural resources? If it does, to what extent?</p> <ol style="list-style-type: none"> 1. Economic and non-economic values of natural resources 2. The causes of natural resource degradation 3. The consequences of natural resource degradation 4. Measures against natural resource degradation 5. Concrete examples on problems relating to use and management of natural resources in Ethiopia 6. Concrete examples on problems relating to use and management of natural resources in other countries or regions

1.4.2 Field Research

1.4.2.1 Preparation of Data Gathering Instruments

Two types of instruments were developed to assess students’ awareness of and views about issues related to natural resource use and management and the problem of food insecurity and famine in Ethiopia: Awareness test and attitude scale. Both instruments had been constructed on the basis of an extensive review of literature (Chapters 2, 3 and 4).

Awareness Test: Construction of Pre-test Version

Students’ awareness of issues related to the use and management of natural resources was measured through their response to items in the test:

- The value of land as a natural resource;
- The extent of the problem of natural resource degradation in Ethiopia; and regions most affected;
- Causes and consequences of natural resource degradation;
- Appropriate measures against natural resource degradation.

The questionnaire had three parts. The cover page had information on the aim of the research emphasising that responses will have no negative impact. Students were also told that there would be no time limit and they could ask for clarifications by raising hands. In the first part of the main body of the questionnaire, students were requested to supply personal data – age, sex, academic stream, etc. In the second part students were asked to give a free response to five items related to land degradation and famine. In relation to

land degradation, they were asked to write FOUR of the most important causes, consequences, and cures.

With regard to famine, students were required to describe TWO of the major famines that affected most or almost all of the Ethiopian population; and ONE such famine that affected most or almost all of the population in their district. It was noted in the questionnaire that the description of the major famines should include the time of its occurrence, its causes, consequences, measures taken to reduce its effects and areas most affected.

The third and last part of the awareness test had 34 statements that were related to the value of natural resources (mainly soil and natural vegetation) and resource degradation. Half of the statements raise general issues related to the use of natural resources and their degradation. The other half deals specifically with the causes, consequences and cures of natural resource degradation. For each of these statements, students were given three alternatives to choose from: TRUE, NOT SURE, NOT TRUE. The statements were constructed in such a way that they would produce either a clearly true response (15 statements) or an unequivocally false (19 statements).

Attitude Scale: Construction of Pre-test Version

Students' views about issues related to the use and management of natural resources and the problem of food insecurity and famine were measured through their response to 'attitude statements'. The statements were drawn from the following areas:

- Significance of natural resources (mainly soil and natural vegetation),
- Ethical issues relating to the use of such resources,
- Measures for the protection and preservation of natural resources,
- Measures against resource loss and degradation, and
- The causes of famine and ways to control its occurrence.

The questionnaire had three parts, the cover page and first part being exactly the same to the awareness test. The second part of the attitude scale was to examine students' views about the seriousness of some major environmental problems in Ethiopia as a whole and in the district they live in particular. Accordingly, a list of ten problems (soil erosion, deforestation, famine, desertification, overpopulation, drought, shortage of grazing land, shortage of farm land, low productivity of land and variability of rains) was provided and students were requested to give their opinion by rating each problem 'Very serious' or 'Serious but not very much' or 'Not serious'. In addition to rating the problems, students were asked to identify the five most serious problems and put them in a rank order for the country as a whole and their respective district.

The third part of the instrument was to measure the students' attitude. To this end, a Likert-type attitude scale composed of 47 statements was constructed. Twelve statements raise general issues related to the use and protection of natural resources, 20 statements are related to causes and cures and the remaining 15 raise to famine – its causes and cures. Some of the statements were worded so that agreement to the statement would mean a favourable attitude (32 statements). Others were worded such that disagreement to the statements would mean a favourable attitude (15 statements). An attempt was made to

avoid neutral or extreme statements, and keep the statements moderately positive or negative. Items in the scale were placed in random order.

Students were asked to indicate their views about the statements by choosing one of five alternatives given under each statement: strongly agree, agree but not very much, uncertain, disagree but not very much, and strongly disagree.

Checking the Reliability and Validity of the Instrument

Validity is defined as “an estimate of the degree to which an evaluation procedure measures what it is designed to measure, while reliability indicates that similar results can be obtained by repetition under similar circumstances” (LUCKO et al., 1982:10). There are a number of ways to check the reliability and validity of an instrument like the one constructed for this study (DUNLAP and VAN LIERE, 1978; ALBRECHT et al., 1982; SHRIGLEY and KOBALLA, 1984; MUSSER and MALKUS, 1994; SMITH-SEBASTO and D’COSTA, 1995; LEEMING, et al., 1995; GARDNER, 1996). The following steps were followed to check the reliability and validity of the awareness test and attitude scale.

Reliability

The initial (pre-test) version of the instrument was administered to grade eleven students of Durame Senior Secondary School, southern Ethiopia, in February 1998. The awareness test and attitude scale were completed by 63 and 55 students respectively. An item analysis was conducted to check the internal consistency of the items making up the awareness test and statements making up the attitude scale.

The best items, i.e., items that differentiate or discriminate most between students were selected by using an adjusted or corrected item to total correlation index, i.e by correlating students’ score on each item with their total score minus the score for the item in question (McIVER and CARMINES, 1983:30). Items with the lowest index were eliminated as they have low correlation with the other items. As a result, the post-test version of the instrument had a fewer number of items in the third section of both tests (see Appendices I/II).

Other changes were made on the pre-test version to enable students to complete the questionnaire within an acceptable time. It took about two hours to complete the pre-test version and that was felt too long. Some parts were thus shortened with maximum effort to limit distortion. Students were, for instance, asked to write three explanations as to the causes, consequences and cures of land degradation and famine instead of four. Similarly, the ten environmental problems were categorised on the basis of their seriousness in the country as a whole (in the pre-test version, such a categorisation was also made to students’ districts).

The Kuder-Richardson formula 20 (THORNDIKE and HAGEN, 1969:185), used to estimate the reliability of the awareness test, was computed to be 0.75. In the case of the attitude scale, coefficient alpha was used to assess reliability (CARMINES and ZELLER, 1985:44). It was calculated separately for the two parts of the attitude statements, i.e. natural resource use and management and famine. More or less the same alpha of 0.67 and 0.66 was computed for the two parts respectively. One can consider the computed alpha sufficient to make the instrument reliable as coefficient alpha is a relatively more conservative method of measuring reliability (MUSSER and MALKUS, 1994:23). Alpha

coefficients upwards of 0.50 are sufficient for scale reliability in the early stages of research (ALBRECHT, et al., 1982:43).

Validity

Two steps were taken to enhance content validity of the instrument. The first was undertaking an extensive review of literature (see Chapters 2, 3 and 4) related to natural resource use and management and the problem of food insecurity and famine. The second step was getting the instrument rigorously reviewed by experts. RIO (1990:313) argues that “the most direct evidence of content validity is obtained from examination of the test itself by a competent judge”. Such an examination was made on the instrument by geographers and geography educators at Addis Ababa University, Ethiopia and Flensburg University, Germany. Besides, the instrument was reviewed by a curriculum expert at the Ethiopian Institute for Curriculum Development and Research. Comments forwarded by these experts were incorporated. Items were, for instance, rephrased in many cases and some general concepts like ‘natural resources’ were operationally defined following suggestions by the experts.

1.4.2.2 Administration of the Instrument (Post-test Version)

Study Population and Sampling Procedure

The post-test version of the instrument was administered in ten schools of Kembata-Alaba-Tembaro (KAT) Zone, southern Ethiopia; and Awassa Teacher Training Institute (TTI). The target population consisted of students of grades eight and eleven and trainees of Awassa TTI.

Grade 8

In the case of grade eight, one junior secondary school was identified from each of the five districts that constitute the KAT Zone, namely, Alaba, Angacha, Kacha Bira, Kedida-Gamela and Omo Sheleko. Accordingly, Alaba, Angacha, Ambo, Shinshicho and Mudula junior secondary schools were selected from the five districts. The schools were selected due to their proximity to the capital towns of their districts. Two sections were selected from each school. Where there were more than two sections, those with free periods or sections having a sport period were identified with the assistance of the directors.

Table 1.2 Number of students who participated in the study by grade level

Grade 8		Grade 11	
Name of School	No. of participants	Name of School	No. of participants
Alaba	75	Alaba	72
Ambo	93	Angacha	90
Angacha	75	Durame	160
Mudula	103	Mudula	89
Shinshicho	87	Shinshicho	81
Total	433	Total	492

Grade 11

There are five senior secondary schools in the Zone with grades up to 12: Alaba, Angacha, Durame, Mudula and Shinshicho (i.e. one for each of the five districts). Two sections (one from the Art and the other from the Science stream) were selected. Where the streams had more than one section, selection was made in a similar to junior secondary schools. Table 1.2 shows the number of students who participated in the study.

In the previous academic year (1996/97), 3612 students were registered in grade 8 in government schools throughout the KAT Zone (EDUCATION BUREAU OF SNNPRG, 1998). The number was 1468 for grade 11. Assuming the number of registered students to be constant, it is calculated that 12% of grade eight and 36% of grade eleven students of the KAT Zone took part in this study.

Awassa TTI

Two hundred forty three students at Awassa TTI (located in Awassa Town, the capital of the southern region of Ethiopia) who appeared for classes on the date of the administration have completed the questionnaire. In the previous academic year, 401 students were registered. Assuming a constant number of students, 61% of the prospective primary school teachers of Awassa TTI have taken part in this study.

Administration of the Questionnaire

The instrument was administered by the author and assistants from the schools and the TTI. In most cases the directors of the schools assisted the author. Where they were not able, the directors discussed the issue with teachers and requested co-operation. A brief orientation was given to all who assisted during the administration of the instrument. The questionnaires were circulated during regular class hours. Students were told about the aim of the study. The completion of the post-test version took 40 minutes to one hour.

1.4.2.3 Methods of Data Analysis

Data was computed and analysed using a number of techniques (see Chapters Five, Six, Seven and Eight). Percentages are used to summarise results. The difference between groups of students (boys and girls, different levels; geography background) in their awareness was analysed and significance of the difference was tested using students' 't-test'.

1.5 SIGNIFICANCE OF THE STUDY

This study, which assesses students' awareness of and views about the crucial problems of Ethiopia is hoped to be a valuable source of information that may be considered by all organisations which claim to have an interest in making schools more productive.

Ethiopia is still in a state of massive educational transformation following the 1991 political changes. This transformation includes decentralisation of the educational system to give responsibility to the lower level administrative regions to design a curriculum by sufficiently incorporating local realities. Accordingly, the existing curriculum has been modified or changed. The modifications or changes in most of the cases are not based on a critical analysis of the problems and needs of the particular communities. Nor is the modification of the existing content or introduction of a new one based on an objective assessment of the current level of students' awareness and their attitudes. The findings of this study may be used at the national and regional levels in the process of curriculum revision particularly for subjects related to environmental education.

2 LAND DEGRADATION: A THREAT TO LIFE IN THE DEVELOPING WORLD

2.1 THE VALUE OF LAND AS A NATURAL RESOURCE

'Land' as a natural resource is described as the part of the earth's surface that supports terrestrial life with space and nutrients (FRANCIS et al., 1993). It has also been considered a "platform on which most activities take place, the prerequisite for food and shelter, the natural repository for water and waste, and a major factor in the maintenance of breathable air" (ASHWORTH, 1999:ii). The human being developed awareness as to the value of land since time immemorial. Both the purpose of using land and the degree to which it has been exploited, have undergone a tremendous change in the course of time as meticulously described by PATRICK (1975:96-97).

Whereas early man cleared small areas of ground to create villages and to cultivate a few crops, modern man needs the ground for: 1) Growth of crops and animals for food on a permanent basis or as shifting cultivation, 2) Building cities for factories and houses, 3) Grazing the natural vegetation, 4) Building roads and air fields, 5) Construction of playing fields for football, golf, horse-racing, etc. 6) Gravel pits and open-cast mining for coal, iron ore, etc. 7) Nature reserves and parks, 8) Sewage disposal, 9) Reservoirs, the water being used for power supply, domestic and industrial consumption and recreation.

Worldwide, out of the 130 million km² ice-free surface of the earth, 32% is covered with forests, 11% is being used for cultivation, and 26% as pasture land. Unutilised grasslands, areas used for settlements and construction of transportation infrastructure account for the remaining 31% (FAO, quoted in FISCHER WELTALMANACH 1999: 1272). There is a remarkable spatial difference in the purpose and degree of use of land. Though the role land plays as a principal factor in agricultural production and animal raising is still great all over the world, there is a striking difference among countries. The life of nearly 90% of the population in certain countries is based entirely on land resources. It is particularly for these people, who subsist on nature's provisions – on soil fertility for food, on stable hydrological cycles for water, and on forests for fuel (DURNING, 1989a), that land has a more decisive role to play. Anything that negatively affects its quality may lead to starvation and death.

2.2 PROBLEM OF LAND DEGRADATION

We have squandered the Earth's wealth to meet our needs without regard for other living creatures or for generations still to come. And we go right on doing it, even now. PORRIT (1988:8)

2.2.1 Land Degradation: The Oldest of the Environmental Problems?

Land Degradation Defined

Land degradation has been defined as a processes of "soil degradation through water erosion and loss of vegetation cover leading to reduced productivity of the land in densely settled or exploitatively used regions" (DANIEL, 1988:59). In a similar way, AGGREY-MENSAH (1984:xi) describes land degradation as a "process by which the productivity of land declines over time, until eventually land is reduced to a level characteristic of desert". A broader definition of land degradation as "a reduction in the land's actual or potential

uses” has been adopted by others (BLAIKE and BROOKFIELD, 1987 quoted in SUTCLIFFE, 1995:66).

A 10,000 Years Old Problem

The human-environment relation (population-land resource relation in particular) began being seriously upset between 10,000 and 5,000 B.C. following a shift in human activity from hunting and gathering to agriculture (HIDORE, 1974). As animals and plants were domesticated, the landscape began to change from a natural to a planned one. Resource deterioration through direct consumption increased progressively while destruction through indirect means began to occur. Resource destruction through indirect means involved destroying some resources to obtain others like removal of forests to get space for human settlement. The clearing of forests has, in turn, resulted in soil erosion, sedimentation and the silting of streams, lakes, flood plains and deltas – “a form of pollution that began some 10,000 years ago and is getting steadily worse” (HIDORE, 1974:6).

Land degradation has become a world-wide phenomenon. Nearly 20 Million km² (15%) of the ice-free surface of the earth has been degraded as a result of human activities (RICHTER, 1998). This percentage is 16 for Africa (Table 2.1). Twenty-five percent of the area of the continent is unproductive, limiting the percentage of productive or usable land to 59.

Table 2.1 The state of soil degradation in the world

Continent	Total Area (Mill. Km ²)	Unproductive		Not degraded		Degraded	
		Mill. km ²	%	Mill. km ²	%	Mill. km ²	%
Europe	9.50	0.01		7.30	77	2.19	23
Asia	42.56	4.85	11	30.23	71	7.48	18
Africa	29.66	7.32	25	17.40	59	4.94	16
Australia	8.82	0.95	11	6.84	77	1.03	11
North America	18.85	0.75	4	17.15	91	0.95	5
Central America	3.06	0.53	17	1.90	62	0.63	20
South America	17.86	0.28	2	14.97	85	2.43	13
Area (72° N to 57° S)	130.31	14.69	11	95.79	74	19.65	15

Source: after RICHTER, 1998:232

Analysis of land degradation by type of land use reveals that 38% of the cultivated land (65% for Africa) has suffered (UNEP, 1990 as quoted in FISCHER WELTALMANACH, 1999: 1272). This percentage is 21 for permanently green areas (31% for Africa), and 18 for forests and savana (19% for Africa).

Table 2.2 Land degradation by type of land use

Regions (Continents)	Land degradation by types of land use		
	Cultivated area (%)	Permanently green area (%)	Forest and savana (%)
Africa	65	31	19
Asia	38	20	27
Central and South America	51	14	14
North America	26	11	1
Europe	25	35	26
Oceania	16	19	8
World	38	21	18

Source: WGBU, UNEP, 1994 (quoted in WELTALMANACH 2000:1274)

Water and wind erosion explain 46% and 38% of the land degradation in Africa (Table 2.3). The balance is attributable to chemical (12%) and physical degradation (4%). Land degradation is known to have been spreading at an alarming rate. HARRISON, in his famous book "Greening of Africa", cited FAO's report that some 3.7 million hectares of forests and wood land are disappearing every year. In West Africa, 4% of the closed forest is being cleared each year (UN Environment Programme estimates quoted in HARRISON, 1990:26).

Table 2.3 The dominant forms of soil degradation in the world

Continent	Degraded Area Mill. km ²	The dominant forms of soil degradation (% of column 2)			
		Erosion by water	Erosion by wind	Chemical degradation	Physical degradation
Europe	2.19	52	19	12	17
Asia	7.48	59	30	10	2
Africa	4.94	46	38	12	4
Australia	1.03	81	16	1	2
North America	0.95	63	36	–	1
Central America	0.63	74	7	11	8
South America	2.43	51	17	29	3
Area (72° N to 57° S)	19.65	56	28	12	4

Source: after RICHTER, 1998:234

2.2.2 Causes of Land Degradation

Land degradation reveals itself in diverse forms (Tables 2.3 and 2.4). These include soil removal by water or wind; loss of nutrients due either to soil removal or removal of crop residues and animal manure; build up of toxicity due to bad irrigation practices; loss of soil structure through repeated tillage and compaction due to the use of heavy machinery (SUTCLIFFE, 1995). Estimation of the degree of seriousness are given in Table 2.4.

Table 2.4 Extent of soil degradation by form and degree of seriousness

Forms of soil degradation	Degraded Area Mill. km ²	Degree of seriousness (% of column 2)		
		Weak	Medium	Strong to extreme
Erosion by water	10.94	31	48	21
Erosion by wind	5.49	49	46	5
Chemical degradation	2.39	39	43	18
- Loss of nutrients	1.35	38	47	15
- Salination	0.76	46	26	28
- Accumulation of hazardous wastes	0.22	18	77	5
- Acidification	0.06	33	50	17
Physical degradation	0.83	53	33	14
Total	19.65	38	46	16

Source: after RICHTER, 1998:234

There are additional forms of land degradation like the creation of deep gullies, of crusts that hinder water from percolating, of rock-hard layers of laterite that hinder hand-tools or plant roots from piercing into it, and of shifting sand dunes that swamp villages and fields (HARRISON: 1990). It is worth noting that nearly 90% of the land degradation world-wide is due only to three factors: deforestation, overgrazing and inappropriate farming practices (FISCHER WELTALMANACH, 1999).

2.2.2.1 Land Degradation through Soil Erosion

World-wide, water erosion is accountable for 56% of land degradation followed by wind erosion causing 28% (Table 2.3). Water and wind erosion together take, according to FISCHER WELTALMANACH (1999), 75 billion tons of soil each year (at a rate of 17 tons of soil per hectare in the USA and Europe; and 30-40 tons per hectare in South America and Africa). The rate of soil formation amounts only to 1-2 tons/hectare. Tables 2.5 and 2.6 indicate the extent and seriousness of soil erosion by water and wind. Forty three per cent of the degraded land is known to have 'strongly' suffered from soil erosion (Table 2.5). This is more than two times the world average.

Table 2.5 Extent and seriousness of soil erosion by water

Continent	Area degraded through erosion by water Mill. km ²	Degree of seriousness (% of column 2)			
		Weak	Moderate	Strong	Extreme
Europe	1.15	19	70	9	2
Asia	4.41	28	55	17	—
Africa	2.27	25	30	43	2
Australia	0.83	96	4	—	—
North America	0.60	23	77	—	—
Central America	0.46	1	48	51	—
South America	1.23	37	53	10	—
Area (72° N to 57° S)	10.94	31	48	20	1

Source: after RICHTER, 1998:234

Table 2.6 Extent and seriousness of soil erosion by wind

Continent	Area degraded through erosion by wind Mill. km ²	Degree of seriousness (% of column 2)			
		Weak	Moderate	Strong	Extreme
Europe	0.42	8	90	–	2
Asia	2.22	60	34	6	–
Africa	1.87	47	48	4	1
Australia	0.16	99	–	1	–
North America	0.35	7	89	4	–
Central America	0.05	2	87	11	–
South America	0.42	62	38	–	–
Area (72° N to 57° S)	5.48	49	46	4	1

Source: after RICHTER, 1998:235

A change induced into the vegetative cover (by deforestation or overgrazing) is known to be the major cause for increase in the rate of soil erosion (Table 2.7). Deforestation and overgrazing explain 64% of soil degradation worldwide.

Table 2.7 Causes of soil degradation (Area in Mill. km² and %)

Continent	Degraded Area Mill. km ²	Causes of soil degradation (% of column 2)				
		Deforestation	Overgrazing	Bad practice of farming	Overcultivation	Pollution
Europe	2.19	38	23	29	–	10
Asia	7.48	40	26	27	6	–
Africa	4.94	14	49	24	13	–
Australia	1.03	11	81	8	–	–
North and Central America	1.58	11	24	58	7	–
South America	2.43	41	28	26	5	–
Area (72° N to 57° S)	19.65	29	35	28	7	1

Source: after RICHTER, 1998:235

DANIEL (1988) cites a comparison made between rates of soil erosion in areas with different forms of land use. Not much variation in soil loss was observed on natural grasslands with change in altitude (the average being a loss of about 0.65mm/year). This amount is said to be not very far from the rate of soil formation. On cultivated land estimated soil loss exceeded soil formation rates by a factor of 4 to 10, depending on the ecological zone (DANIEL, 1988 figures quoted from HURNI, 1986). In West Africa runoff rates recorded from cultivated and bare soils exceeded those from forests twenty-fold (POSTEL and HEISE, 1988).

Factors for Deforestation

Increasing rate of population growth and the subsequent search for more land for cultivation or grazing are believed by many to be the root causes of the ever worsening rate of deforestation in Africa. OWEN argues, for instance, that “the present ecological predicament in tropical Africa can be defined in relatively simple terms. Human numbers are expanding extremely rapidly.... The savanna and forest ecosystems which have taken thousands of years to evolve their biological complexity and stability have been destroyed, and almost everywhere there are signs of cultivation, erosion, and a general degradation of the environment” (OWEN, 1973:181).

There is no doubt that increasing need for farm land, fuelwood and construction materials as a result of increase in population size is playing the leading role in the depletion of the forest cover in developing countries. It is not the only factor. Forests have been extensively destroyed for commercial purposes as evidenced in the Amazon region, some countries of Southeast Asia, and West and Central Africa. To illustrate how trees in arid lands were being sacrificed for money, CLOUDSLEY-THOMPSON (1978) cites the case of Sudan and Somalia where charcoal had been exported to oil-rich Saudi Arabia, Kuwait and the Gulf states, where charcoal barbecue cuisine was fashionable.

Tropical trees have, in general, been destroyed too fast to be replaced (Table 2.8). Estimates show that ten hectares were being cleared for every one hectare planted (FAO quoted in POSTEL and HEISE, 1988). The ratio is 29 to 1 in Africa, and 5 to 1 in Asia.

Table 2.8 Amount of rainforests cleared annually during the 1980's in selected tropical countries

Country	Amount of forests cleared (thousand hectares)
Brazil	8,000
India	1,500
Indonesia	900
Myanmar	677
Thailand	397
Vietnam	173
The Philippines	143
Costa Rica	124

Source: UNEP (IEEP), (n.d.:27)

2.2.2.2 Land Degradation through Overgrazing

Degradation of grazing land refers to decrease in its capacity to support livestock. Both natural and cultural factors are accountable for a fall in the carrying capacity of grazing land. Prominent among the natural factors is rain. A decrease in the amount of rain leads to a decrease in the carrying capacity of land. It was found that in areas where "the mean annual rainfall is about 800 mm, two hectares are needed to support one TLU (Tropical Livestock Unit); where it is 600 mm, 4.5 hectares are needed; with 200 mm as large an area as 22 hectares is required" (DANIEL, 1988:79). It is, however, the cultural factor or mismanagement of grazing land that has often been accused. Use of grazing land beyond its capacity is the most serious of the managerial problems. Such a use has two major effects on the land (THOME, 1992; NATIONAL RESEARCH COUNCIL, 1984). First, it results in elimination of the ground cover preparing the land for further erosion.

Cattle, unlike camels and goats, are known to have an enormous power of eliminating perennial grasses. This was witnessed in southern Tunisia "where coverage of vegetation inside an area fenced off some 60 years ago is 85 per cent in contrast to a 5 per cent outside it" (SMIC, 1971 quoted in JACKSON, 1977:207). JACKSON adds the case of the Karamoja district of northern Uganda where large areas were reduced to thorn-scrub with desert grasses though the annual rainfall was known to be adequate to maintain an open woodland cover with a rich flora of grasses. In Africa as a whole, overgrazing is the major factor accountable for half (49%) of the soil degradation (Table 2.7).

THOME (1992) considers goats as the most voracious enemies of forestry. They are so dangerous because of their ability to climb steep slopes and even trees (CLOUDSLEY-THOMPSON, 1978). Goats, unlike many other domestic animals, are capable of destroying thorny vegetation. After citing the case of the Island of Saint Helena whose plant life had gradually disappeared due to the effects of goats, THOME (1992:66) noted that the same pattern “has been repeated in large areas of Somalia and Ethiopia, where desertification has encroached upon the countryside and the natural environment has been impoverished as a result of the harmful predatory activities of herds of goats”.

The second effect is trampling by livestock. This tamps the porous soil into a dense, hard layer and changes, together with other factors like bad farming practices, proportion of infiltration to runoff, resulting in severe erosion damage and decrease in reserves of soil moisture which might otherwise sustain plant growth and stream flow in droughts.

2.2.2.3 Land Degradation through Sedimentation

Increase in sediment load of major rivers, due to man’s activities, has been estimated to be greater by a factor of 2.5 than the geologic norm; and by a factor of 10 or more for more strongly affected river basins. This load is often discharged down streams making land out of use (NILL, 1998). Lumbering and forest fires are also contributing to the degradation of land. Mining and large scale construction projects are known to result in excessive sedimentation (NATIONAL RESEARCH COUNCIL, 1984).

As sedimentation results in burial of the more developed soil horizons under relatively infertile sandy layers, it is considered as a problem equally serious to soil erosion in view of agricultural land use. Fertile land as large as 15,000 km² is reported to have been rendered useless due to sedimentation of the Kosi river in India (KOLLMANNSPERGER, 1979 quoted in NILL, 1998). Sedimentation may choke river valleys, forcing water to flood broadly over valley bottoms. In the Philippines it is estimated that 1.4 million hectares of upland watershed have been denuded, primarily through uncontrolled logging (POSTEL and HEISE, 1988).

2.2.2.4 Land Degradation through Intensive Farming

In countries of the Third World, intensive farming as a factor for land degradation seems to be less important compared to the other factors discussed. Intensive cultivation is characterised by higher utilisation of machines, chemicals and irrigation systems.

Frequent and heavy application of water to crops is known to result in soil salinity whereas the use of heavy machinery brings about soil compaction (OECD, 1991), which may, in turn, lead to problems comparable to trampling of livestock. The side effect associated with the use of fertilisers is well summarised by THOME (1992:58): “if the farmer is impatient to see his harvest and tries to speed up the process by adding chemical fertilisers to the soil, he is dealing a heavy blow against the physical environment of the soil”. GERSHUNY and SMILLIE (1986) add that even the most sophisticated fertilisation program will give scant returns on land whose structure has been destroyed by overcultivation. It is obvious that repeated ploughing has got advantages. Such advantages are often undermined by water loss through drying and subsequent erosion by wind and water.

2.2.2.5 Land Degradation through Pollution

Like intensive farming, pollution seems to be a problem mainly of highly industrialised regions though the effects are not limited to the regions of origin. These causes of land degradation include hazardous materials and conventional waste disposed both on and within the soil (OECD, 1991). The result is impairment of the growth of both wild and cultivated plants; and harm on the functions of soil bacteria. It is also argued that soils can be contaminated by polluted river sediments.

The result in any of these cases can be dramatic. In Poland villages were declared 'unfit for human habitation' due to the extremely high levels of heavy metals in the air and soil deposited by emissions from nearby copper smelting plants (JACOBSON, 1988). Poor countries of the Third World are increasingly being affected by pollution via the 'dirty' trade of hazardous wastes, an activity that exposes not only the irresponsibility of the decision makers which allow the import of these deadly wastes but also the deep rooted selfish behaviour of the suppliers from 'advanced' countries. A large quantity "of U. S. and European wastes have already been shipped to Africa and the Middle East" and the "frequent rains and poor soils in tropical areas hasten the migration of chemical wastes into groundwater supplies" (JACOBSON, 1988:28).

2.2.2.6 External Debt and Trade Barriers as Causes of Land Degradation

Countries of the Third World are often being forced to devote an extensive area of their land (in many cases the best land) to the growing of cash crops for export so as to meet debt service payments, and cope with the depressed prices of their products and trade barriers (MIDDLEBROOK and GOODE, 1992). The result is in most cases pushing people who occupy such areas off to less fertile and fragile areas thereby creating an increased pressure on the land which, in turn, leads to clearing of marginal lands. The end result will inevitably be devegetation, soil erosion, and overgrazing. Debt and trade barriers are thus known to have been contributing to land degradation in their own way. They play an implicit but very harmful role by adding impulse to one or more of the other factors of land degradation.

2.3 CONSEQUENCES OF LAND DEGRADATION

Africa's environmental crisis will deepen and perpetuate her food, poverty and financial crises. It threatens not just the hope of progress, but even the hope of survival. HARRISON (1990:26)

2.3.1 Desertification

Desertification is considered as a process by which dryland environments are degraded to a less productive state (CAMPBELL, 1986). Degradation of soil and vegetation cover is regarded as one of the indicators of desertification (MENSCHING, 1990). The other indicators listed by MENSCHING include decrease in underground water and change in the morphological process (like formation of sand dunes and accumulation of dust in the air). It is to be noted that some of the causes of land degradation are at the back of formation of deserts in Africa and elsewhere.

An otherwise productive semi-arid region could be converted into a useless desert when soil quality and moisture content decline (OCED, 1991). Desertification may also be attributed to overgrazing. CLOUDSLEY-THOMPSON (1978:421,422) makes a very

interesting conclusion: “desertification results from Man’s over exploitation of arid lands, and can be stopped almost as easily as the world population explosion!” that is, “when the world population has been halted, the deserts of the world may cease to expand”.

2.3.2 Population Displacement

JACOBSON (1988:7) states that “migration is the signal that land degradation has reached its sorry end”. He also predicts that land degradation will remain the single most important cause of environmental refugees until sea level rise overtakes it. The dramatic role land degradation is actually playing in displacing people in the African continent has been emphatically stated (UNEP-IEEP, n.d.:56):

The depletion of the land results in one of the most tragic societal/environmental scenarios of modern time, human migration.... No other region of the world experiences this tragedy more than Africa and, in particular, the Sahel. Land degradation, along with political instability, has caused millions of farmers to migrate to cities. In the last twenty years, the urban population has quadrupled. Many who could not migrate, perished.

Refugees from land degradation migrate from region to region cultivating one plot of marginal land after another. They exacerbate the problem and move on when the land fails to meet basic needs. Others agglomerate in urban areas. Hence a conclusion: “the massive shift from rural regions to cities that has occurred in the Third World since mid century is due in large part to the complex of factors underlying land degradation” (JACOBSON, 1988:10).

2.3.3 Poverty and Malnutrition

Fall in crop production is perhaps the most visible consequence of land degradation. In the tropics as a whole, soil erosion reduces maize yield by 30 to 70 percent (BLACKWELL, 1991). In Mexico, a decline from 3.8 to 0.6 tons per hectare is reported. A dramatic decline of yield from 6.5 to one ton has been documented in Nigeria. The relationship between poverty and land degradation is a two-way: the poor being forced to over-exploit their environment and then getting even poorer as the rate of environmental degradation increases (DANIEL, 1990).

Land degradation, through its effect on poverty, brings about malnutrition. Malnutrition is described as “poverty imprinted on the human flesh and bone” which drags down people’s productivity, lowers their defences against disease, and stunts growing bodies and brains (HARRISON, 1990:21). The relationship between land degradation and food shortages and famine is explored in Chapter Four of this study taking Ethiopia as a case.

3 THE PROBLEM OF NATURAL RESOURCE DEGRADATION IN ETHIOPIA

Ethiopia extends from 3-15 degrees North latitude and 33-48 degrees East longitude (Fig 1). The country covers an area of 1.1 million km² and has a population of about 60 million; 85% live in the rural areas.

3.1 BACKGROUND TO THE PROBLEM OF NATURAL RESOURCE DEGRADATION

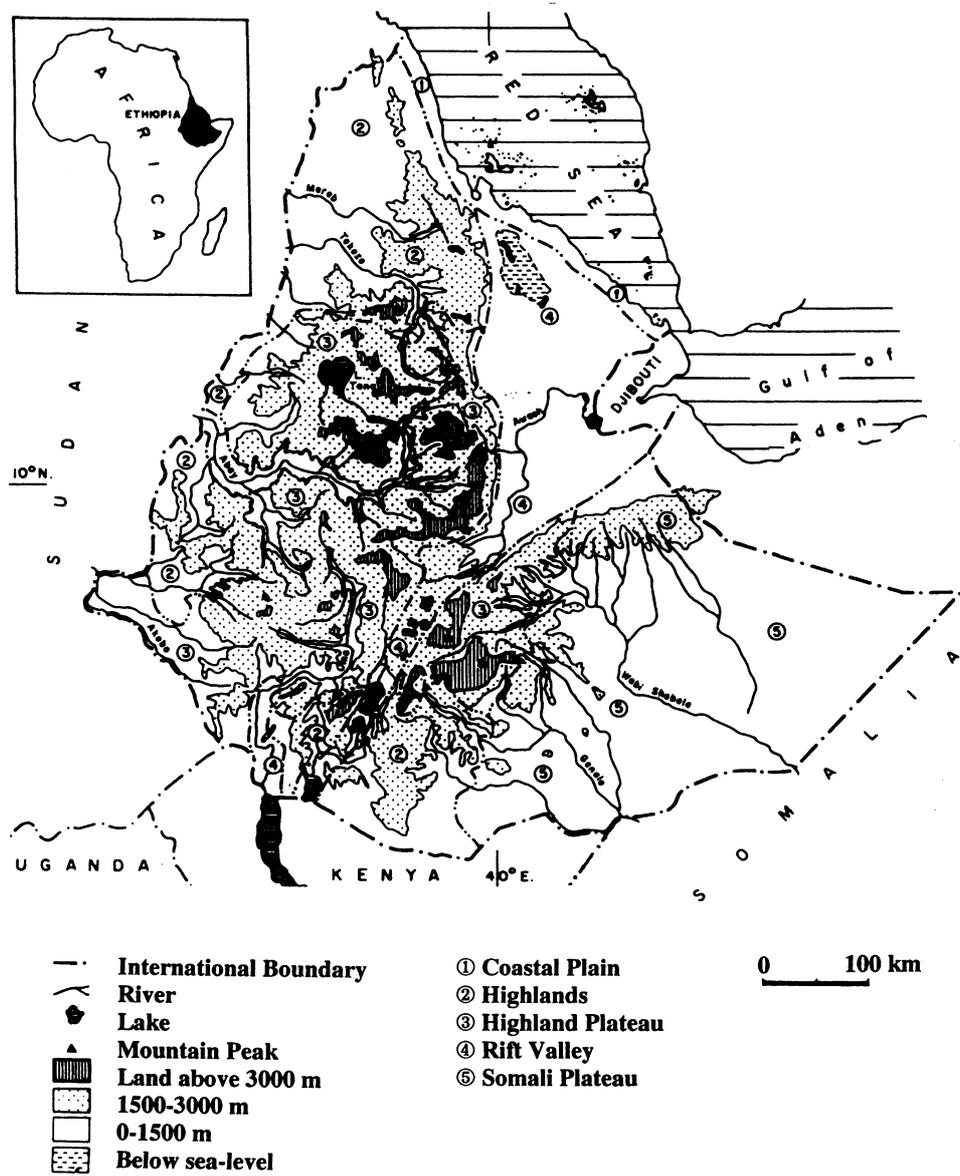
Natural resource degradation began in Ethiopia centuries ago with the commencement of farming; there are evidences that deforestation in the country was at a worrisome stage throughout the late Nineteenth Century. According to PANKHURST (1992:68), Menelik, “the Ethiopian ruler, who was reputedly a great lover of trees, was grieved at the destruction of forests then taking place” and gave orders against using trees without his permission. Natural resource degradation (particularly of soil and natural vegetation) is now the most serious of the environmental problems facing the country (BELAY, 1995; EPA, 1997b).

3.1.1 Physical Characteristics

Ethiopia is a highland country with 65% of its total area having an elevation of more than 1400 m (asl) and a substantial area lying well over 3000 m (Fig. 1 and Table 3.1). The term ‘Roof of Africa’ seems therefore justifiable. It should be equally stressed that there are extensive lowlands and conspicuous depressions, one of which about 120 m below sea level.

The central parts of the country are dominated by highlands which are divided into two by the Ethiopian Rift Valley. The altitude goes on decreasing from the centre outwards in almost all the directions. The marked altitudinal difference has a noticeable effect on the overall state of the country’s environment. Almost every aspect of the physical environment is directly or indirectly affected by it. The highlands get an average rainfall of 500-2000 mm per annum (HURNI, 1994) whereas most of the lowlands receive too little to grow crops. The highlands get 90% of the total rain (ZEMEDE and ENDESHAW, 1995). But the highest mountains are not the wettest regions of the country. The rainfall maximum (2800 mm/a) is on the south western plateau (EMA, 1988).

Figure 1 Physical features of Ethiopia and Eritrea



Source: after AZENE, 1993:VI

3.1.2 Pattern of Population Distribution

The altitudinal contrast has a prominent impact on elements of the physical environment and on the human environment. The highlands, owing to their moderate and friendly climate and absence of some of the most deadly tropical diseases have attracted most of the human and livestock population. Hence 80% of the livestock and 88% of the human population live there (BAYOU, 1996). Nearly 50% of the Ethiopian population live in altitudes above 2200 m and 89% in an altitude of 1400 m and above. Only one tenth is inhabiting areas below 1400 m (Table 3.1).

Table 3.1 Altitude-population relationship in Ethiopia

Altitude (m asl)	Area		Population	
	In 1000 km ²	Percentage	Percentage	Density (persons/km ²)
Above 2600	63.1	5.8	10.4	85.0
2200-2600	128.4	11.8	39.2	157.5
1800-2200	211.2	19.4	27.9	68.1
1400-1800	306.0	28.1	11.5	19.4
1000-1400	145.9	13.4	8.2	29.0
Below 1000	234.0	21.5	2.8	6.2
Total	1,088.6	100.0	100.0	

Source: SEYOUM, 1995:6

The lowland and drier regions of the country are inhabited by population groups primarily engaged in the pastoral mode of production. These regions include important river valleys like the Awash, Genalle, etc. where permanent pasture is available during a considerable part of any given year (SEYOUM, 1996). The agrarian population prefers to stay in higher altitudes though the declining soil quality and general environmental degradation is often reported to drive the farming population into lower altitudes. The interplay between the physical environment and population distribution in Ethiopia explains, to a great extent, the ever worsening problem of natural resource degradation and the problem of land degradation in particular.

3.2 EXTENT AND SEVERITY OF NATURAL RESOURCE DEGRADATION

The Ethiopian rural environment has...got into a degradation syndrome which starts with an accelerating devegetation leading to a loss of soil fertility, soil erosion, genetic erosion, disruption of the hydrologic cycle, increased severity of the impact of droughts, and a further reduction in the ability to produce food and other biological resources demanded by the increasing human and animal population. EPA (1997a:88)

Attempts have been made to quantify the extent and severity of natural resource degradation and express it in terms of the amount of resources depleted and population affected or predicted to be affected. The area of land under forests has shrunk from 16% in 1950 to 3% in 1980 and to only 2.7% in 1990 (KEBEDE, 1995 quoted in FISSEHA, 1996). The largest destruction of forests is believed to have occurred in the 15 months period between the fall of the Dergue regime and the institutionalisation of the regional and local administration then after (FISSEHA, 1996; SHIBRU and KIFLE, 1999). The actual and potential effects of land degradation on the life of the Ethiopian population have been measured or estimated. One prediction indicates that "out of the projected population of the highlands of nearly 60 million by the year 2010, some 9 million or 15%

of the population are expected to be additionally affected by the hazards of degradation if the present trends continue” (AGGREY-MENSAH, 1984:xi).

Natural resource degradation is extensive in Ethiopia. But not all areas of the country are equally suffering. Both the extent and severity of the problem manifest spatial variations depending on difference in relief, ecology, rainfall, land use, land cover and soil types (DANIEL, 1988). The following sections discuss the three major aspects of natural resource degradation in Ethiopia: depletion of forests, and degradation of farm land and pasture land.

3.2.1 Depletion of Forests

Extent of deforestation

It is estimated that about 34% of the total area or 87% of the Ethiopian highlands above 1500 m have originally been covered by dense forests, and about 20% by woodland/savannah (DANIEL, 1988). Up to the beginning of this century, about 40% of the highlands were still covered by natural vegetation. Some sources indicate that the country is now left bare with the forest cover reduced to only 2-6 percent². The annual rate of depletion of forests has been estimated to be in the order of 150,000-200,000 hectares which is equivalent to about 6 percent of the remaining forest cover (Ministry of Natural Resources, 1993 quoted in TEGEGNE, 1995). Of the causes of deforestation, land clearing for agriculture accounts for the highest portion (see Table 3.2). Cutting of forests to get firewood explains about 19% of the deforestation.

Table 3.2 Forest loss by source

Sources of forest loss	Annual loss (ha)
Natural high forest for farming by subsistence agriculturalist	80,000
Acacia woodlands for charcoal and for state farms	50,000
Woodland, thickets and brush for fuelwood	30,000
Total	160,000

Source: UNDP/World bank, 1988 quoted in TEGEGNE (1995:98).

The accuracy and reliability of some of the above cited figures is being highly questioned nowadays. HALVOR (1995), for instance, stresses the difficulty of tracing the origin of the most frequently quoted figure 40% (forest cover at the turn of the century)³.

2 Figures varie. Forest cover is reported to be 2.4 percent (SHIBRU and KIFLE, 1999:20), 2.7 percent (The Economist Intelligence Unit, 1990:18), 3.5 percent (Central Statistical Office, 1987:2), 3.6 percent (MARKOS, 1990:162) and 5.6 percent (FAO, 1986 as quoted in WOOD 1990:187).

3 The same has been said with regard to data pertaining to soil erosion: “data on soil erosion and nutrient loss in Ethiopia are quite thin. The policy implications of these difficulties in the data cited to support the environmental degradation narrative of famine in Ethiopia are in urgent need of reevaluation” (HOBEN, 1995:1015).

Causes for deforestation

The ever increasing rate of population growth is believed to be the major cause of deforestation. Increase in population led to increased need for farm land. It led also to an increased requirement of wood for fuel and construction. Wood and wood products are the prominent materials for construction of houses Ethiopia. About 74% of the housing units in the rural and 72% in the urban areas were reported to be ordinary houses with walls made of wood and mud (MEKETE, 1996). In the case of rural houses, practically all the parts of the house are of biomass (Photo 1).

A huge amount of biomass has been used for fencing (Photo 2). In many parts of Ethiopia including the Rift Valley region where there is high scarcity of wood, a great mass of trees is used to make fences around houses and cowsheds.

Ethiopia is one of the world's most fuel wood reliant nations (HORNE and FROST, 1992; KAREKEZI and RANJA, 1997 quoted in ANDERSON et al. 1999). The traditional fuel sources (woody biomass, crop residues, dung and charcoal) put together are reported to have claimed 95.3% of the total domestic energy consumption in Ethiopia whereas the modern sources (petroleum and electricity) accounted for only 4.7% in 1990/91 (MEKETE, 1996). It was also known that nearly 37% of the housing units in the urban areas (see Photo 3) used only firewood for cooking purposes. Another report shows that 97% of the household energy comes from biomass (Table 3.3).

Table 3.3 Household energy consumption as a percentage of total biomass consumption in a number of selected African countries

Country	Biomass energy consumption (% of total energy consumption)	Household energy consumption (% of total biomass energy)
Burundi	94	78.5
Ethiopia	86	97
Kenya	70	93
Somalia	87	92
Sudan	84	90
Uganda	95	78.6

Source: KAREKEZI and RANJA, 1997 quoted in ANDERSON et al. 1999:68

Even in the major towns and cities including Addis Ababa, the use of modern sources of energy is incredibly low. The share of electricity, gas, and a combination of both was as low as 16.5% in Addis Ababa while firewood (Photo 3) alone accounted for 40.9% (MEKETE, 1996). There are indications that wood charcoal will remain the dominant source in the future (see Table 3.4).

Table 3.4 Estimates for household energy consumption by source (percent of total energy consumption)

Energy source	Urban		Rural	
	1992	2014	1992	2014
Wood charcoal	62	42	66	68
Dung	16	8	20	13
Crop residue	11	5	14	7
Electricity	3	15	-	5
Kerosene gas	8	20	-	2
Coal	-	10	-	5
Total	100	100	100	100

Source: Ministry of natural resources, 1993 quoted in TEGEGNE (1995:103)

The practice of shifting cultivation and establishment of commercial plantation particularly coffee and tea in the western highlands are the other factors contributing to the process of deforestation. The political unrest and the civil wars that shook the country during the last three decades have also played their part in the destruction of natural vegetation. In areas where civil war prevailed, grasses and trees were being cleared to reduce cover for guerrilla fighters (HORNE and FROST, 1992). Fire is another enemy. At this very moment, about one hundred hectares of the meagre forest resources are under fire. There is no agreement as to the cause. Government officials accuse the local people to have set the fire. Opposition groups say that it is the government who set the fire to destroy possible shelters of guerrilla fighters. Whatever the cause, the forest has to keep on burning until help comes from abroad (The Republic of South Africa and Germany were reported to have agreed to offer such help).

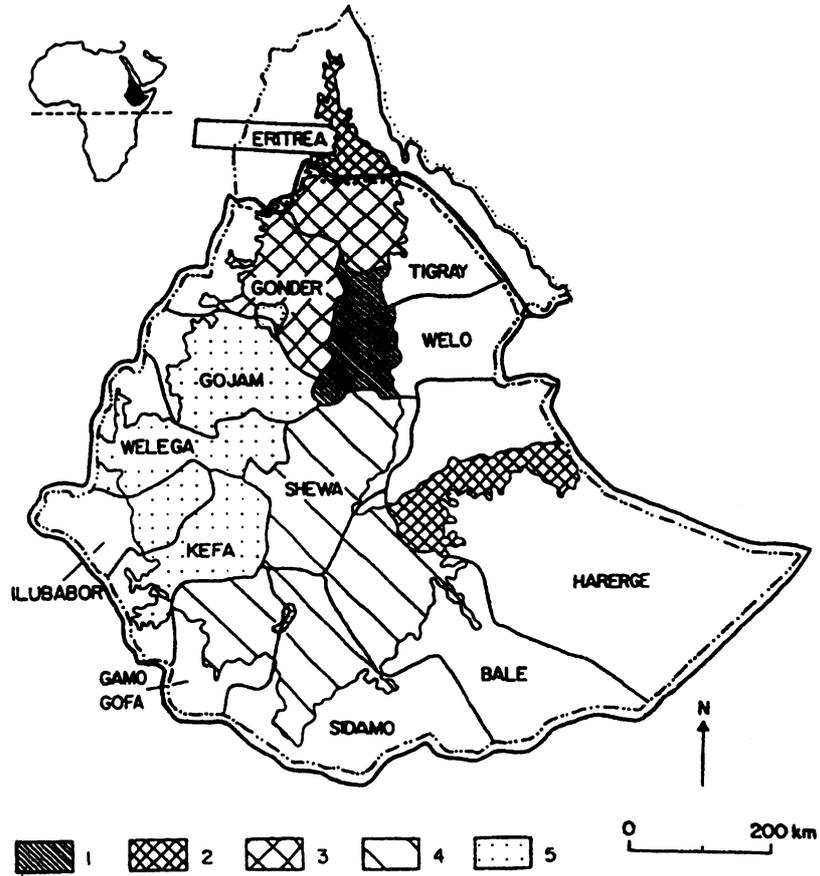
3.2.2 Degradation of Farm Land

Since 95% of the cultivated land is under small-holder peasant agriculture..., it is clearly the cumulative impact of the actions of these land users that has eventually led to the degradation and depletion of these resources. SHIBRU and KIFLE (1999:19)

Almost 75% of Ethiopian highlands are known to have been so degraded that their future use depends on the application of conservation measures (MARKOS, 1990; FAO, 1986 cited in WOOD, 1990; ADB/ECA, 1988 cited in DANIEL, 1990). Soil erosion in Ethiopia is attributable to a combined effect of the rugged configuration of the landscape and the torrential rains; deforestation, cultivation of steep slopes and centuries of mismanagement (MESFIN, 1984).

Fig. 2 shows the degree of severity of soil erosion in Ethiopian highlands. It was estimated that 33% of the Ethiopian highlands have slope gradients of above 30%; while more than 60% have gradients of above 17% (BELAY, 1995).

Figure 2 Severity of soil erosion in Ethiopian highlands



- 1: extreme (over 80 % of the soils are about 20 cm deep only, and the rest about 100 cm)**
- 2: very serious (60-80 %)**
- 3: high (40-60 %)**
- 4: medium (20-40 %)**
- 5: slight (less than 20 %)**

Source: after HURNI, 1988:125

The aspect of land use affects soil erosion (Table 3.5). It could be seen that under forest the amount of soil eroded is less. The loss of soil on cultivated slopes in the drier and warm Lower Kolla zone (below 900 m) is reported to be about 2.3 mm/year while in the moister and cooler highlands of the Upper Kolla and Woina Dega zones (900-2600 m) the rate is about 4.3 mm/year. The rate of soil loss is still higher on the cold and wet highlands above 2600 m in the Dega and Wurch zones – about 4.9 mm/year (DANIEL, 1988:67-68 figures cited from HURNI, 1986).

Table 3.5 Estimated rates of soil loss on slopes in Ethiopia dependent on land cover

Land use	Area (%)	Estimated t/ha/year	Soil loss t/year
Cropland	13.1	42	672,000,000
Perennial crops	1.7	8	17,000,000
Grazing and browsing	51.0	5	312,000,000
Currently unproductive	3.8	70	325,000,000
Currently uncultivable	18.7	5	114,000,000
Forests	3.6	1	4,000,000
Wooded and bushland	8.1	5	49,000,000
Total	100	12	1,493,000,000

Source: HURNI, 1988 quoted in TEGEGNE (1995:105)

Bad practices of cultivation exacerbate the problem of soil erosion. Harmful practices include the following (THOMAS, 1984; WOOD, 1990).

1. Repeated cultivation:

Repeated cultivation (up to six times for *teff*) increases the risk of erosion. The prevailing practice of making fine seedbed for *teff* is known to decrease the capacity of the soil to stand the severe erosion at the outset of the rains. Other unacceptable practices are ploughing up and down the slope in order to control weed; and making the last ploughing down slope so as to reduce water logging. Such practices are necessary, but they lead to degradation.

2. Single cropping:

Single cropping rather than intercropping is also a favourable condition for erosion as there will be few permanent crops whose leaves and roots can provide protection and stability at the start of the rains.

3. Removal of Residues and dung:

The massive deforestation and the resultant shortage of fuel wood led to the use of dung and agricultural residue as fuel. These sources of energy are estimated to provide 58% of total energy needs of Ethiopia (WORLD BANK, 1984 cited in BARNARD and KRISTOFERSON, 1985). Up to 90% of the total household cooking in some towns of northern Ethiopia is said to be done with dung transported from the rural households (see Photo 4).

Use of dung and crop residue as fuel reduces the amount of organic matter in the land. It leads to a progressive deterioration in soil structure, infiltration capacity, moisture storage and fertility, resulting in a massive decrease of productivity. According to EPA (1997b:57), some 80% of the crop losses due to land degradation result from breaches in the nutrient cycle.

4. Planting dates and type of crops:

Farmers delay planting or do not plant at the start of the rains partly due to problems of land preparation owing to lack of oxen in many cases. Delayed planting exposes the farm land for repeated rains.

5. Settlement patterns, roads, and the tracking of livestock and people:

In Ethiopia, many areas are densely settled (see Photo 5) resulting in a tremendous pressure on resources. Roads by erosion. The water-ways constructed at road sides are rapidly turning into deep valleys consuming a considerable part of arable land in the vicinity (see Photo 6). Tracking of livestock and people is also contributing to formation of gullies.

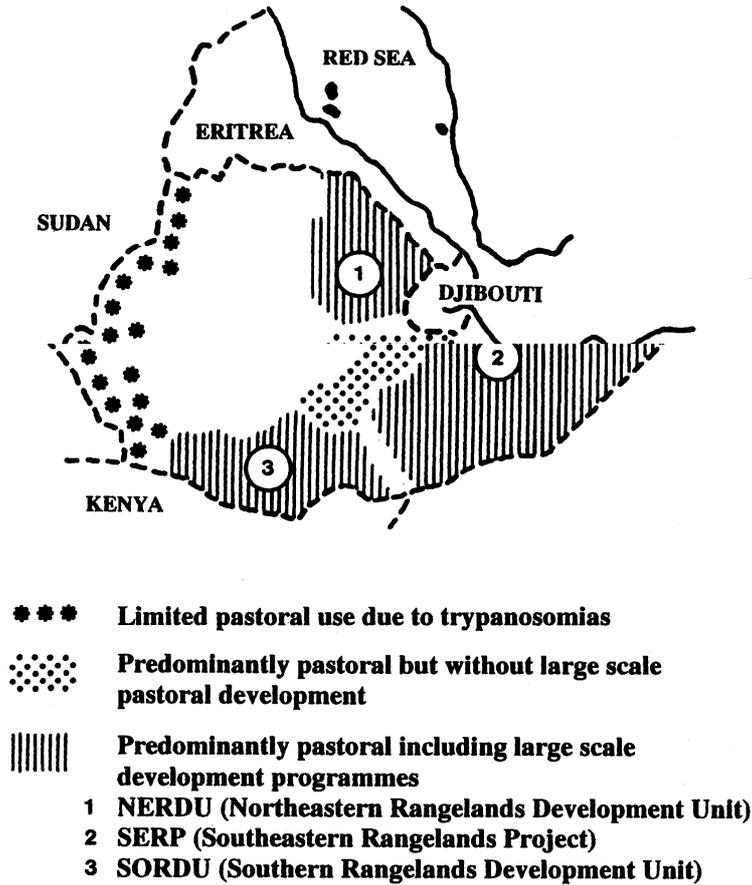
3.2.3 Degradation of Grazing Land

In Ethiopia, livestock are kept by both highland farmers and lowland pastoralists as an asset and for security (DANIEL, 1988). The country stands number one in Africa with regard to the size of livestock population. There is a tremendous pressure on the pastureland (see Photo 7). Much of the grazing area is in the lowlands (see Fig. 3).

Of the total grazing area, close to 67% is in the pastoral-nomadic areas in the lowland – mostly at elevations below 1500 m (DANIEL, 1988). About 77% of the total TLU in the country, excluding camels, are owned by highland cultivators on mixed subsistence farms: 80% of the cattle, 75% of the sheep, 31% of the goats and 81% of the equines (DANIEL, 1988:79). The highlands support close to 80% of the total TLU on about 30% of the total available natural herbage in the country.

An apparently paradoxical relationship is noted between grazing land and number of livestock in Ethiopia: “while the feed source declines, livestock numbers tend to increase” (Ethiopian Red Cross Society, 1986, cited in DANIEL, 1988:80). Since animal yield per capita is low due to genetic and managerial problems – the natural reaction of farmers has been to increase their herds, thus encouraging overgrazing. The contribution of supplementary feed is too insignificant to bring about even a temporary relief to the pastureland. It was estimated that “the crop residue and aftermath grazing provide feed for livestock for only about 10 per cent of days in the year. For 90 per cent of the time, therefore, the livestock have to feed on natural herbage in valleys, on slopes and on uncultivated/fallow land” (DANIEL, 1988:79-80).

Figure 3 The pastoral areas of Ethiopia



Source: ALEMAYEHU, 1998:3

Given the attitude of Ethiopian farmers and nomads towards their livestock in general and cattle in particular, one can not help expecting a similar trend of pressure to prevail in the future. Firstly, cattle are justifiably regarded by farmers as saving accounts. Secondly, number is more valued than quality because social status is traditionally associated with 'how many' one owns. The sad thing is, that pasture land is estimated, assuming no major technological change, to be insufficient to maintain the livestock population by 2004 (HURNI, 1988 cited in WOOD, 1990).

3.3 TENURE RIGHT AND THE PROBLEM OF NATURAL RESOURCE DEGRADATION

Insecure land tenure affects the quality of land by killing farmers' interest to invest on land. Farmers uncertain about their ownership are unwilling to apply soil conservation and environmental rehabilitation techniques, the benefits of which are not seen immediately (WOOD, 1990; SHIBRU and KIFLE, 1999). The effect may even be more dramatic as strongly argued by DURNING (1989b:42): "nothing incites people to deplete forests, soils, or water supplies faster than fear they lose access to them". In Ethiopia, insecurity of tenure has been strongly accused of leading to resource degradation. The insecurity prevailing prior to the revolution is believed to be "one of the main factors responsible for the widespread degradation that occurred in the past" (THOMAS, 1984:28).

The 1974 revolution took the land away from the feudal lords and vested it in the Peasants' Associations which allocated it for individual farmers. Selling, renting or inheriting was not allowed (HARRISON, 1990). The land reform of 1975, which made rural land a collective property of the people, has been criticised for making peasants feel less secure owing to the continual land redistribution (TEKESTE, 1996, MESFIN, 1991). Another result of the land reform was prohibition of cutting down trees which made both the community and the individual loose interest in protecting them. The communities had no control over trees which they might plant, "either they did not plant any at all, or when coerced to plant did not maintain or care for them" (EPA, 1997b:7-8).

The downfall of the socialist government in 1991 has not brought essential changes. Land is still "under the firm control of the ethnically organised regional governments" (TEKESTE, 1996:18). Nevertheless, the new constitution of the Federal Democratic Republic of Ethiopia has "guaranteed current users' rights and allowed the hereditary principle of passing user rights to legal heirs" (SUTCLIFFE, 1995:72). The owners of land are now allowed to lease their usufructuary rights to or from others; to pass it on to kin and to freely sell their produce (EPA, 1997b).

3.4 LACK OF AWARENESS AS FACTOR FOR NATURAL RESOURCE DEGRADATION

It is very fortunate that the magnitude and seriousness of the problem of natural resource degradation are duly recognised both by the government and non-governmental organisations. There are, however, divided views as to whether the problem is well recognised by the grassroots population. Some studies and observations at specified areas indicate that people have good knowledge of the hazard of resource degradation. BELAY (1992:55) has concluded that farmers in the Gununo area of southern Ethiopia "have very good perception of the erosion hazard in the region. Furthermore, these farmers have very well conceptualised the effects of erosion and have clearly identified the major and visible characteristics of erosion". Gununo is one of the areas where intensive soil conservation projects have been carried out for long.

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. MESFIN (1991:44) has, based on his study in north-central Ethiopia, argued that peasants have "not yet clearly understood the direct connection between deforestation and soil erosion, or else it is not a problem which takes priority in their minds". Another interesting finding was the response of farmers to 'the damage caused to the soil when the livestock graze on the fields after

harvest': 60% of the peasants believed that there was no damage done while only 12% had the opinion that damage is high (MESFIN, 1991:114).

3.5 CONSEQUENCES OF NATURAL RESOURCE DEGRADATION

Natural resource degradation has already resulted in noticeable and wide ranging effects on the Ethiopian community – both rural and urban. AGGREY-MENSAH (1984) has categorised such effects into non-economic and economic.

3.5.1 Non-Economic Consequences

The effects of land degradation on the individual, the community or the nation as a whole are, according to AGGREY-MENSAH (1984), hard to quantify owing to the length of time over which degradation takes place. Besides, degradation as a concept focuses on effects which are non-quantifiable. Elaborating this point, AGGREY-MENSAH (1984:8) says:

How could one, for instance, put a value on the need to protect Ethiopia from becoming an extension of the Sahara desert, the loss of human lives as a result of persistent famines and starvation, the psychological effects of parting from one's family, abandoning his ancestral homeland and leaving behind assets acquired over many years of toil and hard work? How could one assess the value of the deterioration of wildlife resources which endangers Ethiopia's rich potential to attract tourists?

Some of the effects of land degradation which could be categorised as non-quantifiable (or very hard to quantify) include (AGGREY-MENSAH, 1984: 9-11; WOOD, 1990; BERHANU, 1998):

1. Loss in water resources

Due to depletion of forests and the resultant increase in runoff, the storage of water has greatly diminished and a large number of water points for human and animal use have dried up.

2. Loss in livestock production

Land degradation leads to decrease both in the quality and number of livestock; any change in livestock sector has tremendous effects on the living standards of the rural people as a whole:

First, in places where the wheel has not yet penetrated, animal transport still provides a reliable and well suited mode of transport.

Second, oxen are extensively used for traction power.

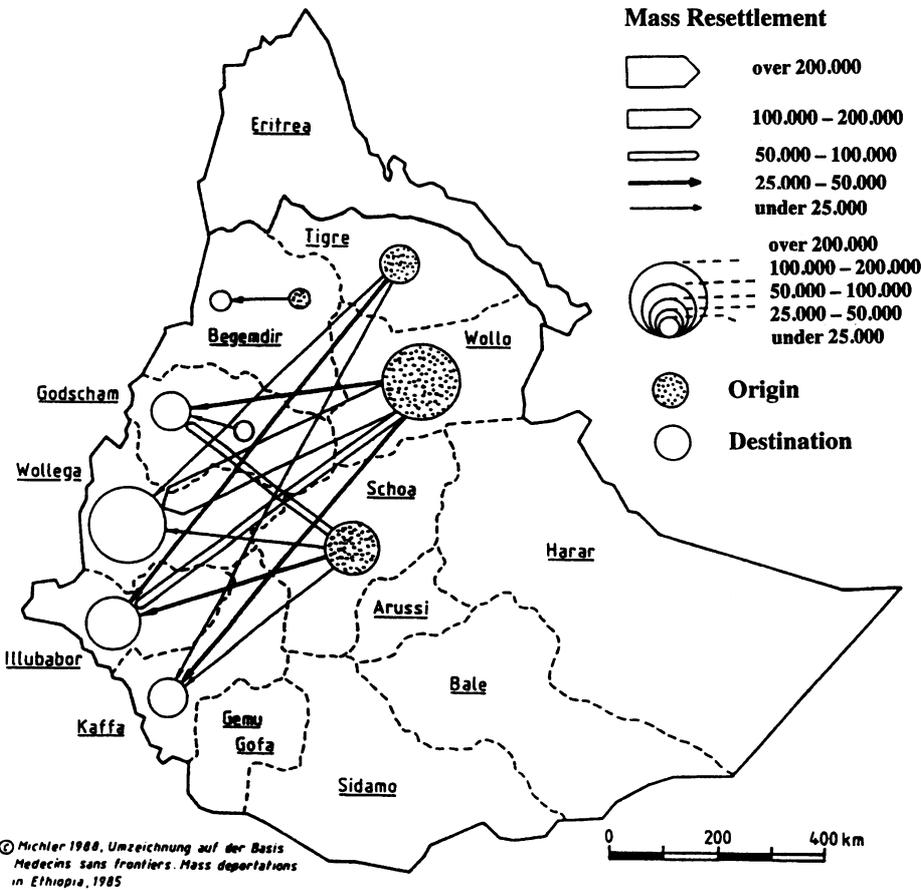
3. Unemployment and out-migration

Where agricultural and livestock production reach very low levels as a result of reduced cultivable land and yields, a situation will be created where there is insufficient land leading to shrinkage of average farm size which, in turn, creates a disguised unemployment.

Ethiopia may stand number one in Africa (perhaps in the world) to witness the power of land degradation deriving people out of their homes. In 1984/85 more than half a million people were forced to leave their homes mainly in the highly eroded northern regions to

the south and south-western parts which are less degraded so far (see Fig. 4). Though divergent views exist as to the political motives of the then resettlement, there is no doubt that land degradation played the major part. It is frightening to read (FAO, 1986 cited in WOOD, 1990) that 10 million people (or 15% of the highland population) will be left destitute by 2010 unless major changes occur.

Figure 4 Resettlement in Ethiopia 1984/85



Source: after MICHLER, 1991:168

4. Long walking distance

Plots have been abandoned and given up to grazing owing to the persistent erosion. It is reported that “about 20,000 to 30,000 hectares of land in the highlands are abandoned each year because cropping can no longer be supported by the soil” (BERHANU, 1998:3). The consequence is use of marginal lands on steep slopes or relatively unsuitable soils. New plots tend to be in remote areas, so more time has to be spent for travelling.

5. Shortage of food – malnutrition

Burning of dung as a result of depletion of forest resources reduces Ethiopia’s crop production by 10 to 20% while decline in the humus content of the soil causes a further fall in crop production of about one percent (HURNI, 1988 cited in WOOD, 1990). The consequence is obvious: shortage of food and malnutrition.

6. Lack of firewood and building material

Where there is no forest resource at all, one can not simply talk about the economic cost of getting fuelwood because there is no possibility to get it even if money is available. The problem is well summarised by MESFIN (1984:75). Over much of northern Ethiopia, according to MESFIN, “most of the land is absolutely treeless, so much so that in some rural areas only stones are used for building houses, and cow dung for fuel. Wood, even for ploughs and other implements, is very scarce, and farmers have to walk long distances into the more remote valleys to get it”.

3.5.2 Economic Consequences

Soil erosion was estimated to have cost nearly Birr 40 million in 1990 in lost agricultural production (i.e. crop and livestock) while the cost of burning dung and crop residues as fuel was nearly Birr 650 million (EPA, 1997b:9). Land degradation is estimated to result in a loss of livestock production equivalent to 1.1 million tropical livestock units (TLUs) in 1990. Approximately 17% of the potential agricultural GDP was lost because of physical and biological soil degradation. Another report indicates that Ethiopia has been losing 6-9% of her GNP due to deforestation (PEARCE, 1991). Table 3.6 indicates the social costs of resource degradation in some developing countries Ethiopia is among those suffering most.

Table 3.6 Social costs of resource degradation in selected countries

Country	Type of damage	Year	% of GNP
Mali	Soil erosion	1988	0.4
Burkina-Faso	Biomass loss	1988	8.8
Ethiopia	Deforestation	1983	6.0 - 9.0
Indonesia	Deforestation	1984	3.6
Indonesia	Soil erosion	1984	0.4

Source: D.W. PEARCE and J. WARFORD, 1991 quoted in PEARCE (1991:70)

3.6 MEASURES PROPOSED AGAINST NATURAL RESOURCE DEGRADATION

Experts have pointed out some possible solutions. THOMAS (1984:15-16) has meticulously summarised measures that help reverse the present trends of land degradation.

- improved land through control of runoff, irrigation, etc.;
- improved soil through return of organic matter, raising nutrient levels, etc.;
- improved water supply through dams, ponds, spring development, etc.;
- improved microclimate through the creation of shelter belts;
- improved output of food, fibre, fuel, timber, cashcrops, livestock and livestock products; and
- improved incomes and living standards through the diversification of the rural economy, creation of opportunities for employment and improving the returns of labour.

In the following section, some of the main strategies to attain those goals are categorised and discussed in relevance to Ethiopia.

3.6.1 Afforestation and Reforestation

Vegetation has a curative and protective value. The otherwise abandoned land may regain importance as a result of a carefully planned and efficiently administered scheme of afforestation. After evaluating the significance of a project carried out in one of the highly degraded areas of Ethiopia, it was claimed (BELETU and YOSEF, 1990:26) that “certain areas, deemed useless for some plant species, are now covered by different species of trees”. GIRMA, (1988:70) states, that “the most important measure to restore the disturbed rural ecology is the implementation of afforestation and reforestation... on a scale large enough to cope with the problems of soil erosion and water wastage”.

Reforestation and afforestation programmes worth mentioning were undertaken in Ethiopia since 1971 when the first large scale afforestation programme was launched by World Food Programme (WFP) and the Federal Republic of Germany in Eritrea and Tigray (DANIEL, 1988; HARRISON, 1990; FISSEHA, 1996). During the last two decades reforestation was implemented on nine catchments in nine regions; and peri-urban plantations were established in Addis Ababa, Nazareth, Dessie and Debre Birhan. An estimated 500 million tree seedlings were planted and about 80,000 hectares of hillsides closed for regeneration between 1976 and 1985 (EPA, 1997b). Despite these and other massive intervention and regulation, natural resource and environmental degradation continued unabated. All efforts to be made in the future in afforestation and reforestation must be viewed in conjunction with continuing deforestation. No effort that aims only at the physical environment will be successful “as long as the lives of the peasants remain impoverished and precarious” (MESFIN, 1991:48).

A successful implementation of afforestation and reforestation schemes requires an ability to form pressure groups in the community or involve existing local groups. Activities like starting nurseries in villages, planting and protecting multipurpose trees along roads, on farms, and around houses, etc., for instance, call for an ability to garner the knowledge, support, and energy of rural people (POSTEL and HEISE, 1988).

3.6.2 Conservation Oriented Crop Combination and Land Management

The underlying principles include making conservation part and parcel of the farming work cycle; and making farming practices involve not only a few new inputs but also provide farmers with short-term economic benefits (WOOD, 1990; NAIR and MUSCHLER, 1993). This method appears to combine the three broad techniques of controlling soil erosion referred to by BELAY (1992):

- agronomic methods, which aim at controlling erosion by improving the vegetative cover;
- soil management techniques, which try to control erosion by improving the aggregation of the soil particles; and
- structural soil conservation methods, which control erosion by shortening the length and minimising the gradient of the ground slope. This technique involves construction of tied ridges, bunds, fanya juu terraces, bench terraces, hillside terraces, diversion ditches (cutoffs) waterways and special water harvesting structures (THOMAS, 1984; MOA, 1986). It has been estimated that in Ethiopia some 600,000 km of soil and stone bunds were constructed on cropland and some 500,000 km of terraces on hillsides between 1976 and 1985 (EPA, 1997b).

Certain farming practices which are believed to conserve the natural resource base and at the same time raise productivity are noted (BLACKWELL, 1991; WOOD, 1990). These include intercropping and relay or sequential cropping; crop rotation; integration of livestock farming with arable cultivation; the cut and carry method of using degraded pasture, controlled grazing and tethering; widespread use of semi-permanent crops like enset (false banana) and cassava or self-seeding and volunteering crops, such as legumes and sweet potatoes. It is not surprising that emphasis has now been put on agroforestry (NAIR and MUSCHLER, 1993; BLACKWELL, 1991; MOA, 1986) which, in broader terms, includes most of the land management practices described above.

3.6.3 Agroforestry

Agroforestry is described as a new name for a set of old practices (NAIR and MUSCHLER, 1993). 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. Agroforestry, according to NAIR and MUSCHLER, represents an interface between agriculture and forestry and encompasses mixed land-use practices that have developed in response to the special needs and conditions of the tropical developing countries.

Agroforestry denotes practices ranging from simple forms of shifting cultivation to sophisticated hedgerow intercropping systems. All the diverse systems have something in common: the purposeful growing or retention of trees with crops or animals in interacting combinations for multiple products or benefits from the same management unit (NAIR and MUSCHLER, 1993:990). This is believed to be the essence of agroforestry. The advantages of agroforestry 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. Since trees are dispersed on farms rather than concentrated in plantations, agroforestry makes trees more accessible and spreads their benefits more

widely. Furthermore, agroforestry programmes are known to cost only 10-20% as much as government-established fuelwood plantations (POSTEL and HEISE, 1988).

3.6.4 Ensuring Rights of Tenure

The question of land management must also address the tough socio-political issue of land tenure or ownership right. As insecure land tenure kills farmers' interest to invest on their farm land, security of ownership is believed to encourage them to use the resources in a sustainable manner. DURNING, (1989b:41-42) commented, that with secure rights to a piece of land, farmers "tend to care for it meticulously, taking a long-term view and foregoing current benefits for dependable future gains". He adds that "neither hired workers, nor hired managers, nor tenant farmers care for land as well as owners".

The confiscation of even the small plantations around their dwellings by the Peasant Associations during the socialist regime is likely to produce further disincentives to plant or manage and protect (DANIEL, 1988:83-84). There is a serious "need not only for educating peasants to be aware of the 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".

3.6.5 Controlling the Rate of Population Growth

All efforts will bear little fruit or no fruit at all if population growth in Ethiopia continues at its present pace. Any improvements introduced will be nullified by a fast growth of population. Concrete suggestions have repeatedly been put forth with respect to controlling the rate of growth. An appropriate population policy aimed at reducing fertility is one of the proposals often underscored (MARKOS, 1990).

A policy, aimed at "reducing the total fertility rate from the current 7.9 children per women to 4.0 children per women by the year 2015" (SEYOUM, 1996:2), has been promulgated in 1993. The issue now is how to put the policy into practice as effectively as possible before it is too late to rescue the remaining resources of the country. Intensive education on population and family planning are part of the recently issued population policy. There is also a lesson to be learned from the experience of the Family Guidance Association of Ethiopia (FGAE) (JANSSON et al., 1990). Through a cautious policy emphasising the value of child spacing and the welfare of the entire family, the FGAE has, according to these writers, sensitised the government and religious authorities to the need for family planning.

4 FAMINE IN ETHIOPIA: CAUSES, CONSEQUENCES AND CURES

4.1 A DISTRESSFUL ASSOCIATION TO FAMINE

Ethiopians everywhere are ashamed of the notorious connection between their country and famine. Their lofty conception of their country as the potential bread-basket of the Middle East has been dealt a devastating blow. MESFIN, 1991:7

Decades have elapsed since Ethiopia has “become synonymous with famine, starvation and serious problems of food security” (BAYOU, 1996:76). Sadly, the very “name, Ethiopia, has been inextricably associated with famine” (FISSEHA, 1996:112). Documentary films showing the hunger-stricken faces of Ethiopian children are still used by some European TV programmes meant to mobilise ‘help for the needy’ no matter where such help is sought. Indeed famine was and still is the fate of hundreds of thousands in Ethiopia. The country was more stricken by famine “in the last two decades than any other country in the world” (HAREIDE, 1990:199). At present, no body or institution can (and is seen trying to) hide the prevalence of famine in the country, as it was the case decades ago. There are, however, marked differences in the way its causes are being presented. The direct victims have their own way of explaining famine. Politicians have been telling the victims and the international community a different story as to why famine is visiting the country time and again. Academicians have their own terms of describing famine. In this chapter the multiple factors for the recurring famine are discussed. This is preceded by a short survey on the history of famine in Ethiopia and followed by a discussion of consequences and possible solutions.

4.2 FAMINE IN ETHIOPIA: A HISTORICAL ACCOUNT

Famine is not a new phenomenon, particularly in the northern parts of Ethiopia. Its prevalence as far back as the ninth century was recorded. Some information as to its magnitude and frequency of occurrence is available (though not covering the whole period) for the last eight hundred years (MESFIN, 1984). In the Thirteenth Century seven famines were recorded. The seventeenth century saw eight. The information as to the causes and consequences of famines that occurred since the nineteenth century appears to be more complete and reliable.

A report indicates that there were three famines in the ancient times (ca 420-1270 A.D), 27 in the medieval period (1270-1855), and 16 in the modern period (since 1855). Averaging one famine every 630 years in the ancient period, one every 22 years in the medieval period, and one every 8 years in the modern period (Relief and Rehabilitation Commission cited in GETACHEW, 1995:71). The geographical coverage of famine and number of victims have been steadily growing. Areas officially identified as “famine prone” in the seventies have more than doubled in size during the eighties and famine victims increased from about three million in 1972/73 to over seven million in 1983/1985 (GETACHEW, 1995).

Table 4.1 Time of occurrence of famine in Ethiopia and areas affected

Year	Affected Areas	Remarks
1836	Wollo	
1888 - 1889	The whole country	Known as 'kifu ken' meaning a bad day
1895 - 1896	The whole country	
1899 - 1900	The whole country	
1921 - 1922	The whole country	
1932 - 1934	The whole country	
1953	Wollo	
1958	Wollo, Tigray	
1964 - 1965	The whole country	
1965 - 1966	Wollo	
1973 - 1974	Wollo, Tigray	A quarter of a million died *
1975 - 1976	Wollo	
1984 - 1986	Tigray, Wollo, Gondar, Gojjam, Shewa were the most victimised areas	Nomadic people were severely affected Two million died *

* GIRMA, 1988

Source: MESFIN (1984); Ethiopian Red Cross Society (1985) cited in MOE (1988)

Table 4.2 Population at risk of famine in Ethiopia (1977-1991)

Year	At-risk population (millions)	Regions affected (of 14 total)	Awrajas affected (of 102 total)
1977	2.7	12	*
1978	1.1	12	32
1979	1.7	10	29
1980	5.2	9	13
1981	3.4	12	48
1982	4.5	14	70
1983	3.7	10	25
1984	5.2	13	60
1985	7.9	11	65
1986	6.4	12	69
1987	2.5	12	73
1988	7.0	9	63
1989	6.6	*	*
1990	7.1	*	*
1991	7.6	*	*

* No information available

Source: GETACHEW (1995:73) based on Relief and Rehabilitation Commission annual reports

The Ethiopian governments were often criticised of doing little to control this pernicious problem. The measures said to have been taken by Menilik substantiate this fact (BAHRU, 1991:72):

The first response of Menilik and Taytu was to enjoin their subjects to pray for divine intercession. When the famine refused to be daunted by this, Menenlik admonished his subjects for not having prayed fervently enough. Doling out food for those who could manage to reach the royal residence was another measure.

Nothing is wrong with faith and prayer. Faith without action is but dead says the Bible (Holy Bible, JAMES Chapter 2, Verse 17). Government officials during the reign of Haileselassie were trying hard to keep the problem secret. The agony of famine in Ethiopia was publicised in the 1970s thanks to internal institutions like the Addis Ababa University and external media (the pioneer being a British television documentary entitled 'The Hidden Hunger').

4.3 MULTIPLE CAUSES OF FAMINE

Experts observing and investigating the root causes of famine in Ethiopia or elsewhere have tried to show the complex faces of famine (MESFIN, 1984; GIRMA, 1988; DANIEL, 1990; HAREIDE, 1990; BAYLISS-SMITH and OWENS, 1994; GOLDENSMITH and GOODE, 1994). Famine, according to them, is the result of an interplay of factors which could be natural, social, cultural, economic or political. Two or three or even all of these factors can operate together to bring famine, thus making its explanation extremely complex.

4.3.1 Famine as a Result of Natural Factors

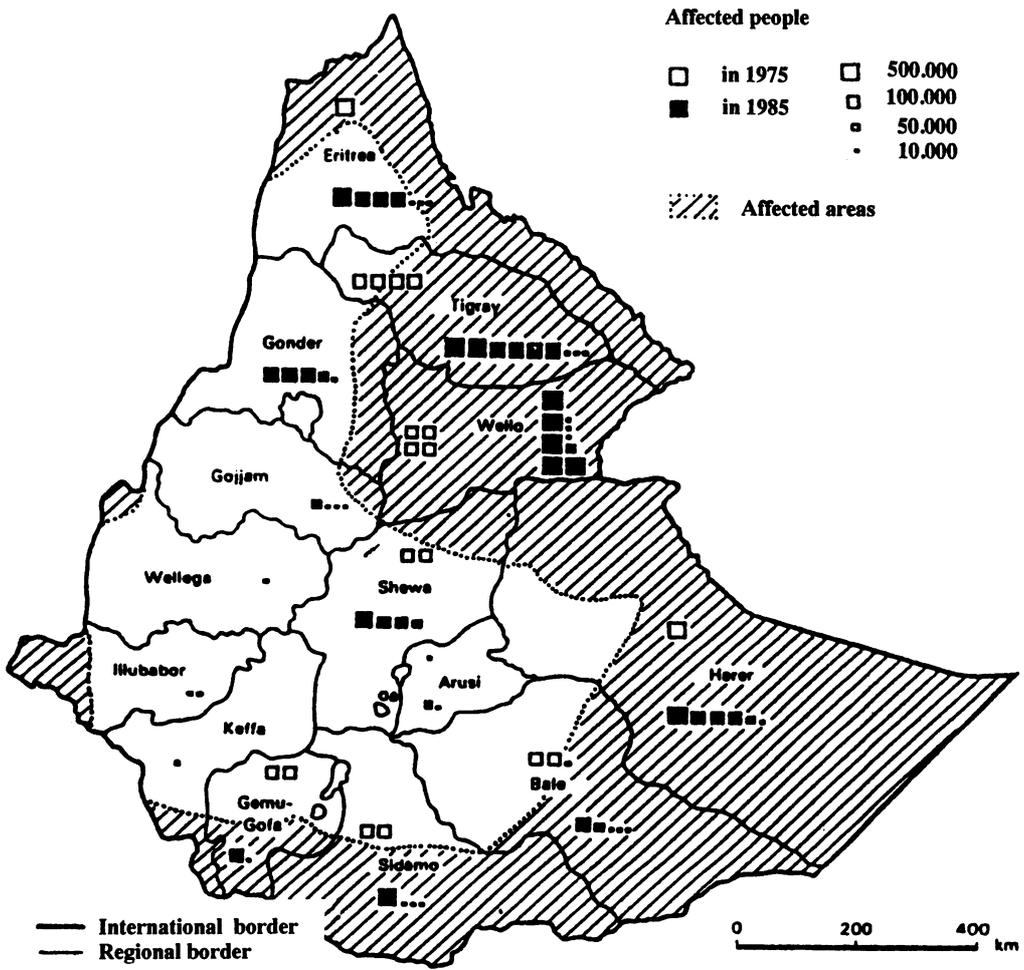
Drought, according to FASSIL (1990), has been the most damaging of the natural factors which resulted in widespread famines. A degree of overlapping is to be seen between areas affected by drought and famine (see Fig. 5). Locust are among the natural factors which contributed to the outbreak of famines by damaging crops. Other climatic phenomena like frost, excessive rain, hailstorm, flood, etc. have also destroyed crops in the past and still do so.

There is little argument, that frost and other natural factors can trigger crop failure. But, ought this lead to series of destructive famines as evidenced in Ethiopia? A number of experts and academicians seem to say 'absolutely NO'. The following is one of such arguments (GIRMA, 1988:125):

There is nothing in the environmental resource base of the country that suggests that famine ought to have been a problem for its inhabitants. The country is endowed with the arable land (a good proportion of which is still unused), abundant supply of water, and huge human power that can be turned into an asset....The Ethiopian famines are linked far more directly to the social and political structure than to the vagaries of climate.

GIRMA argues further that most regions of the country, particularly the highlands, receive adequate precipitation to carry on normal agricultural activities. During the 1973-74 famine, for instance, nearly 75% of the provinces (awrajas) received normal rains the previous summer. The fertile south west regions including Keffa, Illubabr, Wellega, and Gamu Gofa experienced normal rainfall during the 1983-84 famine. Estimates indicate that "the 1983-85 drought affected at most 30% of Ethiopia's farmland" (GIRMA, 1988:126).

Figure 5 Areas affected by drought in Ethiopia and Eritrea



Source: after HOFFMANN, 1987:189 (bases on 'The Challenges of Drought 1985')

4.3.2 Famine as a Result of Socio-economic and Political Factors

Past and present socio-economic and political institutions in Ethiopia bear the full responsibility for keeping the masses in perpetual poverty and vulnerability and for failing to take timely measures to ameliorate the potential effects of natural disasters. GIRMA (1988:130)

A system in which the majority of peasants are totally dependent on the physical environment and on their backward methods of production, and in which the socio-economic and political forces persist in incapacitating the productive potential of peasants by incessant oppression and exploitation is a condition for vulnerability to famine. MESFIN (1984:169)

4.3.2.1 Gap between Rates of Food Production and Population Growth

It was proved time and again that even under normal conditions (with adequate rain fall, absence of plant pests and diseases, etc.) the per capita grain production in Ethiopia has never been much more than subsistence level (DANIEL, 1988). The temporal pattern of food production shows a downward trend. Table 4.3 shows the annual growth of food production in Ethiopia compared to that of Africa and the rest of the less developed world (EMA, 1988: 21). Both the total and per capita food production sank, preceding the deadly famine of 1984/85.

Table 4.3 Average annual growth rates of total and per capita food production in %

Year	Total food Production			Per capita food production		
	Ethiopia	Africa	LDC's	Ethiopia	Africa	LDC's
1977 - 1978	5.3	3.3	3.8	2.7	0.4	1.1
1978 - 1979	8.8	2.2	0.5	6.1	-0.8	-2.1
1979 - 1980	3.4	3.6	3.3	0.7	0.6	0.7
1980 - 1981	-1.3	1.9	4.2	-3.8	-1.1	1.6
1981 - 1982	-0.8	3.1	1.5	-3.4	0.0	-1.1

Source: Ethiopian Mapping Authority, 1988:21

The growth rate of domestic food production over the last two or three decades was less than 1.0% on the average and that of major crops only 0.5% per year (DEBEBE and SISAY, 1994 cited in HAILU, 1996:8). The growth of population was over 2.5 percent in the same period.

4.3.2.2 System of Production

It is known that one of the reasons for the constantly low rate of food production in Ethiopia is the archaic system of production. Close to 90% of the country's population is composed of subsistence producers depending almost entirely on traditional equipment. The absence of modern inputs, has weakened the ability of peasants to produce sufficient food in the face of the ever growing population contributing to the outbreak of famine (SEYOUM, 1995).

4.3.2.3 Deterioration of Household Resources

The decline in household access to land resources is an aspect of the general deterioration in household resources (GETACHEW, 1995). It was reported that land resources per capita have sank down since the 1974 revolution. The mean land holding size among land-titled households of 0.7 hectares is considered to be far below the estimated average (3.7 hectares) required to provide a minimum household livelihood security with the present level of technology and farming practices. The temporal decline holds true also to household access to livestock resources.

4.3.2.4 Shortage of Alternative Employment Opportunities

Another economic phenomenon leading to food shortage and famine is the widespread underemployment and unemployment. One of the causes is the progressively falling size of farm land owing to degradation and increasing population. Off-farm income opportunities are no longer available to any degree thus weakening household entitlement to food (GETACHEW, 1995).

4.3.2.5 Taxes and Payments Imposed on Peasants

The multiple taxes and payments imposed on peasants are believed to be among the main causes of famine in Ethiopia (MESFIN, 1991; GETACHEW, 1995). In addition to the payments made to the government in form of taxes and fees, associations like those of peasants, youth and women had been snatching their share from the peasants' meagre income. GETACHEW identified the following types of payments under peasants' obligation to the state: land use tax, agricultural income tax, education tax, surtax, PA contribution, Women's and Youth Association contributions. Prior to the removal of the socialist government, all rural taxation expressed as a proportion of gross agricultural income is said to account for 23% of low income and 12% of upper income households' expanses.

Iddir (a voluntary association mostly dealing with funeral expenses) and debts incurred by peasants (often annually in the summer months just before harvest) are among the cash obligations though not as important as the others mentioned. There were "numerous spontaneous and largely extra-legal contributions demanded by local authorities for literally one hundred and one purposes, from construction of stadiums and revolutionary squares to clinics and schools" (MESFIN, 1991:146). The cash extractions have continued even during the famine years, when peasants were under extreme distress and dying in thousands.

4.3.2.6 The Market

Market was the other force operating against the rural poor. The exchange value of household resources for food staples was far below what was required during drought and famine years. The value of one cow unit deteriorated nearly 10 times in exchange for teff, barley, and sorghum, and 9 times for wheat and maize (GETACHEW, 1995). In 1982, six 100-kilo sacks grain could be bought for the price of an ox, enough to feed two people for fifteen months (HARRISON, 1990:18). By 1984, an ox fetched only one sack.

Owing to the institutional demands for cash at a specific period, peasants have been forced to sell their products at harvest time. Prices fell as all peasants were forced to bring their crops to the market. The peasants were, according to MESFIN (1991:148), squeezed between two blind forces. They were urged to pay their obligation during a specific time by one force; and sell their crops at very cheap prices by the other force. It should be recalled that there was, until 1992, a special state trading agency, the Agricultural Marketing Corporation, through which the state controlled and manipulated the marketing of rural produce. Such a restrictive market policy resulted in transfer of a considerable amount of household income to the state – the state-fixed price was said to amount only to 50% of what an open market would have offered (GETACHEW, 1995). Another effect of this action was a fall in peasants' interest to produce more even if they were in a position to.

4.3.2.7 War and Political Instability

The civil wars characteristic to Africa, and East Africa in particular, have been contributing a great deal directly and indirectly, to famine. This was well presented by GIRMA (1988) and GETACHEW (1995):

In each of its offensives in Eritrea and Tigray,... the army has frequently engaged in indiscriminate attacks by destroying crops, domestic animals, and settlements. Each year more and more land is left uncultivated. Every year tens of thousands of peasant farmers are forcibly conscripted into the militia force and sent to the war fronts....As a result, rural communities have suffered from labour shortages (GIRMA, 1988:130).

The chronic waging of war and the undemocratic political system in the Ethiopian administrative apparatus have significantly contributed to famine. Large amounts of manpower and scarce foreign exchange resources that could have been used for priority financing of rural development and improved household food security were shifted to the war front (GETACHEW, 1995:347).

The Ethiopian government was known to have been allocating a remarkable proportion of the national budget to the military operations against opposition groups, and by 1990, the war was consuming 60% of the country's national budget (HORNE and FROST, 1992). Two of the then major opposition groups are now on power both in Ethiopia and Eritrea. In 1998, the two countries launched another destructive war with each other. This war resulted once again in death of tens of thousands and shift of almost all the national income to the 'war front'. In the same period, millions of people are officially reported to have been exposed to famine in Ethiopia.

4.4 CONSEQUENCES OF FAMINE

Food that was hitherto considered taboo was eaten. Some looked for grain in the excrement of cattle. Others ate the carcasses of animals only to die painfully from the diseased meat. Still others resorted to the extreme of cannibalism. A few sought survival in enslavement. There were also those who, giving up all hope, committed suicide. BAHRU (1991:72)

The recurrent famines in Ethiopia had resulted in all kinds of evils. In this section, attempt has been made to see into some of the quantifiable and non-quantifiable effects of famine in Ethiopia.

4.4.1 Death of People

Famine is accompanied by loss of human life. The ‘Great Famine’ of 1888 and 1892 was estimated to have killed one third of the country’s entire population; in some areas of the north the population was reported to have been reduced by more than half (MESFIN, 1984). A quarter of a million died during the 1973-74 famine (GIRMA; 1988). Similarly, the 1984/85 famine is estimated to have put nearly 10 million people at risk and to have killed as many as one to one and half million (THE ECONOMIST INTELLIGENCE UNIT, 1990; MESFIN, 1991).

4.4.2 Long Ranging Economic Effects

The loss of active workforce in hundreds of thousands leaves scars on the economic life. HARRISON (1990) reports that farmers in the central highlands of Ethiopia, following the recurring famines, sold off first their sheep and goats, then young cattle, mules and asses, then their cows, and finally their draught oxen. In some places even ploughs and hoes have been sold. A study in Wollo region, northern Ethiopia revealed that peasants sold their dwellings at the high point of the crisis as a last resort measure (DESSALEGN, 1988).

4.4.3 Socio-psychological Effects

Besides its measurable consequences, famine has social and psychological repercussions that are not easy to quantify. These include “hopelessness that makes a human being empty to the core”, “helplessness that tortures a human being standing face to face with slow but certain death”, a feeling of nothingness, being neglected and forgotten, and spatial dislocation and the accompanying dismemberment of families which, in turn, result in tearing and shattering of the social fabric (MESFIN, 1984:55). MESFIN emphatically notes:

It is impossible to estimate the money value the daily helpless suffering of the mother whose pain of hunger is compounded by the innocently persistent demands of her children. It is impossible to estimate the money value the tearless cries and the wrinkled faces of starving children. Day by day, misery is compounded by debilitating process of starvation.

4.5 MEASURES TO PREVENT THE OCCURRENCE AND CONTROL THE EFFECTS OF FAMINE

A sustainable solution to chronic and transitory food insecurity is expected to link emergency feeding (provisioning), rehabilitation (protection) and development (promotion) of the livelihood (GETACHEW, 1995). Emphasising that there is no single means of eradicating household food insecurity and famine, GETACHEW recommends ‘pragmatic ways’ to prevent famine. These are summarised in the following sections.

4.5.1 Protection of the Right to Food and Provision of Famine Relief

As Ethiopia is facing almost constantly a chronic and geographically widespread food insecurity, there is a need to anticipate and integrate emergency famine relief programmes into the national development plans (GETACHEW, 1995). In pastoral areas, emergency livestock feed reserve, which can help maintain the preservation of suitable animal species, is recommended. It was also suggested to aim at the provision of veterinary services.

4.5.2 Long-term Strategies against Famine

Several conditions must be met in the long term so as to ensure food security (GETACHEW, 1995): democratising the political apparatus and eliminating the chronic waging of war; reconsidering land tenure issues and clarifying ownership; intensifying family planning by using effective extension services and incentive systems. Income alternatives for the rural population like milk production, poultry production, and cottage industries are also mentioned by GETACHEW.

4.5.3 Increasing food production

There is a repeated call for a medium and long term famine prevention by increased food production. Options for optimal use of available resources have been pointed out (GETACHEW; 1995; FISSEHA, 1996; EPA, 1997b). including:

1. **Flood harvesting:** believed to help capture moisture for crop growth in dry-land farming systems.
2. **Micro-irrigation:** Out of the estimated potentially irrigable land of about 3.7 million hectares, only 75,000 hectares of large scale and 72,000 hectares of small scale irrigation has been established in Ethiopia (EPA, 1997b:77). The irrigation potential of the highlands is estimated to result in 5% of the annual domestic production (ASRES, 1994 cited in FISSEHA, 1996). It has also been claimed that Ethiopia will comfortably be able to produce enough food for its fast growing population if half of the available potentially irrigable land is brought under cultivation.
3. **Use of high yielding and early maturing varieties of crops:** It is believed that there are great opportunities for increasing production and minimising crop failure by introducing high yielding and early maturing varieties of crops.
4. **Expansion of cultivated land:** In the west and south western parts large tracts of virgin lands are still existing, owing to the prevalence of trypanosomiasis (FISSEHA, 1996). It has also been argued that (with improved techniques of cultivation) areas of cultivable land can be expanded even in the intensively cultivated highlands by using vertisols.
5. **Intensification of crop cultivation:** Among the strategies suggested are timely land preparation and planting and adequate application of fertilisers and multiple cropping. Given enough draught power for timely land preparation and sowing, multiple cropping is expected to result in better yield particularly in those parts of the country that have a bimodal rainfall distribution.

4.5.4 Monitoring of Household Food Security: A Strategy for Preventing Occurrence of Famine

Collecting information and using it to predict the occurrence of famine is another measure particularly important to prevent the outbreak of famine. GETACHEW (1995) underscores that food information systems must be legally linked to the political decision making apparatus through a Famine Code. Information to be collected, analysed and acted upon include (GETACHEW, 1995:358):

1. **Meteorological information** including data on onset of rainy season and rainfall distribution at times of harvest;

2. **Crop production information** such as timely land preparation, availability of seed, oxen and other inputs, provision of pesticides, prevalence of hazards, previous years production information and ability for storage and stock-piling;
3. **Livestock information** including health and general condition of livestock, production and productivity of livestock, availability of pastureland and water;
4. **Market information** consisting of livestock prices, prices of food staples, types of commodities displayed on markets, and purchasing power of market participants;
5. **Population and nutrition information** such as 'normal' and 'unusual' patterns of population migration, and data on children's and old peoples' nutritional status;
6. **Emergency information** including recurrent food shortages, patterns of deaths among human and livestock populations, changes in food intake, local storage and warehouse capacity, transport and logistic facilities.

4.6 FIGHT AGAINST FAMINE: PRACTICAL SIDE OF THE MATTER

Attempt is made to show what is actually being done at the grassroots level using the activities of an office in charge of disaster prevention at a provincial level.

A National Office for Disaster Prevention and Preparedness (ODPP)

In Ethiopia, a national policy has been promulgated to prevent disasters one of which being famine. Among the leading aims of the policy is prevention of loss of human life as a result of shortage of food; and elimination of the root causes of famine (CDPP, 1995). Strategies include collection and dissemination of information, accumulation of food grain and seed to be distributed, deposition of money to be used when disasters break out, credit service to help the people affected, etc.

Disaster Prevention and Preparedness in Action

The national office for disaster prevention and preparedness has branches down to the district level. The activities of the ODPP at Durame (a capital of the Kembata-Alaba-Tembaro Zone) have been closely examined to see how the strategies designed at the national level have been put into practice. According to Mr Petros Girmiso, the head of the early warning department, the provincial office was established in 1995 to co-ordinate, among others, the process of collection and distribution of aid in the Tembaro district. Besides satisfying the immediate needs of people for food and thereby preventing loss of human life, the office was reported to work hard to enable such people to lead an independent life. This was done mainly by providing seeds, equipment and oxen in return for development oriented activities.

The provincial office has been conducting valuable surveys to identify the peasant associations that are possible victims of the next famine. Such an organised attempt to gather authentic information and offering help on this basis is an unprecedented activity at least in that region. The office plans projects at district level based on specific assessments. One department of the ODDP at Durame is the Early Warning department, which collects information on a regular basis. The information is sent to the regional office at Awassa: data on rains, grain production and marketing, pasture lands, animal health, cattle market, drinking water, etc. The writer is of the opinion that information gathered in this way at a provincial level could be of use not only for planning disaster prevention strategies but also for designing sustainable development.

5 GEOGRAPHY CURRICULUM AND ISSUES RELATED TO THE USE AND MANAGEMENT OF NATURAL RESOURCES

5.1 HISTORICAL TIES BETWEEN GEOGRAPHIC EDUCATION AND NATURAL RESOURCE USE AND MANAGEMENT

5.1.1 What is Geographic Education all about?

It is common for teachers to define their subject. This seems challenging for geography teachers. They try not to define Geography or make the definition abstract and complicated, so to discourage further questions. The teachers cannot be blamed for not being able to give a precise definition. Geography doesn't have one. No word as to 'what geography is' is in any of the student textbooks for Ethiopian secondary schools. Curriculum designers also appear to be too shy to define their subject.

One thing seems to have been accepted by geographers as the crux of geographic education and research: the man-environment relation. This is to be easily observed in the comprehensive book by ROGERS, et al., (1992). It introduces views aired by geographers (physical and human) as to the 'what' and 'worth' of geographical studies. Most authors have underlined the pivotal position of environmental issues in geography. Some argue, that the very survival of geography as a discipline is attached to its contribution to environmental issues. Geography cannot claim to be the only discipline or school subject to address the man-environment relationship though.

5.1.2 Geographic Education and Environmental Awareness

There is a growing understanding that the contribution geography can make to a contemporary society is to be weighed against its contribution to the in-depth study of the man-environment relationship: "If the science of geography wishes to regain its former utility it should focus on the study of man-environment relationship more than ever before (MEKETE, 1996:234). The term environment as used in the context of 'man-environment' relationship has been defined as "that part of nature which directly or indirectly affects the day-to-day activities of man for the actual and potential development of human society" (Social Science Panel, 1983:4).

A similar view was advanced in the geography syllabus for one of the German federal states: Schleswig-Holstein (MBWFK, 1997:15). Emphasised was the role geography has to play in equipping students with basic awareness and skills which enable them to behave intelligently and responsibly in the social and natural environment. Below is a more complete quotation in the original German language.

Das Fach Erdkunde vermittelt den Schülerinnen und Schülern Grundeinsichten und -fertigkeiten, damit sie sich sachkundig und verantwortungsbewußt in ihrer natürlichen und sozialen Umwelt verhalten und an der Bewältigung von Gegenwartsproblemen und Zukunftsaufgaben beteiligen können.

GALE (1992:21) advances the view that a geographical training brings about understanding not only of the relationship between people and their environment but also of how people's reactions to their environment are influenced by their cultural conditioning. For GALE, geography is a "study not so much of people in the environment but of how people visualise and use that environment. It is not so much what is there as what we believe to be there". HAUBRICH (1994:1.9) argues that geographic education

contributes to environmental and development education by making individuals aware of their own behaviour and that of their societies, providing information and skills that enable them to make environmentally sound decisions and develop an environmental ethic. UNWIN (1994:207) lists issues to be treated in geographic education. These include environmental degradation, climatic change, differential access to resources, famine and poverty. The role of geography is, according to UNWIN, revealing the contradictions associated with the human exploitation of the environment, and in so doing to suggest ways in which these might be resolved. Could this be taken as the fundamental goal of Geographic education of tomorrow?

5.1.3 Geographic Education of Tomorrow

There is a strong recommendation from professional geographers and geography educators that geography should make its relation to the environment tighter than ever before not only for the sake of 'social relevance' but also for its own survival. Geography of tomorrow should, according to MEKETE (1996) focus on man-environment relationships including:

1. perception of the environment, both natural and man-made;
2. mechanisms for adjustment to environmental hazards;
3. assessment of the availability of human and natural resources;
4. degradation of the physical environment
5. high technologies and their impacts on the environment; and
6. development of technologies that benefit the environmental conditions of the underdeveloped world.

5.2 ENVIRONMENTAL ISSUES IN GEOGRAPHY CURRICULUM: THE CASE OF GERMANY

Biology and Geography are among the school subjects treating environmental issues. This seems to be a world wide phenomenon. The case of Germany was taken for an in-depth analysis. That geography and biology are the school subjects having great concern for environmental issues is to be seen from the following quotation.

Da seit Mitte der 70er Jahre ökologische Probleme den Gesellschaften der westlichen Welt zunehmend bewußt werden, wurden auch diese Themen als obligatorische Arbeitsfelder in den Schulunterricht einbezogen. Vor allem die Fächer Geographie und Biologie (ökologische Zentrierungsfächer) richteten ihre Lerninhalte seit Anfang der 70er Jahre in stärkerem Maße auf ökologische Fragestellungen aus (VONNAHME, 1987:523).

A brief review of studies on how environmental issues are treated in school textbooks is presented in the following sections. Besides, the Geography syllabus for Schleswig-Holstein was investigated.

5.2.1 Environmental issues well addressed

An investigation on four of the school subjects in Germany revealed a sufficient coverage of environmental issues in all the cases. Geography textbooks were found to have the additional quality of integrating environmental issues into the other themes:

Die Analyse zeigt, daß in den untersuchten Schulbüchern der vier genannten Fächer ökologischen Themen im großem und ganzen genügend Raum gewidmet wird. Die didaktische Aufbereitung ökologischer Fragestellungen ist in den einzelnen Fächern allerdings unterschiedlich. Während sich in Politik- und Biologiebüchern nach wie vor eigene Kapitel zu klassischen Umweltthemen finden lassen, ist bei neueren Erdkundebüchern der Trend erkennbar, ökologische Probleme und Fragestellungen nicht mehr in Form eigener Umweltkapitel darzustellen, sondern diese in andere Themen einzubinden (VONNAHME, 1987:523).

PAPE (1992) examined environmental issues in geography textbooks officially approved for teaching in primary and secondary schools of Lower Saxony (Germany) He states:

- The quantity of relevant issues, mainly for primary school level, exceeds the basic requirements of the official curriculum;
- Most of the student exercises focus on memorisation. Only a few are practice or pupil oriented; and
- The international dimension of many environmental problems and the global responsibility to overcome them received no mention at all.

A major difference is to be seen among the federal states in Germany as to the issues covered and the way they were addressed. Certain themes and regional examples were not revised for long (HENRY and LIEFNER, 1994:348). The original words of the writers are:

Die Gewichtung umweltorientierter Fragestellungen in den Lehrplänen der verschiedenen Bundesländer variiert jedoch erheblich und die einzelnen Themenkomplexe werden auch höchst unterschiedlich behandelt. Einzelne thematische Inhalte und räumliche Beispiele sind schließlich teilweise seit Jahren unverändert geblieben und damit wenig geeignet, umweltbewußtes Verhalten vor Ort zu entwickeln.

5.2.2 Environmental Issues in Geography Syllabus for Schools in Schleswig-Holstein

The Geography syllabus in Schleswig-Holstein has been prepared by the federal state's ministry of Education, Science, Research and Culture. Five core problems have been selected to be tackled by geography education and one, "Erhalt der natürlichen Lebensgrundlagen" (preservation of the natural basis of life) has a direct relation to the contribution of geography to environmental awareness. Three statements signify this (MBWFK, 1997:16):

Der Erdkundeunterricht:

- Vermittelt Einsichten in die Naturausstattung der Erde und die Gesetzmäßigkeit natürlicher Vorgänge,
- Veranschaulicht die Folgen menschlicher Eingriffe und klärt über die Endlichkeit der Ressourcen auf, macht in landschaftsökologischen Fragen sachkundig und weist auf Gefahren für den Lebensraum des Menschen hin,
- Regt die Diskussion von Maßnahmen und ihrer politischen Durchsetzbarkeit an.

Geography education is thus given the responsibility to impart the understanding as to the natural set up of the earth; and the understanding that natural events occur on the basis of definite laws. Issues relating to the influence of mankind on the natural environment, the life span of resources and dangers associated, were identified as the job description of geography as a school subject (MBWFK, 1997:18). In geography, according to the syllabus, pupils will develop a perspective about the earth as a foundation of life, continuously diminishing as a result of human exploitation.

Im Erdkundeunterricht erfahren die Schülerinnen und Schüler die Erde als eine endliche Lebensgrundlage, die mit zunehmenden gesellschaftlichen Raumansprüchen enger wird. Sie gewinnen dabei Einsichten in die Wechselwirkungen zwischen Mensch und Raum, die in umweltkonformen und umweltschädigenden Aktivitäten des Menschen sichtbar werden.

Geography education is also assigned the task of stimulating discussions on the problems arising during use of resources and measures to solve such problems. The list of topics (content) selected to enable geography to perform the job assigned to it and specified in the syllabus is given in Table 5.1. The English translation was added:

Table 5.1 Themenübersicht (Topic Overview)

Klassenstufe (Grade Level)	Hauptthemen (Major Topics)	Umweltbezogene Themen (Environment related topics)
5 Hauptschule * Realschule * Gymnasium *	- Ohne Landwirtschaft geht es nicht (<i>It doesn't work without agriculture</i>)	- Nahrungsmittel aus ökologischem Anbau und artgerechter Tierhaltung (<i>Food production through Eco-farming and animals husbandry in the natural environment</i>)
	- Deutschland: Vom Industrie- zum Dienstleistungsland (<i>Germany: From an industrial to a service-oriented country</i>)	- Umweltschutz in den alten und neuen Ländern (<i>Environmental protection in the old and new federal states</i>)
6 Hauptschule Realschule Gymnasium	- Europas Landschaftsgürtel beeinflussen unsere Lebensweise (<i>Europe's landscape zones influence our way of life</i>)	- Jahreszeitenklimate in Europa und ihre Auswirkungen auf Natur und Mensch (<i>Seasonal climate of Europe and their impacts on nature and humans</i>)
7 Hauptschule Realschule Gymnasium	- Wieviele Menschen trägt die Erde? (<i>How many people does our earth bear?</i>)	- Die Tropen - Landschaftsgürtel und Nahrungsbasis (<i>The Tropics: Landscape zones and nutrition basis</i>) - Afrika: Muß Hunger sein? (<i>Africa: Must it be a continent of Famine?</i>) - In der Sahelzone: Kampf gegen die Ausbreitung der Wüste (<i>The Sahel Zone: Struggle against the spread of deserts</i>) - Afrikas Bodenschätze für die Weltwirtschaft (<i>Africa's soil resources for the global economy</i>)
8 Hauptschule Realschule Gymnasium	- Rußland: Kernstaat der GUS (<i>Russia: Core of the Union of Independent States</i>) - Eine Welt oder viele Welten (<i>One world or many worlds</i>)	- Zerstörung natürlicher Lebensgrundlagen (<i>Destruction of natural foundations of life</i>) - Teufelskreis der Armut (<i>The vicious circle of poverty</i>)

Klassenstufe (Grade Level)	Hauptthemen (Major Topics)	Umweltbezogene Themen (Environment related topics)
9 Hauptschule	<ul style="list-style-type: none"> - Der Mensch beeinflusst seinen Lebensraum (<i>Humans influence their locality</i>) 	<ul style="list-style-type: none"> - Die Lebensgrundlage Wasser und Luft (<i>Water and air as foundations of life</i>) - Waldschäden in Europa (<i>Damage on forests in Europe</i>) - Traditionelle und alternative Energieträger (<i>Traditional and alternative sources of energy</i>) - Ökosystem Weltmeer: Gefährdung der Meere (<i>Ocean Ecosystem: Endangering the oceans</i>)
9 Gymnasium	<ul style="list-style-type: none"> - Ökosystem Weltmeer (<i>Ocean Ecosystem</i>) - Energie: Krise aus Mangel oder Überfluß? (<i>Energy: Problem of shortage or abundance?</i>) 	<ul style="list-style-type: none"> - Nahrung und Rohstoffe aus dem Meer (<i>Food and raw materials from the ocean</i>) - Gefährdung der Meere (<i>Endangering the oceans</i>) - Bedeutung der Meere für das Klima (<i>The effect of the oceans on climate</i>) - Fossile Energien: Reserven, Verbrauch, Umweltbelastung (<i>Fossil energies: Reserves, utilisation and environmental pollution</i>) - Ausstieg aus der Kernenergie? (<i>Quitting the nuclear energy?</i>) - Energiesparen und alternative Energiequellen (<i>Energy saving and alternative energy sources</i>) - Energiestandorte und Energiepolitik in Deutschland (<i>Energy location and energy politics in Germany</i>)
10 Realschule	<ul style="list-style-type: none"> - Ökosystem Weltmeer (<i>Ocean Ecosystem</i>) - Der Mensch beeinflusst seinen Lebensraum (<i>Humans influence their living space</i>) 	<ul style="list-style-type: none"> - Nahrung und Rohstoffe aus dem Meer (<i>Food and raw materials from the ocean</i>) - Gefährdung der Meere (<i>Endangering the oceans</i>) - Bedeutung der Meere für das Klima (<i>The effect of oceans on climate</i>) - Die Lebensgrundlage Wasser und Luft (<i>Water and air as foundation of life</i>) - Waldschäden in Europa (<i>Damage on forests in Europe</i>) - Traditionelle und alternative Energieträger (<i>Traditional and alternative sources of energy</i>) - Raubbau im Urwald (<i>Overexploitation of natural forests</i>)
10 Gymnasium	<ul style="list-style-type: none"> - Der Mensch beeinflusst seinen Lebensraum (<i>Humans influence their living space</i>) 	<ul style="list-style-type: none"> - Die Lebensgrundlage Wasser und Luft (<i>Water and air as foundations of life</i>) - Waldschäden in Europa (<i>Damage on forests in Europe</i>) - Traditionelle und alternative Energieträger (<i>Traditional and alternative energy sources</i>) - Atomabfall im Eismeer (<i>Atomic waste in the Arctic Ocean</i>) - Raubbau im Urwald (<i>Overexploitation of natural forests</i>)

* Hauptschule, Grundschule and Gymnasium are the different streams of education in Germany. Source: Geography syllabus for Schleswig-Holstein (MBWFK, 1997)

5.3 NATURAL RESOURCE USE AND MANAGEMENT IN GEOGRAPHY CURRICULUM FOR ETHIOPIAN SCHOOLS

One of the main aims of the present study was to assess the extent to and ways in which the problem of natural resource degradation was treated in the geography syllabi for Ethiopian schools. Accordingly, the revised social science syllabi (grades one to twelve), geography text books (grades seven to twelve) and Geography teacher's guides (grades seven to twelve) were thoroughly examined.

5.3.1 Geographic Education in Ethiopian Schools

Geography has existed as one of the school subjects ever since the inception of modern education in Ethiopia. In 1963, geography had been merged with history at the primary level to create an integrated subject called social studies. Thus geography has existed in the Ethiopian school curriculum either as a separate or an integrated subject (KEDIR, 1994). Up to the 80's, geography books used by teachers for preparing notes were said to have been purchased from abroad, mainly Great Britain and Canada. A report of a conference involving African leaders of education held in Addis Ababa in 1961 stressed the need to reorient education to economic and social needs and base it on knowledge of natural heritages of the individual countries of Africa. Subsequent to the conference, a meeting of geographers sponsored by UNESCO was held in 1965. The meeting was to explain the implication of the report to geographic education.

Syllabi for geographic education at Ethiopian schools were said to have been developed in view of the recommendation made in the meeting of geographers and the special African requirements as stipulated by the participants of the 1961 conference. The first national geography syllabi for Ethiopian secondary schools were outlined in 1965 (KEDIR, 1994). Locally written geography teaching materials came nearly twenty years later. In 1980 the first student textbook for grade 9 was published. The first edition of a geography teacher's guide grade 7 to 12 appeared in 1983 (KEDIR, 1994). The rest of this chapter deals with the analysis of these first teaching materials (or their revised version).

5.3.2 Analysis of Objectives

General Aims

The Geography teacher's guide (Social Sciences Panel, 1983a:5-13) contains a list of aims (general objectives) of geographic education in Ethiopian secondary schools. Two of the nine general objectives seem to be related directly to natural resource use and management. The aims and elaboration accompanying them have been quoted below:

Aim 1:

“To develop the student knowledge to observe spatial distribution of things and phenomena and their interrelations in a given environment”.

It is written in a way of elaboration that

“Spatial distribution of things and phenomena are the basis of study in geography. In this case the study of geography shall help the student to identify what things and phenomena (land form, soil, climate, vegetation, people's activity etc.) are found in a given area or region. He shall also understand why these things and phenomena are there and how they are interrelated”.

Aim 4:

“To develop in the student the knowledge of understanding the interrelation between man and his geographical environment and the conviction that man has the control over nature”.

It has been contended that

“Man acts on nature in order to satisfy his own needs. Through his activity he affects the environment. The concept that nature has the control over man and that man is powerless in the face of nature has to be contradicted by a materialist dialectical approach. The approach which ascribes the cause of social development to factors external to society such as geographic and climatic is weak and unscientific”.

It was also indicated that there is a contradiction in the influence of scientific and technological revolution. On the one hand, according to the writers, the fast development of science and technology has increased production, intensifying man’s pressure on the natural environment. On the other, science and technology are enabling man to use new substances, harness nature, etc. In view of a contradiction and regional disparity in the distribution of natural resources, “It is the responsibility of every student to appreciate natural resources and take part in conservation measures”.

Specific Objectives

The aims were set into specific statements and listed for each grade (Social Science Panel, 1980:10-21). Objectives related to natural resource use and management are singled out:

Grade 8, Objective 5:

“Enable students develop the ability to see and analyse causal relationships between physical elements of the environment.”

Grade 9, Objective 4:

“Develop a positive attitude in students concerning the relationship between the environment and social development that the environment does not determine social development and that man has the ability to change and control nature.”

Grade 10, Objective 4:

“Develop in students positive attitudes with regard to the conservation of natural resources; enable them acquire the principles of conservation so that they may be able to implement them in their practical life activities.”

Grade 10, Objective 5:

“Provide students with basic knowledge about the fundamentals of population growth and its ideological implications so that students may appreciate the Marxist view on population growth.”

Grade 11, Objective 5:

“Acquaint and provide students with the diverse economic developmental problems of the African regions, so that students may appreciate the need for co-operation among African countries.”

Grade 12, Objective 2:

“Enable students to develop the ability to carry out quantitative analysis of the physical environment of Ethiopia and arrive at a scientific resource management both natural and human.”

A Remark on the Aims and Objectives

The analysis of the aims of geographic education in Ethiopian secondary schools shows that the human-environment-relationship in general and use and management of natural resources in particular have been duly considered. There have been ample opportunities to select content to address the problem of natural resource degradation and environmental pollution.

Though in-depth analysis of the clarity and measurability of the aims is beyond the aim of this study. The statements on these aims appear to beg criticism as to the way they were constructed. The statement: “To develop the student knowledge to observe spatial distribution...” is vague and difficult to understand let alone put in measurable terms. The other statement: “To develop in the student the knowledge of understanding the interrelation...” is confusing. The phrase – ‘the knowledge of understanding’ – makes no sense at all. What is more, the three domains of educational objectives are not presented in a balanced way. Emphasis has been made on dissemination of knowledge and formation of attitude as to the use and management of natural resources. Skills essential for the protection of the environment and wise use of natural resources have not been adequately addressed.

5.3.3 Analysis of Students’ Textbooks

The content of students’ textbooks for grades seven to twelve (MOE, 1985a; 1985b; 1986a; 1986b; SOCIAL SCIENCE PANEL, 1981; 1983) was thoroughly analysed in order to see how the objectives were translated into content and presented.

Grade Seven

In Ethiopian schools, geography proper begins in grade seven. At lower grades it is combined with history and political education to form 'social studies'. Geography of grade seven deals with physical features. Issues like the position of earth in space have been elaborated and terms such as galaxy, Milky Way, the solar system introduced. This is followed by a brief description of the formation of continents. Rocks making up the earth’s crust are discussed together with mineral resources. Internal and external forces like folding, faulting, earthquake, volcanic activities and erosion are treated in greater depth. Resource degradation is not properly discussed. The discussion on soil erosion could have been extended to land degradation by supplying quantitative information on the extent of the problem.

Grade Eight

Grade eight geography, which begins with techniques of locating places on the earth's surface, covers a wide range of physical topics. The movement of the earth and related phenomena; weather and climate and natural vegetation – types and factors affecting its distribution – are addressed. Nothing is said about natural resource degradation and the need for conservation. Deforestation and its implications including the depletion of biodiversity could have been introduced without much change.

Grade Nine

At this grade, the world is divided into three climatic zones – tropical, temperate and frigid. Sub-regions are taken for detailed analysis from geographic location to economic activities. The equatorial rain forest, the tropical hot desert, the Mediterranean region, the coniferous forest region, the Tundra, and the polar ice region are the six sub-regions treated in greater depth. The impact of altitude on climate and economy is shown, taking two mountain regions from the tropical and from the temperate zone. The last portion is devoted to a discussion of geographical determinism and the interdependence between regions. The role played by the physical environment is elaborated. The argument seems, however, one-sided with an effort to indoctrinate.

With the exception of the (rather shallow) information about the endeavours of people in the Konso region of southern Ethiopia to protect their farm plots against soil erosion, there is no discussion of resource degradation. There were opportunities to discuss desertification and depletion of biodiversity (tropical hot zone); proper use and management of land (Mountain Regions); and the concept of 'spaceship earth' ('Geographical Determinism and Interdependence between regions').

Throughout the textbook, arguments are blended with political ideology. Use and management of natural resources suffered most. No care seems to have been taken to present the principles and problems of natural resource use and management. The goods of socialism and evils of capitalism overflowed the arguments (Social Science Panel, 1983: 73-74):

Under socialism, society systematically changes the geographical environment for the benefit of the working people. Under capitalism the natural resources are often carelessly and greedily destroyed. If they do not give high profits to the capitalists they are left unused.

Aspects of the above argument might be true. What is unacceptable is the medium used to present the issues: use of textbooks to preach the dislike of one in favour of the other. Future curriculum designs in Ethiopia should be based on the understanding that schools are not the right forums for such a sermon. Discussions on the use and management of natural resources, as presented in the textbooks, downplay the very principle of the interdependence of man and the environment by repeatedly drawing students' attention towards the potential of the human society to change and exploit the environment for his 'own benefits'.

Grade Ten

By and large, geography grade ten is an economic geography of the world dealing with: agriculture, forestry, fishing, mining, and manufacturing. In all cases, the purpose of production, types of products and problems are emphasised. Trade, transportation and tourism are also treated. At this point, it would have been possible to relate the lengthy discussions on the problem of the unfavourable trade relationship between the developed and developing countries with the issue of resource degradation.

Chapter three has been entirely devoted to conservation of natural resources. This is the only chapter in junior and senior grades where resource degradation is comprehensively presented. The need for conserving and wise use of natural resources are thoroughly elaborated. The discussion includes land and soil, air and water, minerals, natural vegetation and wild life. Issues range from deforestation and soil erosion all the way to water pollution and global warming. Not much has been done to attach these problems to the day to day life of students and support theory with statistical information and examples.

The last part of the textbook presents the issue of world population and regional organisations. Growth and distribution is presented without discussion of natural resources. Some arguments are at best confusing or entirely groundless:

The growth of population is desirable for the developing nations. For the developing nations a bigger population means a higher potential in production and a richer social and cultural life. But, one thing should not be ignored here. That is more number of people should not be taken for a reliable force in solving the existing social and economic problems in many of the developing countries (MOE, 1986b:147).

Socialist society never has any relative overpopulation manifested in unemployment in towns and agrarian overpopulation expressed in poverty in the countryside (MOE, 1986b:156).

Such an extravagancy in use of every aspect of the curriculum to inject political ideology should not surprise us as it was clearly stated that the functions of education in Ethiopia were “radically different from those of the pre-revolution period” (FASIL, 1985:81-82). Education in revolutionary Ethiopia was regarded as “the instrument by which the ideology of Socialism is to be inculcated in the minds of the young as well as the adult population”.

Grade Eleven

The ‘Geography of Africa’ is divided into two parts. The first part introduces the physical and human environments: location of the continent, relief, climate, drainage, vegetation, wild life and soil are among the physical features described. Population distribution and economic development is accompanied by figures, which unfortunately are as inadequate as they are outdated. In the second part of the textbook, the continent is divided into six sub-regions: East, North, West, Central, South and Insular Africa. The same procedure of describing the physical and human environment is applied to the sub-regions making much of the text redundant. On the whole, this textbook seems to be the most ill-organised, carrying a heavy load of disintegrated facts and outdated figures.

No more has been said about the problem of natural resource degradation than a simple mention of the threat of expansion of the Sahara desert and soil erosion. One can thus see a splendid but lost opportunity to introduce desertification as a global problem by using the Sahara as an example.

Grade Twelve

The 'Geography of Ethiopia' covers the physical, human, and economic characteristics of the country. Geological history, physical regions, drainage and water resources, climate, vegetation and soils are among the physical features discussed. The interrelation between these elements and their relation to the population distribution and economic specialisation have been well treated. Agriculture as a mainstay of the Ethiopian economy is extensively covered starting from the natural conditions favourable for agricultural production all the way to the problems encountered in the process of production. The state of the other sectors of the economy (mining, manufacturing, trade and transportation) is also described, but very briefly. Food self-sufficiency has just been mentioned. This was once again a lost opportunity.

The management of water resources, particularly rivers, is briefly discussed. The same is true for soil degradation. In general, the current state of natural resource degradation could have been elaborated in a more comprehensive manner as most of the information being quoted and re-quoted today had been available when these textbooks were prepared or revised. A totally lost opportunity was that of introducing population growth as a principal factor in natural resource degradation. Nowhere in the textbooks is the problem of outdated information more evident than here. Students in the year 2000 had no alternative but recite data on the population 25 years ago. The number grew from 30 million to 60 million and the rate of growth from 2.5 to 3.2 since!

5.3.4 Ample but Unused Opportunity

One can see ample opportunity in the existing geography curriculum to introduce and discuss practically all forms of the global and local environmental problems. These opportunities should be wisely used, to make geography at Ethiopian schools not only exciting but problem-oriented. This requires moving away from 'facts and figures' of the existing textbooks. Students are to solve real problems like loss of millions of tons of fertile soil every year; famine, etc. The revision of the geography syllabi marks a first step.

5.4 THE PROBLEM OF NATURAL RESOURCE DEGRADATION IN THE REVISED SYLLABI

5.4.1 A Beginning that Could Transform Geographic Education in Ethiopian Schools

Developments that could encourage a systematic integration of natural resource use and management into the Ethiopian school curriculum are outcropping recently (AKLILU, 1999). Perhaps the most important of these is the formulation of a comprehensive policy on natural resources and the environment. The overall goal of the policy, which seems to echo the mottoes of the Rio Earth Summit, reads as follows:

To improve and enhance the health and quality of life of all Ethiopians and to promote sustainable social and economic development through the sound management and use of natural, human-made and cultural resources and the environment as a whole so as to meet the needs of the present generation without compromising the ability of future generations to meet their own needs (EPA, 1997b:23).

One of the nine specific policy objectives is directly related to environmental education. The policy seeks to “raise public awareness and promote understanding of the essential linkage between environment and development” (EPA, 1997b:24). One section of the cross-sectoral environmental policies is devoted to ‘environmental education and awareness and human resource development’. Two of the guiding principles of the section read as follows:

To promote the teaching of environmental education on a multidisciplinary basis and to integrate it into the ongoing curricula of schools and colleges and not treat it as a separate or additional subject, though this should also be done at the tertiary level.

Special programs to develop the required human resources should be launched at tertiary level institutions (EPA, 1997b: 55-56).

These statements are expected to form the basis of goals, objectives, content and teaching strategies of education, meant to boost the understanding of the present state of natural resources in the country and the need to use them efficiently. Substantial changes have already been made on the curricula in accordance with the new Education and Training Policy issued in 1994.

5.4.2 The Revised Geography Syllabi

The investigation of the revised curriculum for Geography grades 7-12 made it clear that environmental topics on the national and international levels are integrated at all grades (Table 5.2). Grades 7, 8, 9 and 10 cover the main environmental issues of great relevance all over the world. Grades 11 and 12 focus on environmental issues and problems of Africa and Ethiopia respectively.

Table 5.2 Topics related to the use and management of natural resources that are integrated into the revised geography syllabi for Ethiopian secondary schools

Grades 7 / 8	<ul style="list-style-type: none"> - Man and his environment - Climate and the human-being - Vegetation and the human-being - Population and Development - Factors affecting Population growth - Population policy
Grade 9	<ul style="list-style-type: none"> - Human adaptations and resource use in different environments - Impacts of human activities on the environment of the natural regions of the earth - Deforestation: Causes, consequences, protection mechanisms - Erosion and measures against it - Wild life: Importance, how species become depleted and extinct, methods for protecting and managing wildlife - Water pollution: Forms and sources of pollution, controlling mechanisms - Air pollution: Sources, effects, controlling methods - Harmful wastes: Types and effects; ways of controlling and managing
Grade 10	<ul style="list-style-type: none"> - Sustainable use of natural resources - Population policy of Ethiopia: Rationale, objectives and strategies - Soils: Importance, degradation and conservation measures - World food problems - Hunger and poverty - Harmful environmental impacts of industrialised and traditional agriculture - Forestry: Importance, problems, conservation and management - Environmental degradation caused by industrialisation
Grade 11	<ul style="list-style-type: none"> - Rapid population growth and its implications on the environment and socio-economic development - Drought in Africa: Causes and consequences - Deforestation: Causes, consequences and measures taken - Soil degradation and conservation measures - Problems of food self-sufficiency in Africa: Causes, consequences, remedial measures - Environmental crises and problems of food supply in Africa - Appropriate use and allocation of resources - Designing and implementing appropriate population policy
Grade 12	<ul style="list-style-type: none"> - Water resource conservation and management - Problems of drought in Ethiopia: Causes, consequences and measures - Problems of deforestation, methods of forest resource conservation and management - Soil degradation: Causes, consequences, and methods of conservation and management - Imbalance between population growth and agricultural production - Improved land holding system

Source: Based on ICDR, 1998

It is to be hoped that the new geography syllabi, if applied effectively, forms a foundation to the understanding of natural resource use and management along with the problem of resource degradation.

6 STUDENTS' AWARENESS OF AND VIEWS ABOUT ISSUES RELATED TO NATURAL RESOURCE USE AND MANAGEMENT

6.1 A BRIEF REVIEW OF RELATED LITERATURE

Many investigations have been conducted to test awareness and views about environmental issues in general and environmental problems in particular. Many studies have been made in the most developed parts of the world. Air pollution, the green house effect, acid rain, and ozone layer depletion are most frequently addressed. Reports from developing countries seem to be meagre. Most of the studies reviewed here and in the next chapters were published in 'The Journal of Environmental Education', 'International Journal of Science Education' or 'International Journal of Environmental Education and Information'.

On the whole, the researchers appear to have been interested more in the primary and secondary levels than the tertiary level, perhaps reflecting the relative strength of environmental education (EE) in primary and secondary schools. A Likert-type scale has been widely employed to measure students' attitudes. Knowledge and awareness have been measured by instruments including free-response, multiple choice and true-false type tests. In some cases changes in students' behaviour or the development of a new behaviour as a result of exposure to EE was examined. Most of the studies reviewed tried to explain the pattern of awareness creation, attitude formation; and change or development of behaviour against some independent variables like sex, age or grade level, place of residence, exposure to the mass media, academic stream, etc.

6.1.1 Poor and Discouraging Results

Most of the surveys on students' awareness indicate that students have poor, very general and uncritical knowledge. A national survey on American high school students' environmental knowledge was one of such studies (GAMBRO and SWITZKY, 1996:31). Most of the high school seniors were found to "possess an extremely elementary comprehension of environmental problems and lack the necessary understanding to go beyond the common recognition of an issue". Neither could the students use their knowledge to grasp the consequences of environmental problems or offer solutions. The 'Environmental Knowledge Scale' was made up of issues related to acid rain and green house effect.

A test administered to twelfth grade students of the Dominican Republic has revealed a low average score of 51% for the knowledge section (ROTH and PEREZ, 1989). The items were composed of five areas: ecology, population, pollution, culture, and natural resources. Similarly, STANISSTREET et al. (1993) came up with a result they considered totally disappointing. Their study on the attitude of children to the uses of animals revealed that less than half (46%) of the pupils responded positively to the conservation of animals and nearly one fifth thought that conservation of animals is a 'waste of time'. The trend for the conservation of plants was the same. A study assessing the Nigerian students' knowledge, attitudes and practices (KAP) showed results equally or even more disappointing. Students in the senior classes of secondary schools "demonstrated a remarkably low knowledge of the concepts involved. Out of a maximum possible score of 60, males obtained a mean score of 13.0, while females scored 12.2" (MANSARAY and AJIBOYE, 1997:320). The issues were solid waste disposal; environmental pollution and degradation; ozone layer depletion and global warming; selected cultural practices and

their environmental effects; and population, environment and development. The Nigerian study has disclosed a negative attitude towards environmental issues. Bush-burning, a common aspect of traditional farming in the study area, was, for instance, considered to be of no consequence by the majority.

BRODY (1994), discovered a low level of understanding about basic concepts of ecosystem dynamics, resource utilisation, management and decision-making processes. He commented, that students in the elementary grades learn few basic science and natural science concepts relevant to current ecological crises. HORSLEY (1984) compared the attitude of American and non-American students on issues of the physical environment. American students were found to be relatively more environmentally sensitive than non-Americans. Students of the two groups were found to be unwilling to take responsibility for spoiling the environment.

6.1.2 Very General and Uncritical Knowledge

Other investigations show that students possess information about environmental hazards and environmentally friendly activities. The knowledge they have tended, however, to be not only very general but also uncritical. A study on children's perception of the 'green house effect', revealed a tendency to think that all environmentally friendly actions help all problems (BOYES and STANISSTREET, 1993). A similar finding was reported by BATTERHAM et al. (1996) in a study on children's ideas about the environmental impact of motor vehicles. It confirmed the pupils' employment of an over-generalised model of the causes and consequences of environmental problems. The pupils were aware of the various sources of environmental contamination but wrongly considered the sources as contributing to pollution in general (BATTERHAM et al., 1996).

HAUSBECK et al. (1992) studied environmental knowledge, awareness and concern among 11th-grade students of New York State. Students showed awareness and concern, "but have weak substantive knowledge about how environments work, how societal and personal actions affect the environment, or how environmental problems affect society" (HAUSBECK et al., 1992:32). This finding accords with the conclusion that "people generally seem to have a positive feeling toward the environment, but often do not know much about specific topics or issues, nor do they often practice positive behaviours concerning environmental preservation, protection, and conservation" (OSTMAN and PARKER, 1987:4).

6.1.3 Great Concern for the Environment

Contrary to most of the cases discussed, a sample of students in Germany was found to have a highly positive attitude towards living things. SZAGUN and MESENHOLL (1993:37), after assessing the ethical and emotional concern of 12, 15 and 18 years old adolescents about nature, reported emphatically that "adolescents of all age groups judged harm done to an ecosystem as immoral and more unacceptable than harm done to humans". HUCK (1993:119) too reported a remarkably favourable attitude towards environmental protection. More than four-fifths of the pupils included in the study were said to have shown willingness to engage in activities related to environmental protection; 68% suggested a severe punishment to those who mistreat the environment.

6.1.4 Knowledge-Attitude-Behaviour Relationship

Some of the studies being reviewed in this chapter tried to see the relation students' environmental knowledge has to their attitude and self-reported behaviour. The study by OSTMAN and PARKER (1987) revealed, among other things, a positive interrelation between environmental knowledge, concerns, and behaviour. Education was found to have an ability to predict environmental knowledge and subsequent behaviour. ROTH and PEREZ (1989) have found a substantial correlation between students' knowledge of environmental issues and attitudes, commenting that good environmental knowledge could eventually lead to positive attitudes toward the environment.

The reverse side of the same argument has been proved true (MANSARAY and AJIBOYE, 1997): lack of knowledge leads to bad attitude and practice. The study showed that students had attitudes negative to a healthy environment "which seem to conform to their poor knowledge base". It was further argued that students' "knowledge and attitudes provide the framework for their predominant practices which... are highly inimical to a healthy environment" (MANSARAY and AJIBOYE, 1997:322).

6.2 RESULTS OF THE PRESENT STUDY

6.2.1 A Preliminary Analysis

The second part of the instrument used for the present study required students to write three of the causes and consequences of land degradation they think are most important. The respondents were also asked to propose three ways they think are most effective to solve the problem (see Chapter One and Appendix I). Every correct response to the three questions was given one point making the maximum score of 9. Table 6.1 shows the percentage of students of the different levels who got scores from zero to nine.

Table 6.1 Table 6.1 Awareness about land degradation: Performance by grade level

Level	No. of respondents	Performance (%)										Total
		9	8	7	6	5	4	3	2	1	0	
JSS	433	1.6 *	11.7	15.1	17.6	13.2	12.2	9.9	9.2	4.9	4.5	100.0
SSS	493	6.1	16.7	23.5	21.9	14.0	7.4	5.3	2.1	1.6	1.5	100.0
TTI	242	15.7	24.4	24.0	14.0	9.1	5.0	4.5	1.7	0.0	1.7	100.0
Total	1168	6.4	17.0	21.3	18.2	12.2	8.5	6.6	4.7	2.5	2.7	100.0

JSS = Junior secondary school

SSS= Senior secondary school

TTI = Teachers training institute

* Percentage of students who scored 9 out of the maximum possible (9)

A bit more than six percent of the students could give the required number of correct answers. Table 6.1 shows the different scores in the different levels. TTI students seem to be more aware than others.

Table 6.2 shows the percentage of students who could give a specified range (0-3, 4-6, 7-9 out of nine) of correct answers. The first figure (28.0) indicates, for instance, that 28% of students at Alaba junior secondary school gave three or less correct answer to the question related to the causes, consequences and cures of land degradation.

Table 6.2 Awareness about land degradation: Performance of junior secondary schools

Schools (JSS)	No.	Performance (%)				
		0 - 3	4 - 6	7 - 9	%	Average
Alaba	75	28.0	46.7	25.3	100.0	4.8
Angacha	75	36.0	46.7	17.3	100.0	4.5
Ambo	93	24.7	45.2	30.1	100.0	5.2
Mudula	103	5.8	33.0	61.2	100.0	6.6
Shinshicho	87	48.3	43.7	8.0	100.0	3.3
Total	433	28.6	43.0	28.4	100.0	

A remarkable proportion (28.6%) of the students at junior level could give only three correct responses or less. An equal percentage (28.4%) of the students were able to give 7-9 correct answers. The corresponding percentages are 10.5 and 46.0 for students of the senior secondary level; and 7.9 and 64.0 for those of the TTI. Awareness of land degradation tends to increase with level of education.

Table 6.3 Awareness about land degradation: Performance of senior secondary schools and the TTI

Schools (SSS)	No.	Performance (%)				
		0-3	4-6	7-9	%	Average
Alaba	72	5.6	40.3	54.2	100.0	6.6
Angacha	90	10.0	52.2	37.8	100.0	5.8
Durame	161	13.0	28.0	59.0	100.0	6.2
Mudula	89	7.9	42.7	49.4	100.0	6.2
Shinshicho	81	16.0	53.1	30.9	100.0	5.4
Total	493	10.5	43.2	46.3	100.0	
TTI	242	7.9	28.1	64.0	100.0	6.7

One could also note a difference in the performance of different schools. It was very surprising to the author that the average score of one of the junior secondary schools (Shinshicho) is only half of that of another school of the same level (Mudula). The gap in the performance of students at the senior secondary level seems to be not so wide. Shinschicho demonstrated the least performance once again. Angacha stood next to Shinshicho viewed from bottom up. A statistical test has been made to check whether or not the grade level difference in students' awareness about land degradation is significant. Results of the test are presented in Chapter Eight.

6.2.2 Causes of Land Degradation

Analysis of the written responses of the students resulted in a long list of factors contributing to the problem of land degradation (Table 6.4). Soil erosion occupied the leading position being mentioned by 62.5% of the students who completed the questionnaire. Deforestation, inability to use fertilisers, absence of crop rotation practices, bad farming practices and inability to make terraces and cut water ways are the other factors considered by more than 10% of the respondents to be among the three most important causes of land degradation.

Table 6.4 Causes of land degradation as expressed by the respondents

Causes	JSS No. = 433	SSS No. = 493	TTI No. = 242	Total No. = 1168	Percentage of the total
Soil erosion	275	296	159	730	62.5
Deforestation	75	167	123	365	31.3
Inability to use fertilisers	43	111	55	190	16.3
Lack of crop rotation	15	85	84	184	15.8
Bad farming practices	59	80	24	163	14.0
Inability to make terraces and waterways	48	72	10	130	11.1
Failure to plant trees	37	66	14	117	10.0
Overgrazing	40	42	31	113	9.7
Overcultivation	5	34	36	75	6.4
Bad relief	16	23	6	45	3.9
Planting eucalyptus tree	4	12	3	19	1.6
Overpopulation	2	12	1	15	1.3

Some factors put high on the list by experts seem to be not much appreciated by the students. These include overpopulation, overcultivation and grazing beyond the carrying capacity of a given field. Students' tendency to downplay the role of these factors is all the more surprising as the study region is one of the most densely populated areas in Ethiopia with actual or potential danger of population pressure on resources in general and land in particular.

6.2.3 Consequences of Land Degradation

Students' responses on the consequences of land degradation concentrated around three factors (Table 6.5).

Table 6.5 Consequences of land degradation as expressed by the respondents

Consequences	JSS No. = 433	SSS No. = 493	TTI No. = 242	Total No. = 1168	Percentage of the total
Decrease in production	233	315	164	712	61.0
Famine	189	188	153	530	45.4
Drought	112	109	64	285	24.4
Poverty and economic backwardness	86	87	39	212	18.2
Desertification	31	47	45	123	10.5
Loss of minerals	14	30	8	52	4.5
Disruption of ecological balance	8	24	14	46	3.9
Difficulty for farming	9	10	10	29	2.5
Shortage of pasture land	13	11	0	24	2.1
Population displacement	6	7	5	18	1.5
Harm on wildlife	2	9	6	17	1.5
Increased requirement for fertilisers	3	11	0	14	1.2

Decrease in production and famine are considered as the major consequences of land degradation, followed by drought. Poverty and economic backwardness, and desertification are factors noted by more than 10% of the respondents. Loss of minerals, disruption of ecological balance, difficulty for farming, and shortage of pasture land are mentioned but by few. Issues like population displacement and increased requirement for chemical fertilisers which are often underlined by experts have been undermined by the participants of this study.

6.2.4 Measures against Land Degradation

A range of measures against land degradation has been proposed by the students (Table 6.6).

Table 6.6 Measures against land degradation as expressed by the respondents

Proposes Measures	JSS No. = 433	SSS No. = 493	TTI No. = 242	Total No. = 1168	Percentage of the total
Afforestation and reforestation	229	334	149	712	60.1
Making waterways	170	160	28	358	30.7
Terracing	105	147	58	310	26.5
Use of fertilisers	76	131	93	300	25.7
Contour ploughing	84	86	37	207	17.7
Crop rotation	20	95	91	206	17.6
Improved farming practices	36	48	47	131	11.2
Controlled grazing	24	32	28	84	7.2
Construction of dams	28	38	8	74	6.3
Shifting cultivation	10	23	33	66	5.7
Awareness creation	1	15	14	30	2.6

Afforestation and reforestation is indicated by 60% of the respondents as a prominent measure. More than 10% of the students mentioned waterways, terracing, fertilisers, contour ploughing, crop rotation and improved farming practices.

6.2.5 Natural Resource Use and Management

Fifteen True-False items were used to test students' awareness about issues related to the use and management of natural resources. Table 6.7 summarises the performance of students of the different levels. Subsequent tables (Tables 6.8 and 6.9) take the analysis further and give data on performance at school level and for the TTI. Figures show the percentage of students who gave correct answers in the awareness test. The figure 2.1 in the third column indicates, for instance, that only 2.1% of the students in the TTI answered 15 out of 15. The corresponding percentage is 0.3 for senior and 0.0 for junior secondary schools.

Table 6.7 Awareness about issues related to natural resource use and management: Performance by grade level

Level	No.	Performance (%)															Total	
		15	14	13	12	11	10	9	8	7	6	5	4	3	2	1		0
JSS	433	0.0	0.0	0.9	2.1	4.6	9.0	12.0	17.2	17.2	15.7	8.7	7.5	4.4	0.7	0.0	0.2	100.0
SSS	493	0.3	1.7	3.9	8.1	11.4	12.3	14.5	15.5	11.4	11.5	5.0	2.6	1.0	0.3	0.2	0.0	100.0
TTI	242	2.1	6.2	16.0	13.2	14.4	14.0	13.6	6.2	4.9	2.9	3.3	1.6	1.2	0.4	0.0	0.0	100.0
Total	1168	0.6	2.1	5.4	6.7	9.7	11.4	13.5	14.6	12.2	10.9	5.7	4.1	2.3	0.5	0.1	0.2	100.0

The best achiever at junior level could answer only 13 of the 15 items of Table 6.7 correctly; 21.5% of the students at the same level answered only five out of 15 or less! Performance of students at the secondary level seems better. About one-fourth answered more than ten of the fifteen items correctly, 9% failed to give more than five correct responses. Compared to students at the junior and senior levels, those at the TTI demonstrated a remarkably higher level of performance. More than half of them could answer at least eleven of the fifteen items.

Sixty-four percent of the students answered more than half of the items correctly. This percentage is only 45.8 for junior schools and 67.7 and 85.7 for senior schools and the TTI respectively. Thus 54% of the students at the junior secondary level, 32% at the senior secondary, and 14% at the TTI failed to answer half of the items in the awareness test.

Table 6.8 Awareness related to natural resource use and management: Junior secondary schools

Schools (JSS)	No.	Performance (%)				
		0-5	6-10	11-15	Total	Average
Alaba	75	22.7	69.3	8.0	100.0	7.5
Angacha	75	24.0	72.0	4.0	100.0	6.9
Ambo	93	21.5	71.0	7.53	100.0	7.1
Mudula	103	12.6	72.8	14.6	100.0	7.9
Shinshicho	87	26.4	70.1	3.45	100.0	6.8
Total	433	21.4	71.0	7.5	100.0	

Table 6.9 Awareness related to natural resource use and management: Senior secondary schools and TTI

Schools (SSS)	No.	Performance (%)				
		0-5	6-10	11-15	Total	Average
Alaba	72	2.78	56.9	40.3	100.0	9.7
Angacha	90	10.0	65.6	24.4	100.0	8.5
Durame	161	5.59	67.1	27.3	100.0	9.0
Mudula	89	18.0	65.2	16.9	100.0	7.8
Shinshicho	81	9.9	71.6	18.5	100.0	8.3
Total	493	9.2	65.3	25.5	100.0	
TTI	242	6.6	41.6	51.9	100.0	10.3

Shinshicho and Angacha junior schools performed least. This is also to be seen from their relatively low average scores (Table 6.8). Ambo junior has also demonstrated a below average performance. On the whole, awareness of junior students about issues related to natural resource use and management is noticeably low with only one (Mudula) of the five schools having average scores of more than 50%. Unlike junior schools, all the five senior secondary schools had average scores of more than 50%. The top position was occupied by Alaba senior secondary school; Durame followed. With an average score of 10.3 (out of 15), students of the TTI have proved superior performance.

6.2.6 Analysis of Individual Items

Five of the 15 statements are related to natural resource use and management in general (Table 6.10 – A1-A5), the rest is specifically related to Ethiopia (Table 6.10 – B1-B10).

Table 6.10 Items corresponding to the codes (A1-5 and B1-10)

Code	Items
A1	The rate of population growth in developed countries like Germany is faster compared to that in less developed countries like Kenya.
A2	Use of animal dung and crop residue as fuel adversely affects the productivity of land.
A3	Plant litter not only adds humus to the soil but also increases the amount of rain water that goes down into the soil.
A4	Overgrazing can change a fertile land to a useless desert.
A5	Cutting and carrying grass elsewhere is more useful than letting animals graze on the field.
B1	More than 96 per cent of the total area of Ethiopia can be cultivated.
B2	The land in the southern half of Ethiopia is more degraded than that in the northern half.
B3	The remaining forest land of Ethiopia are concentrated in the central highlands of Wollo, Tigray and Gondar.
B4	Nearly 40 per cent of the Ethiopian population depend directly on farming for their livelihood.
B5	More than two-third of the foreign currency of Ethiopia is derived directly from the agricultural sector of the economy.
B6	The present rate of growth of the Ethiopian population is one of the lowest in Africa.
B7	Kembata, Sidama and Wolaita are known in Ethiopia for their high density of population.
B8	Erosion by wind is bringing more harm in Ethiopia than erosion by running water.
B9	The high livestock population in Ethiopia is creating pressure on the existing grazing land.
B10	More than half of the population in Ethiopia uses electric power for cooking.

Table 6.11 Performance of students in both general and specific items

Schools	No.	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10
Alaba JSS	75	26.7	56.0	72.0	69.3	65.3	33.3	44.0	20.0	41.3	86.7	38.7	36.0	48.0	56.0	58.7
Alaba SSS	72	51.4	62.5	79.2	76.4	79.2	25.0	69.4	20.8	68.1	81.9	81.9	63.9	62.5	62.5	83.3
Angacha JSS	75	21.3	28.0	65.3	53.3	70.7	36.0	58.7	28.0	20.0	96.0	25.3	60.0	34.7	58.7	34.7
Angacha SSS	90	46.7	44.4	74.4	54.4	63.3	48.9	54.4	12.2	46.7	88.9	57.8	73.3	46.7	68.9	70.0
Ambo JSS	93	20.4	36.6	75.3	58.1	54.8	37.6	38.7	11.8	21.5	87.1	51.6	60.2	39.8	60.2	55.9
Durame SSS	160	47.5	71.3	75.6	63.8	61.3	38.1	56.3	19.4	51.3	82.5	76.9	81.9	48.8	56.9	76.9
Mudula JSS	103	24.3	52.4	79.6	63.1	75.7	32.0	29.1	20.4	41.7	90.3	43.7	54.4	45.6	78.6	56.3
Mudula SSS	89	36.0	66.3	64.0	56.2	65.2	33.7	40.4	12.4	43.8	78.7	48.3	62.9	42.7	69.7	62.9
Shinshicho JSS	87	20.9	46.5	69.8	61.6	68.6	32.6	37.2	15.1	30.2	83.7	46.5	62.8	23.3	57.0	32.6
Shinshicho SSS	81	12.3	59.3	66.7	63.0	65.4	40.7	49.4	51.9	51.9	76.5	50.6	74.1	50.6	53.1	74.1
TTI	242	52.5	69.0	83.1	81.8	74.8	43.4	80.2	38.0	66.5	88.8	67.8	81.8	65.3	53.7	84.7
Total	1167	32.7	53.8	73.2	63.7	67.7	36.5	50.7	22.7	43.9	85.6	53.6	64.7	46.2	61.4	62.7

General Issues

The apparently obvious fact that developing countries have a relatively faster rate of population growth has been answered correctly by a shockingly low percentage of the respondents – only 23% in the case of students at the junior level. This percentage is 39 for students of the senior level and 53 for those of the TTI. A little more than half of the respondents were found to be aware that use of animal dung and crop residue as fuel adversely affects the productivity of land (Table 6.11). Awareness about this item clearly increased with level of education which is the case for most of the items in the awareness test.

Table 6.12 Performance in general items (A1-A5)

	Items	Performance*			
		JSS	SSS	TTI	Total
A1	The rate of population growth in developed countries like Germany is faster. Compared to that in less developed countries like Kenya.	22.7	38.8	52.5	32.7
A2	Use of animal dung and crop residue as fuel adversely affects the productivity of land.	43.7	60.8	69.0	53.8
A3	Plant litter not only adds humus to the soil but also increases the amount of rain water that goes down into the soil.	72.4	72.0	83.1	73.2
A4	Overgrazing can change a fertile land to a useless desert.	61.1	62.8	81.8	63.7
A5	Cutting and carrying grass elsewhere is more useful than letting animals graze on the field.	67.0	66.9	74.8	67.7

* Figures show percentage of students who could give correct answers to statement in the awareness test

Performance in the other issues like use of plant litter, danger attached to overgrazing and the importance of cutting and carrying grass elsewhere was relatively better (more than two-thirds of the respondents could give correct answers in each of the cases), but one third of the students at junior and senior levels failed to give correct answers in all cases except A3.

Issues Related to the Problem of Resource Degradation in Ethiopia

The test shows that students had a remarkably low level of awareness about the resource base in Ethiopia and the extent of resource degradation (Table 6.12). Surprisingly, 63% of the respondents wrongly thought that more than 96% of the total area of the country is cultivable. Worse, 77% indicated that the remaining forest land of Ethiopia is concentrated in the central highlands of Wollo, Tigray and Gondar: the very areas known for the highest rate of deforestation (see Chapter Three). Half of the respondents wrongly thought that the land in the southern half of the country is more degraded than that in the north, indicating that students' awareness about local realities is not encouraging either. Their inability to differentiate the state of the environment in the north and the south is all the more surprising as this is one of the most frequently made comparisons.

The agricultural sector is the mainstay of the national economy. This was known to 85% of the students. Only 44% knew, that the vast majority of the country's population depends directly on farming for its livelihood. Calling for serious thought, is the students' lack of awareness of population characteristics. Nearly half (46%) approved the statement that "The present rate of growth of Ethiopian population is one of the lowest in Africa". About one third was not aware of the population characteristics of their own districts: though "Kembata, Sidama and Wolaita are known in Ethiopia for their high density of population".

Table 6.13 Performance in items related to the problem of natural resource degradation in Ethiopia (B1-B10)

Items		Performance*			
		JSS	SSS	TTI	Total
B1	More than 96 per cent of the total area of Ethiopia can be cultivated.	34.3	37.3	73.4	36.5
B2	The land in the southern half of Ethiopia is more degraded than that in the northern half.	41.5	54.0	80.2	50.7
B3	The remaining forest land of Ethiopia are concentrated in the central highlands of Wollo, Tigray and Gondar.	19.1	23.3	38.0	22.7
B4	Nearly 40 per cent of the Ethiopian population depend directly on farming for their livelihood.	31.0	52.3	66.5	43.9
B5	More than two-third of the foreign currency of Ethiopia is derived directly from the agricultural sector of the economy.	88.8	81.7	88.8	85.6
B6	The present rate of growth of the Ethiopian population is one of the lowest in Africa.	41.2	63.1	67.8	53.6
B7	Kembata, Sidama and Wolaita are known in Ethiopia for their high density of population.	54.7	71.2	81.8	64.7
B8	Erosion by wind is bringing more harm in Ethiopia than erosion by running water.	38.3	50.2	65.3	46.2
B9	The high livestock population in Ethiopia is creating pressure on the existing grazing land.	62.1	62.2	53.7	61.4
B10	More than half of the population in Ethiopia uses electric power for cooking.	47.6	73.4	84.7	62.7

* Figures show percentage of students who could give correct answers to the given item (statement) in the awareness test

The harm done by water erosion in comparison to wind erosion appears to be less internalised. More than half of the respondents wrongly indicated that “erosion by wind is bringing more harm in Ethiopia than erosion by running water”. Students’ awareness about overgrazing is relatively better. Better was also their awareness of the marginal role of electric power as a source of energy for cooking.

6.3 VIEWS ABOUT NATURAL RESOURCE USE AND MANAGEMENT

6.3.1 Environmental Problems Rated on the Basis of Seriousness

Ten of the most important problems related to natural resources relevant to Ethiopia were to rate as ‘very serious’, ‘serious but not very much’ and ‘not serious’ (details in Tables 6.14 and 6.15). Table 6.16 shows the proportion of students who considered the given problem ‘very serious’ and ‘the first of the three most serious’. Soil erosion has been rated very serious by three-fourths. What is more, one in four students considered soil erosion the first of the top three environmental problems facing the country. Except desertification, all the problems are regarded as very serious by at least half of the students. Deforestation, famine, overpopulation and shortage of farmland were rated by about two-thirds or more to be very serious.

Table 6.14 Some environmental problems (1,2,3... 10) rated on the basis of their seriousness

		Grade Level						Grade Level			
		JSS	SSS	TTI	Total			JSS	SSS	TTI	Total
1	I	77.6	72.7	74.7	74.9	6	I	66.7	56.4	46.3	58.0
	II	16.1	21.5	19.1	19.0		II	20.4	27.9	35.8	26.8
	III	6.3	5.8	6.2	6.1		III	13.0	15.6	17.9	15.2
2	I	72.2	65.5	72.6	69.4	7	I	63.8	65.8	45.0	60.7
	II	19.2	23.2	22.8	21.9		II	26.9	26.4	43.8	30.3
	III	8.0	11.3	4.6	8.7		III	9.2	7.8	11.3	9.0
3	I	68.4	71.3	64.2	68.7	8	I	71.4	71.3	47.9	66.3
	II	19.9	19.0	25.8	20.8		II	21.6	20.3	34.6	23.8
	III	11.7	9.7	10.0	10.5		III	7.0	8.4	17.5	9.8
4	I	39.6	33.3	28.8	34.6	9	I	56.3	62.1	41.5	55.6
	II	31.9	30.9	39.2	33.0		II	34.0	31.4	45.6	35.4
	III	28.5	36.0	32.1	32.4		III	9.7	6.5	12.9	9.0
5	I	66.3	74.5	50.8	66.4	10	I	57.4	52.4	44.8	52.6
	II	24.3	18.5	39.2	25.0		II	28.3	33.9	38.6	32.9
	III	9.4	7.0	10.0	8.5		III	14.3	13.7	16.6	14.5

Numbers 1,2,3... refer to the ten environmental problems as indicated in Table 6.16
 I = Very serious, II = Serious but not very much, III = Not serious

Table 6.15 Environmental problems (1,2,3...10) designated as top three on the basis of their seriousness

		Grade Level						Grade Level			
		JSS	SSS	TTI	Total			JSS	SSS	TTI	Total
1	1 st	111	114	67	292	6	1 st	14	33	12	62
	2 nd	41	57	24	122		2 nd	47	42	23	112
	3 rd	33	40	25	98		3 rd	43	46	12	101
2	1 st	23	30	26	79	7	1 st	15	15	6	36
	2 nd	59	42	57	158		2 nd	9	26	15	50
	3 rd	23	36	24	83		3 rd	25	33	10	68
3	1 st	93	90	49	232	8	1 st	29	47	15	91
	2 nd	59	60	27	146		2 nd	37	59	27	123
	3 rd	43	60	34	137		3 rd	43	66	19	128
4	1 st	2	13	2	17	9	1 st	7	14	9	30
	2 nd	16	10	6	32		2 nd	18	31	15	64
	3 rd	24	90	10	43		3 rd	31	45	17	93
5	1 st	24	61	26	111	10	1 st	19	29	17	65
	2 nd	28	64	24	116		2 nd	23	17	10	50
	3 rd	26	50	33	109		3 rd	41	35	41	117

Numbers 1,2,3... refer to the ten environmental problems as indicated in Table 6.16

Table 6.16 Proportion of students who rated the problem as ‘very serious’ and ‘the first of the three most serious’

Environmental Problems	Very serious	First of the top three
1. Soil erosion	74.9	25.0
2. Deforestation	69.4	6.8
3. Famine	68.7	19.9
4. Desertification	34.6	1.5
5. Over population	66.4	9.5
6. Drought	58.0	5.3
7. Shortage of grazing land	60.7	3.1
8. Shortage of farm land	66.3	7.8
9. Low productivity of farm land	55.6	2.6
10. Variability of rains	52.6	5.6

Famine has not only been considered ‘very serious’ by 69% of the students but also rated first of the top three environmental problems facing Ethiopia by 20%. Details on the views of students are presented in Chapter Seven.

6.3.2 Views about the Specific Issues

A Likert-type attitude scale was used to measure the views of students about the use and management of natural resources. The scale goes from 1 (unfavourable view) to 5 (most favourable). Table 6.17 presents the results of the analysis for the 10 junior and senior secondary schools. The 13 statements have been divided into four blocks (A-D) on the basis of similarity of issues (Table 17) and then analysed in detail (Tables 6.19–6.22)

Table 6.17 Statements making up the attitude scale by code

Code	Statements
A1	The quality of life in Ethiopia is to a greater extent dependent on the quality of such resources as natural vegetation and soil.
A2	Careless use of the land means damaging the very basis of human life.
B1	The earth has a limited resource base and hence can support only a limited number of population.
B2	One should always take into consideration the needs of future generations while using natural resources.
B3	In Ethiopia, one should be worried more about satisfying the needs of the present generation than talking about preservation of resources for the future generation.
B4	One should not blame people who sell fuel wood by cutting forests from community land because that is the only choice they have to sustain life.
B5	It is preferable to secure an additional piece of farmland than keeping the land under forest cover.
C1	It is possible to turn a rural village green by planting trees on private and public land.
C2	The local communities have to take the initiative themselves to protect natural resources rather than waiting for governmental directives and instructions.
C3	The local communities can work out and implement mechanisms to stop the misuse and overuse of natural resources.
D1	Students at all levels have a responsibility to inform their families and neighbours about the need for protection and careful use of natural resources.
D2	Education of the community can bring little improvement with regard to the protection of natural resources.
D3	Knowledge gained at Ethiopian schools does not help to improve the quality of land and thereby increase agricultural production.

Table 6.18 Views of students about issues concerning use and management of natural resources

Schools	No. of respondents	Statements												
		A1	A2	B1	B2	B3	B4	B5	C1	C2	C3	D1	D2	D3
Junior secondary														
Alaba	75	4.4	3.7	3.2	4.5	2.5	3.8	4.6	4.7	4.5	4.0	4.7	3.6	4.1
Angacha	75	4.4	3.4	3.3	4.5	1.9	3.6	4.5	4.0	4.5	4.1	4.8	3.1	3.8
Ambo	89	4.2	4.2	3.1	4.4	2.2	3.5	4.4	4.1	4.6	4.2	4.8	3.5	4.1
Mudula	102	4.5	4.1	3.0	4.5	2.6	3.9	4.6	4.2	4.6	4.1	4.9	3.9	4.2
Shinshicho	72	4.3	3.6	3.5	4.0	2.2	4.0	4.0	3.9	4.2	3.9	4.7	2.9	3.7
Senior secondary														
Alaba	71	4.6	4.6	2.4	4.7	3.5	3.4	4.5	4.7	4.9	4.5	4.9	4.1	4.0
Angacha	86	4.1	4.1	3.2	4.7	3.5	3.7	4.4	4.5	4.5	4.5	4.8	3.8	4.2
Durame	152	4.5	4.3	3.2	4.5	3.0	3.2	4.3	4.2	4.4	4.1	4.9	4.0	4.1
Mudula	87	4.6	4.6	3.4	4.7	3.2	3.7	4.7	4.5	4.4	4.2	5.0	4.0	3.9
Shinshicho	76	4.3	4.3	2.6	4.5	2.7	3.4	4.5	4.2	4.4	4.3	4.8	3.4	4.3

A great degree of similarity is to be observed in responses of students of the different schools. Eight of the thirteen statements (A1, B1, B2, B4, C2, C3, D1, D3) produced a range of only 0.5 or less in the case of junior secondary schools. The range is narrower in the case of senior secondary schools. All items except two (B1, D2) have a range of 0.5 or less in the latter case.

Views about Value of Natural Resources

Two statements that relate to the value of natural resources got the agreement of more than two-thirds of the respondents (Table 6.19). About 70% strongly agree to the statement (A1) that ‘The quality of life in Ethiopia is to a greater extent dependent on the quality of such resources as natural vegetation and soil’. This view is reinforced by their response to statement (A2); 71% share the view that careless use of the land is tantamount to damaging the very basis of human life. The high average scores of 4.4 and 4.2 (on a five-point scale) for the two statements respectively are indicators of the positive views students hold on the value of natural resources.

Table 6.19 Views of students about the value of natural resources (all figures are given in percentages)

Level	Statements	I	II	III	IV	V	I+II	IV+V	Average on a five point scale
JSS	A1	69.6	9.2	13.5	3.0	4.7	78.8	7.7	4.4
SSS		66.2	17.2	9.0	3.6	4.0	83.4	7.6	4.4
TTI		73.6	15.3	5.1	3.0	3.0	88.9	6.0	4.5
Total		69.8	13.9	9.2	3.2	3.9	83.7	7.1	4.4
JSS	A2	55.8	7.4	14.9	5.0	16.9	63.2	21.9	3.8
SSS		75.9	7.2	4.0	3.0	10.0	83.1	13.0	4.4
TTI		82.1	5.5	3.0	2.1	7.2	87.6	9.3	4.5
Total		71.3	6.7	7.3	3.4	11.4	78.0	14.8	4.2

I = strongly agree; II = agree but not very much; III = undecided;

IV = disagree but not very much; V = strongly disagree

Statement A1: ‘The quality of life in Ethiopia is to a greater extent dependent on the quality of such resources as natural vegetation and soil.’

Statement A2: ‘Careless use of the land means damaging the very basis of human life.’

Use and Protection of Natural Resources

Students appear to have divided views on some issues. One of the basic premises of sustainable development (that the earth has a limited resource base and hence can support only a limited number of population) (B1) has been supported by 41%. To the surprise of all who propagate sustainability, more than one-fourth of the students expressed strong disagreement.

The ethical basis of sustainable development (the view that one should always take into consideration the needs of future generations while using natural resources) (B2) has been endorsed by a vast majority (89%). The respondents seem to be inconsistent in their view about the needs of the future generations. The agreement on the global level was projected on the use of natural resources in Ethiopia. As many as 44% support the opposite view that ‘In Ethiopia, one should be worried more about satisfying the needs of the present generation than talking about preservation of resources for the future generation’ (B3). This can also be seen from the relatively low average score (3.1 on a five-point scale) for the statement. Such a contrasting view reflects the contrast inherent to the very philosophy of sustainability. It is easy to talk about the future when there is food enough for today. Otherwise it would be only natural not to think very much about grand children. This is probably why students accept the principle generally, but not that happily when related to Ethiopia where ‘today’ poses a great challenge that makes ‘tomorrow’ less relevant.

Table 6.20 Views of students about the use and protection of natural resources (all figures are given in percentages)

Level	Statements	I	II	III	IV	V	I+II	IV+V	Average on a five point scale
JSS	B1	33.0	11.4	23.0	8.9	23.7	44.4	32.6	3.2
SSS		28.8	11.2	20.6	8.6	30.9	40.0	39.5	3.0
TTI		25.1	13.6	21.3	11.5	28.5	38.7	40.0	3.0
Total		29.0	12.1	21.6	9.7	27.7	41.1	37.4	3.1
JSS	B2	69.4	12.3	9.7	4.0	4.5	81.7	8.5	4.4
SSS		76.5	13.2	6.0	2.5	1.9	89.7	4.4	4.6
TTI		89.8	5.5	3.4	0.4	0.9	95.3	1.3	4.8
Total		78.6	10.3	6.4	2.3	2.4	88.9	4.7	4.6
JSS	B3	48.8	14.5	12.1	7.6	16.9	63.3	24.5	2.3
SSS		31.7	8.5	10.4	8.6	40.8	40.3	49.4	3.2
TTI		16.6	10.2	10.2	13.6	49.4	26.8	63.0	3.7
Total		32.4	11.1	10.9	9.9	35.7	43.5	45.6	3.1
JSS	B4	15.4	6.9	11.5	17.4	48.8	22.3	66.2	3.8
SSS		21.1	7.2	14.6	14.8	42.3	28.3	57.1	3.5
TTI		20.9	8.9	15.3	23.4	31.5	29.8	54.9	3.4
Total		19.1	7.7	13.8	18.6	40.9	26.8	59.5	3.6
JSS	B5	3.7	5.2	8.1	13.4	69.6	8.9	83.3	4.4
SSS		3.7	3.1	5.5	18.1	69.7	6.8	87.8	4.5
TTI		0.9	3.4	4.3	26.0	65.5	4.3	91.5	4.5
Total		2.7	3.9	6.0	19.1	68.3	6.6	87.4	4.5

I = strongly agree; II = agree but not very much; III = undecided;

IV = disagree but not very much; V = strongly disagree

Statement B1: ‘The earth has a limited resource base and hence can support only a limited number of population.’

Statement B2: ‘One should always take into consideration the needs of future generation while using natural resources.’

Statement B3: ‘In Ethiopia, one should be worried more about satisfying the needs of the present generation than talking about preservation of resources for the future generation’.

Statement B4: ‘One should not blame people who sell fuel wood by cutting forests from community land because that is the only choice they have to sustain life’.

Statement B5: ‘It is preferable to secure an additional piece of farmland than keeping the land under forest cover’.

More than one-fourth of the respondents agree that ‘One should not blame people who sell fuel wood by cutting forests from community land because that is the only choice they have to sustain life’ (B4). Though understandable, such a stand makes the road towards transmitting the message of environmental protection bumpier. As to the clearing of forests to secure land for cultivation, the vast majority of students has a favourable stand. Shortage of farm land is a serious problems in Ethiopian highlands in general and the study area in particular. It is encouraging to have more than 87% of the respondents disagree to the statement that ‘It is preferable to secure an additional piece of farmland than keeping the land under forest cover’.

Community Participation in Resource Management

All three statements relating to the role of the community enjoyed a high degree of support. Eighty three percent agree that a rural village can be turned green by planting trees on private and public land (C1). An overwhelming majority (93%) support the view that ‘The local communities have to take the initiative themselves to protect natural resources rather than waiting for governmental directives and instructions’ (C2). The respondents also seem to be optimistic that local communities can work out and implement mechanisms to stop the misuse and overuse of natural resources (C3).

Table 6.21 Students’ views about community participation in natural resource protection and management (all figures are given in percentages)

Level	Statements	I	II	III	IV	V	I+II	IV+V	Average on a five point scale
JSS	C1	60.2	15.5	13.0	4.4	6.9	75.7	11.3	4.2
SSS		73.8	10.5	5.6	2.9	7.2	84.3	10.1	4.4
TTI		77.9	11.5	4.3	2.1	4.3	89.4	6.4	4.6
Total		70.6	12.5	7.6	3.2	6.1	83.1	9.3	4.4
JSS	C2	65.6	23.7	6.5	1.6	2.6	89.3	4.2	4.5
SSS		73.4	16.2	3.3	3.6	3.5	89.6	7.1	4.5
TTI		82.6	16.2	0.4	0.4	0.4	98.8	0.8	4.8
Total		73.9	18.7	3.4	1.9	2.2	92.6	4.1	4.6
JSS	C3	54.6	20.2	10.3	5.0	9.9	74.8	14.9	4.1
SSS		64.1	17.5	9.4	4.6	4.4	81.6	9.0	4.3
TTI		54.5	28.5	11.5	0.4	5.1	83.0	5.5	4.3
Total		57.7	22.1	10.4	3.4	6.5	79.8	9.9	4.2

I = strongly agree; II = agree but not very much; III = undecided;

IV = disagree but not very much; V = strongly disagree

Statement C1: ‘It is possible to turn a rural village green by planting trees on private and public land.’

Statement C2: ‘The local communities have to take the initiative themselves to protect natural resources rather than waiting for governmental directives and instructions.’

Statement C3: ‘The local communities can work out and implement mechanisms to stop the misuse and overuse of natural resources’.

This strongly positive view as to the potential and actual role played by the grassroots population is very important and promising. Many students are part and parcel of the community about which they are talking. They are indicating, in a way, what they believe they could do for the environment.

Contribution of Education to the Use and Management of Natural Resources

The last group of statements deals with views about the contribution of education to the use and management of natural resources. Nearly all the students agree that ‘Students at all levels have responsibility to inform their families and neighbours about the need for protection and careful use of natural resources’ (D1). A generally favourable attitude has been demonstrated in view of the role education plays in the protection of natural resources. A degree of scepticism has been seen though. The sceptics, who constitute about 23% of the respondents, agree that ‘Education of the community can bring little improvement with regard to the protection of natural resources’ (D2).

Table 6.22 Students’ views about the contribution of education to the protection and management of natural resources (all figures are given in percentages)

Level	Statements	I	II	III	IV	V	I+II	IV+V	Average on a five point scale
JSS	D1	85.7	10.1	2.0	0.5	1.7	95.8	2.2	4.8
SSS		91.7	5.9	1.7	0.4	0.3	97.6	0.7	4.9
TTI		94.9	3.8	0.9	0.0	0.4	98.7	0.4	4.9
Total		90.8	6.6	1.5	0.3	0.8	97.4	1.1	4.9
JSS	D2	18.9	12.7	18.8	9.7	39.9	31.6	49.6	3.4
SSS		15.9	8.7	8.4	6.8	60.3	24.6	68.8	3.9
TTI		11.5	2.6	3.8	8.5	73.6	14.1	82.1	4.3
Total		15.4	8.0	10.3	8.4	57.9	23.4	66.3	3.9
JSS	D3	12.5	5.0	12.0	12.9	57.6	70.5	17.5	4.0
SSS		10.7	3.9	9.4	16.3	59.7	14.6	76.0	4.1
TTI		10.6	6.0	7.7	14.9	60.9	16.6	75.8	4.1
Total		11.3	4.9	9.7	14.7	59.4	16.2	74.1	4.1

I = strongly agree; II = agree but not very much; III = undecided;

IV = disagree but not very much; V = strongly disagree

Statement D1: ‘Students at all levels have responsibility to inform their families and neighbours about the need for protection and careful use of natural resources’.

Statement D2: ‘Education of the community can bring little improvement with regard to the protection of natural resources’.

Statement D3: ‘Knowledge gained at Ethiopian schools does not help to improve the quality of land and thereby increase agricultural production’.

There is a widespread view that school education in the developing world, is so structured that it contributes little to the understanding of local environmental problems let alone solutions. Participants of this study did not approve this view. Nearly three-fourths of them disagree to the statement that ‘Knowledge gained at Ethiopian schools does not help to improve the quality of land and thereby increase agricultural production’ (D3).

7 STUDENTS' VIEWS ABOUT FAMINE IN ETHIOPIA

7.1 WHAT DO EXPERTS AND THE ACADEMIA SAY?

Famine in Ethiopia attracted the attention of social science researchers both within and outside the country. In most cases, an attempt to describe the degree and seriousness of the problem is followed recommendations. Natural factors like lack or fluctuation of rains, hailstorms, locusts, pest and plagues are accused time and again of triggering famine (see Chapter Four). Researchers seem to put the greatest blame on socio-economic and political forces (AKLILU, 2000). The ever increasing deterioration of household resources, taxes and payments imposed on farmers together with the force of market, war and political instability are such forces. The proposed solutions range from insuring and protecting the right to food all the way to strategies to increase food production. This chapter is on what students think about the cures and causes of famine.

7.2 A PRELIMINARY ANALYSIS

Students were asked to write three of the causes of famines in Ethiopia which, they think, are the outstanding ones. They were also asked to suggest three possible solutions to the problem. Results are summarised in Table 7.1. Only 13% of the respondents were able to provide the required number of sensible responses. One-fourth wrote five responses correctly out of the six expected.

Table 7.1 Causes and cures of famine: Responses by grade level (figures are all in percentages)

Level	No.	Number of responses							Total
		6	5	4	3	2	1	0	
JSS	433	7.7	15.4	23.6	19.6	17.2	9.9	6.6	100.0
SSS	493	12.6	28.9	23.5	17.8	9.1	4.3	3.7	100.0
TTI	242	21.9	33.9	22.7	14.0	4.5	1.7	1.2	100.0
Total	1168	12.6	24.9	23.5	17.6	11.0	6.0	4.3	100.0

Students of the junior level happened to have very limited ideas as famine. Only 23% could write five or six (of six) answers correctly. The corresponding percentage is 42 for students of senior secondary level and 58 for those in the TTI (Tables 7.2 and 7.3). One-third of the students at the junior level were able to give only one or two acceptable responses.

Table 7.2 Causes and cures of famine: Responses by students of the junior secondary schools (figures are all in percentages)

Schools	No.	Number of responses					Average (out of six)
		0-2	3-4	5-6	%		
Alaba	75	29.3	41.3	29.3	100.0	3.5	
Angacha	75	36.0	46.7	17.3	100.0	3.1	
Ambo	93	25.8	49.5	24.7	100.0	3.5	
Mudula	103	16.5	49.5	34.0	100.0	3.9	
Shinshicho	87	60.9	28.7	10.3	100.0	2.1	
Total	433	33.7	43.1	23.1	100.0		

All except one (Shinshicho) of the junior secondary schools scored above average (see Table 7.2) with the highest score by Mudula. Exactly the same position was taken by these two schools with regard to their performance in a test on natural resource use and management (Chapter Six). Similarly, Alaba leads senior secondary schools (with the average score of 4.7).

Table 7.3 Causes and cures of famine: Responses by students of senior secondary schools and the TTI (figures are all in percentages)

Schools	No.	Number of responses				
		0-2	3-4	5-6	%	Average (out of six)
Alaba	72	2.8	38.9	58.3	100.0	4.7
Angacha	90	13.3	53.3	33.3	100.0	3.8
Durame	161	19.9	39.8	40.4	100.0	3.8
Mudula	89	19.1	44.9	36.0	100.0	3.8
Shinshicho	81	30.9	29.6	39.5	100.0	3.4
Total	493	17.2	41.3	41.5	100.0	
TTI	242	7.44	36.8	55.8	100.0	4.4

7.3 CAUSES OF FAMINE

A number of factors were given by the students in response to the request to supply three of the major causes of famine in Ethiopia (Table 7.4).

Table 7.4 Causes of famine as expressed by the respondents

Causes	JSS No. = 433	SSS No. = 493	TTI No. = 242	Total No. = 1168	Percentage of the total
Climatic vagaries including drought	133	115	76	324	27.7
Lack of modern equipment and technique of farming	77	108	103	288	24.7
Laziness	115	107	26	248	21.2
Inability to use fertilisers and selected seeds	51	104	77	232	19.9
Overpopulation	56	117	58	231	19.8
Shortage of farm land	53	79	20	152	13.0
Deforestation	35	36	29	100	8.6
Land degradation	31	55	11	97	8.3
War	9	12	62	83	7.1
Decrease in production	14	33	34	81	6.9
Lack of trained manpower	22	40	13	75	6.4
Soil erosion	40	11	18	69	5.9
Wastefulness	29	25	10	64	5.5
Poverty and backwardness	24	26	8	58	5.0
Others*	8	64	37	109	9.3

* Others include heavy dependence on rainfed agriculture (mentioned by 35 students), lack of jobs (30), lack of industries (21), pests (12) and heavy tax (11).

Climatic vagaries including drought stood number one in the list (27,7%), followed by 'lack of modern equipment and techniques' (24,7%). More than 20% of the students believe that laziness is one of the forces behind famines in Ethiopia. This is surprising because one would hardly trace laziness as a factor in studies describing the root causes of famine in Ethiopia. It is all the more surprising to have students (themselves being victims of the problem) attribute famine to laziness, a kind of self-criticism which is not a common practice. Many prefer pushing the responsibility to others or to blame God.

Limited use of fertilisers and selected seeds, overpopulation and shortage of farmland are the other factors mentioned by 13-20%. The rest include deforestation, land degradation, war, decrease in production, lack of manpower, soil erosion, wastefulness, and poverty and backwardness. War and tax imposed on farmers, which are often presented in literature as the forces are not placed on top of the list by the students.

7.4 SOLUTIONS TO FAMINE

Hard work as a solution to famine stands number one (36%) in the list of the students. This is in accordance with the expressed view of students that laziness is among the major causes of famine. Such a tendency on the part of students to seek a local medicine to the chronic disease of the country is very encouraging as external solutions failed to destroy the root of the problem. Use of fertiliser, application of selected seeds and modern techniques of farming are the other solutions proposed by more than one-fifth of the respondents. Family planning is the last of the solutions recommended by more than 10% of students (see Table 7.5). The relatively low emphasis given to family planning as a solution to famine may be related to the students' lack of awareness about the basic population characteristics of Ethiopia (see Chapter Six).

7.5 VIEWS ABOUT SPECIFIC FACTORS RELATED TO FAMINE

Eight statements related to the causes and cures of famine (Table 7.6) were used to measure students' views on more specific issues often raised by experts in discussions pertaining to the problem. A score of 5 was assigned to a 'favourable' attitude and 1 for 'unfavourable'. Details as to the meaning and procedure are described in the methodology section of Chapter One.

Table 7.5 Solutions to famine as expressed by the respondents

Proposed Solutions	JSS No. = 433	SSS No. = 493	TTI No. = 242	Total No. = 1168	Percentage of the total
Hard work	212	186	27	425	36.4
Use of fertilisers and selected seeds	70	160	113	343	29.4
Modern techniques of farming	58	87	108	253	21.7
Family planning	28	89	50	167	14.3
Awareness creation	27	56	31	114	9.8
Planting trees	44	32	30	106	9.1
Irrigation	8	46	28	82	7.0
Agricultural extension	20	37	19	76	6.5
Being less wasteful	37	30	7	74	6.3
Appealing for aid	27	38	6	71	6.1
Others*	50	99	78	227	19.4

* Others include stopping war (mentioned by 53 students), creating job opportunity (49), industrialisation (33), land for landless (32), prayer (23), crop rotation (19), use of pesticides (18).

Table 7.6 Statements making up the attitude scale by code

Code	Statements
A1	It is unfair to make government policy or officials accountable for the occurrence of famine in Ethiopia.
A2	Corruption of government officials is one of the principal causes of famine in Ethiopia.
B1	The government has been contributing to famine in Ethiopia by imposing different forms of taxes and payments.
B2	Peasants are often forced to sell their crops at cheap prices during the harvest time to pay government obligations like taxes.
B3	Sale of crops during harvest time can lead to a shortage of food in the latter part of the year.
C1	Drought alone may not lead to the outbreak of famines.
C2	It is shameful to appeal repeatedly for a grain aid from other countries.
C3	Both the degree and frequency of occurrence of famine in Ethiopia may decrease if people work a bit harder.

Analysis shows a degree of difference between the views of students and those held by researchers and experts as to the root causes of famine in Ethiopia. Statements A1, C1 and C3 produced relatively great difference in the case of junior students (Table 7.7).

7.5.1 Drought as a Factor

The media in Ethiopia tend to overemphasise the role of drought as a force behind famines in Ethiopia. Experts hold the view that socio-economic factors are more damaging than natural factors in general and drought in particular. Slightly more than half (52%) of the students agree to the view that ‘Drought alone may not lead to the outbreak of famines’. Nearly one-third do not agree to this view, making drought the most accountable force. The acceptance of this view tends to increase with increase in level of education. Average points grew from 3.1 for junior schools to 3.7 for the TTI. Thirty eight percent of the students at junior level believe that drought alone can cause famine.

Table 7.7 Students’ views about the statement (C1): ‘Drought alone may not lead to the outbreak of famines’(figures are all in percentages)

Level	I	II	III	IV	V	I+II	IV+V	Average (on a five point scale)
JSS	34.3	7.0	20.7	14.8	23.1	41.3	37.9	3.1
SSS	42.6	9.1	16.2	14.1	18.0	51.7	32.1	3.4
TTI	48.1	14.9	12.3	11.9	12.8	63.0	24.7	3.7
Total	41.7	10.3	16.4	13.6	18.0	52.0	31.6	3.4

I = strongly agree; II = agree but not very much; III = undecided;
IV = disagree but not very much; V = strongly disagree

7.5.2 Government Officials and Policies as Factors

There is a divided view as to the part played by government policies and officials. Less than half of the respondents made this factor (A1) accountable for famine. The all the common allegation that ‘The government has been contributing to famine in Ethiopia by imposing different forms of taxes and payments’ (B1) got the agreement of slightly more than half of the participants (Table 7.8).

Surprisingly enough, the apparently moderate attitude towards government policy and officials has changed dramatically when corruption was mentioned specifically. Seventy two percent of the students thought that ‘Corruption of government officials is one of the principal causes of famine in Ethiopia’ (A2). Similarly, the statement that peasants have

often been forced to sell their crops at cheap prices during the harvest time (B2) received the agreement of more than three-fourths. There is a widespread belief on the part of experts in social sciences that the sale of crops during harvest time (as a result of external pressure) has been exacerbating food shortage and famine. Nearly 60% of the students also think that ‘sale of crops during harvest time can lead to a shortage of food in the latter part of the year’ (B3).

Table 7.8 Views of students on government policy or officials as forces behind famine in Ethiopia (figures are all in percentages)

Level	Statements	I	II	III	IV	V	I+II	IV+V	Average (on a five-point scale)
JSS	A1	21.2	19.4	20.5	7.6	31.4	40.6	39.0	3.1
SSS		17.2	18.2	14.7	9.6	40.3	35.4	49.9	3.4
TTI		7.7	15.7	19.6	13.6	43.4	23.4	57.0	3.7
Total		15.4	17.8	18.3	10.2	38.4	33.2	48.6	3.4
JSS	A2	52.6	15.1	19.7	5.5	7.0	67.7	12.5	4.0
SSS		55.2	15.3	14.4	6.3	8.9	70.5	15.2	4.0
TTI		63.8	14.0	13.2	3.4	5.5	77.8	8.9	4.3
Total		57.2	14.8	15.8	5.1	7.1	72.0	12.2	4.1
JSS	B1	41.4	15.0	16.3	6.5	20.8	56.4	27.3	3.5
SSS		39.2	15.3	13.8	4.3	27.4	54.6	31.7	3.4
TTI		36.2	12.3	8.5	8.5	34.5	48.5	43.0	3.1
Total		38.9	14.2	12.8	6.4	27.6	53.1	34.0	3.3
JSS	B2	57.1	15.9	12.8	4.3	9.8	73.0	14.1	4.1
SSS		62.7	17.2	7.5	4.7	7.9	79.9	12.6	4.2
TTI		63.4	14.0	7.2	5.5	9.8	77.4	15.3	4.2
Total		61.1	15.7	9.2	4.8	9.2	76.8	14.0	4.2
JSS	B3	41.7	6.2	15.0	17.2	20.0	47.9	37.2	3.3
SSS		54.5	10.2	8.7	14.4	12.3	64.7	26.7	3.8
TTI		53.2	13.2	7.7	17.4	8.5	66.4	25.9	3.9
Total		49.8	9.8	10.4	16.3	13.6	59.6	29.9	3.7

I = strongly agree; II = agree but not very much; III = undecided;

IV = disagree but not very much; V = strongly disagree

Statement A1: It is unfair to make government policy or officials accountable for the occurrence of famine in Ethiopia.

Statement A2: Corruption of government officials is one of the principal causes of famine in Ethiopia

Statement B1: The government has been contributing to famine in Ethiopia by imposing different forms of taxes and payments

Statement B2: Peasants are often forced to sell their crops at cheap prices during the harvest time to pay government obligations like taxes

Statement B3: Sale of crops during harvest time can lead to a shortage of food in the latter part of the year

7.5.3 Famine and Hard work

As indicated earlier, hard work has been recommended by the respondents as the best solution to famine in Ethiopia. Some of the students believe that hard work alone can not do away with the entire problem. About one-third of the respondents do not agree that ‘Both the degree and frequency of occurrence of famine in Ethiopia may decrease if people work a bit harder’ (C3).

Table 7.9 Students’ views about hard work and ‘appealing for aid’ as solutions to famine (figures are all in percentages)

Level	Statements	I	II	III	IV	V	I+II	IV+V	Average (on a five-point scale)
JSS	C2	46.2	15.1	18.2	4.4	16.2	61.3	20.6	3.7
SSS		49.1	15.3	15.7	6.9	13.0	64.4	19.9	3.8
TTI		49.4	19.6	13.2	7.2	10.6	69.0	17.8	3.9
Total		48.2	16.6	15.7	6.2	13.3	64.8	19.5	3.8
JSS	C3	32.9	5.6	13.4	15.2	32.9	38.5	48.1	2.9
SSS		51.1	5.5	9.2	10.1	24.0	56.6	34.1	3.5
TTI		67.7	13.6	5.1	6.8	6.8	81.3	13.6	4.3
Total		50.6	8.2	9.3	10.7	21.2	58.8	31.9	3.6

I = strongly agree; II = agree but not very much; III = undecided;

IV = disagree but not very much; V = strongly disagree

Statement C2: ‘It is shameful to appeal repeatedly for a grain aid from other countries.’

Statement C3: ‘Both the degree and frequency of occurrence of famine in Ethiopia may decrease if people work a bit harder.’

A bit less than two-thirds agree to the statement that it is shameful to appeal repeatedly for a grain aid from other countries (C2). One in five seems to believe the opposite. The latter appear to think that ‘it is OK to appeal for a grain handouts whenever famine breaks out’. Yet, 71 students (6%) had recommended ‘appealing for aid’ as a cure for famine in Ethiopia.

8 FACTORS INFLUENCING AWARENESS OF AND VIEWS ABOUT NATURAL RESOURCE DEGRADATION AND FAMINE

8.1 A BRIEF REVIEW OF LITERATURE

A number of studies were conducted to examine students' awareness of and attitudes towards environmental issues in general and environmental degradation in particular. Unprecedented interest in such issues began in the late 60s. Many of these studies had been done in the industrially advanced parts of the world, concentrating on issues relevant to their conditions (AKLILU, 1999). Several factors have been identified as affecting students' knowledge of and attitude towards issues related to environmental protection and natural resource use and management. These include curricular focus and teaching strategy; age/grade level, sex, academic stream, source of information, and place of residence.

Inconsistencies are discernible among findings of different studies. A variable reported to be strong by some studies was found by others to be weak.

8.1.1 Curricular Focus and Teaching Strategies

It is evident that environmental education has a different status in different countries or even different schools within the same country. This could naturally be reflected in the knowledge and attitude pattern of students. HORSLEY (1984:42) underlined the role of the curricular goals of the different nations while explaining the observed differences in attitudes of American and non-American students. It was pointed out that "non-American societies may be teaching a less environmentally focused curriculum due to the social and/or political values of the society, and non-American societies definitely have had a shorter experience with formalising environmental concerns". It may be argued that the highly positive attitude demonstrated by German adolescents (see Chapter Six) is the result of a curriculum which gives ample space for environmental matters.

In a study on Mexican elementary school children CORRAL-VERDUGO et al., (1996) revealed that teaching strategies were significant determinants of environmental critical thinking. Such strategies as 'giving examples', 'providing feedback', and 'reinforcing the proper distinction between environmental facts and opinions' produced higher scores in critical thinking, compared to 'simple exposition'.

8.1.2 Age/Grade Level

This is one of the variables producing inconsistent reports. It seemed to have a weak effect on students' environmental knowledge, attitude and behaviour in some cases and very strong and significant effects in others.

Age/Grade as a Weak Variable

Students were reported to have demonstrated little growth in environmental knowledge from 10th to 12th grade (GAMBRO and SWITZKY, 1996). Similarly, no change or improvement has been noted in their attitudes and knowledge about the environment when they moved from the first to the fourth year of college education (GIFFORD et al., 1982). OSTMAN and PARKER (1987) have found no correlation between age and any dependent variables. BRODY (1994) found little assimilation of new science concepts or differentiation of existing concepts between students of different grades. According to BRODY, students' knowledge on ecological crises appeared to be consistent over grade levels because they find it difficult to relate new material to their existing knowledge.

Age/Grade as a Strong Variable

A distinct difference was found as to the way students perceive ecological crises. In the fourth grade students have a down-to-earth attitude. Their understanding became progressively more abstract in eighth and eleventh grade (BRODY, 1994). Concern for the future of the earth and awareness of the need for global co-operation were also more apparent in the upper grades. Pessimism about the future increases with grade level.

In general, studies that found a strong and significant age/grade difference (BATTERHAM et al., 1996; BOYES and STANISSTREET, 1993; ALAIMO, 1978) show children's thinking to develop with age/grade. ALAIMO's assessment of factors influencing environmental values in high school students revealed that students of grades 10-12 had a higher preference to the theoretical value than those of grades 7-9; students of the higher grades maybe perceiving answers to the environmental dilemma more abstractly. Students of lower grades had a preference for aesthetic value because of their concern to the appearance of the environment. Students at this level were found to have a higher preference to political values implying that they might believe in politics as solutions to environmental problems. LEEMING (1997) reports attitudes differing as a function of grade level, with children in grades (1-3) having a significantly more positive attitude compared to grades 4-6.

8.1.3 Sex

There is more agreement among researchers about the relationship between environmental knowledge and attitude and sex. In general, males are known to be less sympathetic but more knowledgeable (BATTERHAM et al., 1996; BOYES and STANISSTREET, 1993). ROTH and PEREZ (1989) disclosed that males consistently outscored females. According to HAUSBECK et al. (1992), boys were slightly more knowledgeable while girls were slightly more aware and concerned. GIFFORD et al. (1982) substantiated that males have more environmental knowledge, while females express greater affect, and verbal commitment.

8.1.4 Place of Residence

The environmental perception of urban and rural high school students was compared by LEFTRIDGE and JAMES (1980). The issues measured were air and water pollution, waste disposal, and land use. Rural students were found to be more perceptive, regardless of issues, geographic setting, or educational background. The disparity in perception scores was explained in terms of rural students' proximity to the outdoors. Further evidence as to the superiority of rural students was reported by HAUSBECK et al. (1992): Students growing up in the city had less knowledge and awareness and were less concerned compared to students in suburban and rural areas.

8.1.5 Academic Stream

University students majoring in natural sciences have more environmental knowledge and have shown more emotion about the environment than those majoring in social sciences or non-sciences (GIFFORD et al. 1982). The 'non-sciences' included history, physical education, recreation, French, philosophy, music, visual arts, English, social work, outdoor education, public administration, and art history.

8.2 IMPACT OF ENVIRONMENTAL EDUCATION ON STUDENTS' KNOWLEDGE

A systematic instruction is known to have a positive impact on students' knowledge and attitude. JAUS' (1984:36) study on the development and retention of environmental attitude in elementary school children has supported the contention that even a "minimal instruction in environmental education is effective in producing highly positive attitudes towards the environment". Positive attitudes were found to be retained over time.

An environmental education programme for intermediate levels in Sudan produced similar results, directing the attention of the pupils to the need for environmental conservation, encouraging them to tackle problems in their own communities and schools (EL ZUBEIR, 1992). Based on their study on the effects of water conservation instruction, BIRCH and SCHWAAB (1983:29) asserted that "the knowledge and attitudes about water use of a sample of seventh-grade students could be changed after being taught a unit of water conservation". A similar finding was reported by a study conducted on the effects of class activities related to environmental protection (LEEMING, et al. 1997).

8.3 FINDINGS OF THE PRESENT STUDY

8.3.1 Difference in Grade Level

The difference between students of the three levels has been tested using a t-test. It revealed a significant difference between students of junior and senior secondary levels in their awareness about issues related to natural resource use and management (Table 8.1). The latter performed better as was hypothesised. The same was true for senior secondary students and the TTI. Students of the TTI performed better.

Table 8.1 shows that the performance of senior secondary students is better than that of junior secondary students in 12 of the 15 items. The latter performed better in three items. Students of the TTI were found to be superior compared to those of the senior secondary in all items except one. A similar trend has been found in students' views about natural resource use and management. The differences are significant. Students of the senior secondary schools showed a more favourable view compared to those of junior secondary schools (Table 8.2). Similarly, students at the TTI had more favourable views compared to those in the senior secondary schools.

Table 8.1 Difference between students of the different levels in their awareness about natural resource use and management

Level	No.	Items in the awareness test															Sum	T
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		
JSS	433	41.5	41.2	62.1	54.7	88.8	61.1	31.0	72.4	22.7	19.1	34.3	47.6	43.9	67.0	38.3		
SSS	492	54.0	63.1	62.2	71.2	81.7	62.8	52.3	72.0	38.8	23.3	37.3	73.4	60.8	66.9	50.2		
TTI	242	80.2	67.8	53.7	81.8	88.8	81.8	66.5	83.1	52.5	38.0	43.4	84.7	69.0	74.8	65.3		
d*		12.4	21.9	0.1	16.5	-7.1	1.7	21.4	-0.4	16.1	4.3	3.0	25.8	16.9	-0.2	12.0	144.4	3.72
d2		154.8	481.2	0.0	273.6	49.7	2.7	457.4	0.2	257.9	18.2	8.8	665.9	284.5	0.0	143.6	2798.7	
d**		26.2	4.7	-8.5	10.6	7.1	19.1	14.2	11.1	13.7	14.7	6.1	11.3	8.2	7.9	15.1	161.1	5.45
d2		685.4	22.1	72.4	112.0	50.4	362.9	200.4	123.5	188.2	215.2	37.4	126.9	67.9	62.8	226.7	2554.4	

d = difference, * between JSS and SSS, ** between SSS and TTI

Figures show percentage of respondents who could give correct answers to the corresponding item.

Table 8.2 Difference between students of the different levels in their views about natural resource use and management

Level	Statements making up the attitude scale													Sum	T
	1	2	3	4	5	6	7	8	9	10	11	12	13		
JSS	4.4*	4.4	3.4	2.3	3.2	3.8	4.8	4.5	4.1	3.8	4.2	4.0	4.4		
SSS	4.4	4.6	3.9	3.2	3.0	4.4	4.9	4.5	4.3	3.5	4.4	4.1	4.5		
TTI	4.5	4.8	4.3	3.7	3.0	4.5	4.9	4.8	4.3	3.4	4.6	4.1	4.5		
d*	0.1	0.2	0.5	0.9	-0.3	0.6	0.1	0.1	0.3	-0.3	0.2	0.1	0.1	2.5	2.19
d²	0.004	0.05	0.206	0.8	0.07	0.35	0.01	0	0.072	0.0797	0.06	0.01	0.0034	1.727	
d**	0.1	0.2	0.4	0.5	0.0	0.1	0.0	0.3	0.0	-0.1	0.2	0.0	0.0	1.8	2.7
d²	0.006	0.03	0.194	0.27	0.0	0.01	0.0	0.08	0.0	0.0066	0.03	0.0	0.0	0.63	

d = difference, * between JSS and SSS, ** between SSS and TTI

These figures indicate average score on a scale running from 1-5.

The test has thus indicated an increase in students' awareness about issues related to natural resource use and management with increasing level of education. Views appeared to be more favourable with increase in level of education. The case was different with famine. No significant difference was found between TTI students and those of the senior secondary level (Table 8.3). The difference between the latter and students of the junior secondary schools was, however, significant. Those at the senior level had views that are more favourable compared to views of the junior level students.

Table 8.3 Difference between students of the different levels in their views about famine

Level	Statements making up the attitude scale								Sum	t
	1	2	3	4	5	6	7	8		
JSS	3.1*	4.0	3.1	3.5	3.3	3.7	2.9	4.1		
SSS	3.4	4.0	3.4	3.4	3.8	3.8	3.5	4.2		
TTI	3.7	4.3	3.7	3.1	3.9	3.9	4.3	4.2		
d*	0.3	0.0	0.3	-0.1	0.5	0.1	0.6	0.2	1.72	2.57
d²	0.07	0.0	0.08	0.02	0.22	0.01	0.34	0.03	0.76	
d**	0.3	0.3	0.3	-0.3	0.1	0.1	0.8	0.0	1.6	1.76
d²	0.12	0.08	0.07	0.07	0.01	0.01	0.68	0	1	

d = difference, * between JSS and SSS, ** between SSS and TTI

* These figures indicate average score on a scale running from 1-5

8.3.2 Difference in Sex

Female students constituted about 24% (29.0% for junior secondary, 17.5% for senior secondary and 27.7% for the TTI) of the study population. The percentage ranged from the lowest of 6.3 for Shinshicho senior secondary to the highest of 41.3 for Angacha junior secondary school. More than one fourth of the trainees were females (Table 8.4) The percentage of female students registered in the government schools of the study area in the previous academic year (1996/97) was 29.7 for junior secondary, 25.1 for senior secondary and 34.9 for the TTI (EDUCATION BUREAU OF SNNPRG, 1998).

Table 8.4 Percentage of female students

School	Total No.	Male (%)	Female (%)
Alaba JSS	75	78.7	21.3
Angacha JSS	75	58.7	41.3
Ambo JSS	93	61.3	38.7
Mudula JSS	103	80.6	19.4
Shinshicho JSS	87	75.9	24.1
Alaba SSS	72	81.9	18.1
Angacha SSS	90	64.4	35.6
Durame SSS	161	83.9	16.1
Mudula SSS	89	88.8	11.2
Shinshicho SSS	80	93.8	6.3
TTI	242	72.3	27.7
Total	1167	76.3	23.7

A significant difference was found between the males and females in their awareness about issues related to natural resource use and management and views about famine. Male students performed better in the awareness test and had more favourable views about famine. No significant difference was found between male and female students in their views about the use and management of natural resources (Tables 8.5, 8.6 and 8.7).

Table 8.5 Difference between male and female students in their awareness about issues related to natural resource use and management

School	No. of respondents		Average Score (out of 15)		d	d ²	t
	Male	Female	Male	Female			
Alaba JSS	59	16	7.8	6.7	1.1	1.21	
Angacha JSS	44	31	7.5	6.0	1.5	2.25	
Ambo JSS	57	36	7.3	6.8	0.5	0.25	
Mudula JSS	83	20	8.0	7.2	0.8	0.64	
Shinshicho JSS	66	21	6.9	6.7	0.2	0.04	
Alaba SSS	59	13	10.1	7.6	2.5	6.25	
Angacha SSS	58	32	9.1	7.5	1.6	2.56	
Durame SSS	135	26	9.3	7.9	1.4	1.96	
Mudula SSS	79	10	7.9	7.0	0.9	0.81	
Shinshicho SSS	75	5	8.5	7.4	1.1	1.21	
TTI	175	67	11.1	8.2	2.9	8.41	
Sum	890	277			14.5	25.59	5.4

d = difference

Table 8.6 Difference between male and female students in their views about issues related to natural resource use and management

School	No. of respondents		Views (on a five-point scale)		d	d ²	t
	Male	Female	Male	Female			
Alaba JSS	59	16	4.1	3.9	0.2	0.04	
Angacha JSS	44	31	3.9	3.7	0.2	0.04	
Ambo JSS	57	36	3.8	3.9	-0.1	0.01	
Mudula JSS	83	20	4.1	3.9	0.2	0.04	
Shinshicho JSS	66	21	3.3	3.5	-0.2	0.04	
Alaba SSS	59	13	4.1	4.2	-0.1	0.01	
Angacha SSS	58	32	4.2	4.0	0.2	0.04	
Durame SSS	135	26	4.0	4.0	0	0	
Mudula SSS	79	10	4.2	4.2	0	0	
Shinshicho SSS	75	5	3.9	3.2	0.7	0.49	
TTI	175	67	4.2	4.0	0.2	0.04	
Sum	890	277			1.3	0.75	1.6

d = difference

Table 8.7 Difference between male and female students in their views about famine

School	No. of respondents		Views (on a five point scale)		d	d ²	t
	Male	Female	Male	Female			
Alaba JSS	59	16	3.6	3.6	0	0	
Angacha JSS	44	31	3.5	3.1	0.4	0.16	
Ambo JSS	57	36	3.4	3.2	0.2	0.04	
Mudula JSS	83	20	3.9	3.5	0.4	0.16	
Shinshicho JSS	66	21	3.2	3.1	0.1	0.01	
Alaba SSS	59	13	3.7	3.6	0.1	0.01	
Angacha SSS	58	32	3.7	3.4	0.3	0.09	
Durame SSS	135	26	3.6	3.3	0.3	0.09	
Mudula SSS	79	10	3.8	3.8	0	0	
Shinshicho SSS	75	5	3.6	3.5	0.1	0.01	
TTI	175	67	3.8	3.6	0.2	0.04	
Sum	890	277			2.1	0.61	5.38

d = difference

For the awareness test, the deviation is maximum with students of the TTI and Alaba senior secondary school and minimum for Shinshicho and Ambo junior secondary schools. Female students demonstrated a more favourable view about natural resource use and management in the case of Ambo and Shinshicho junior secondary schools and Alaba senior secondary school whereas absolutely no difference is found between the groups in Durame and Mudula senior secondary schools. With regard to views about famine male students a more favourable view, with the exception of Alaba junior and Mudula senior secondary schools where the difference was zero.

8.3.3 Difference between Students with and without Geography Background

There are two major streams in the Ethiopian educational system: The Arts and Science. Arts students continue taking geography up to the last grade of secondary education. Science stream students stop geography in grade ten. Of the 492 senior secondary students 215 (43.7%) were from the Arts stream and the balance from the Science stream.

Geography textbooks for Ethiopian senior secondary schools cover the issues raised in the questionnaire to some degree (see Chapter Five). It seems that students with geography background should have an advantage. The test reveals the reverse (Tables 8.8, 8.9 and 8.10). The difference between the groups was found to be not significant both for the awareness test and attitude scale. Students of the Science stream demonstrated a more favourable attitude towards natural resource use and management; and famine. In the case of Angacha senior secondary school, students of the Arts stream performed poorly in the awareness test. Both groups achieved equal results in Durame senior secondary school. Students of the Science stream have either equally favourable or more favourable views about issues related to natural resource use and management; and famine in the case of all schools (except Shinshicho with results as hypothesised).

Table 8.8 Difference between students with and without geography background in their awareness about issues related to natural resource use and management

School	No. of respondents		Average score (out of 15)		d	d ²	t
	with geog. background	without geog. background	with geog. background	without geog. background			
Alaba SSS	33	39	10.6	8.9	1.7	2.89	
Angacha SSS	32	58	7.8	8.9	-1.1	1.21	
Durame SSS	57	104	9.1	9.1	0	0	
Mudula SSS	44	45	8.0	7.7	0.3	0.09	
Shinshicho SSS	49	31	8.4	8.3	0.1	0.01	
Sum	215	277			1	4.2	0.44

d = difference

Table 8.9 Difference between students with and without geography background in their views about issues related to natural resource use and management

School	Views (on a five-point scale)		d	d ²	t
	with geog. background	without geog. background			
Alaba SSS	3.6	3.6	0	0	
Angacha SSS	3.9	4.2	0.3	0.09	
Durame SSS	3.8	4.1	0.3	0.09	
Mudula SSS	4.2	4.2	0	0	
Shinshicho SSS	3.9	3.7	-0.2	0.04	
Sum			0.4	0.22	0.83

d = difference

Table 8.9 Difference between students with and without geography background in their views about famine

Schools	Views (on a five-point scale)		d	d ²	t
	With geog. Background	Without geog. Background			
Alaba SSS	3.7	3.8	0.1	0.01	
Angacha SSS	3.6	3.6	0	0	
Durame SSS	3.4	3.6	0.2	0.04	
Mudula SSS	3.8	3.8	0	0	
Shinshicho SSS	3.5	3.3	-0.2	0.04	
Sum			0.1	0.09	0.15

d = difference

More knowledgeable students often tend to choose the Science stream. It seems that discussions on the natural resources of Africa at grade eleven did not help students of the Arts stream to have a performance comparable to their fellow students of the Science stream.

9 SUMMARY, CONCLUSION AND RECOMMENDATIONS

9.1 SUMMARY

Purpose of the Study

This study was based on the premise that schools can contribute to the abatement of the problems related to natural resource use and management. They can do so:

- By purposefully and intensively addressing environmental issues and thereby creating awareness and developing attitudes and behaviours towards proper use and management of natural resources; and
- By positively influencing the community using their unique opportunity of being located within the grassroots population. Studies indicate that children can influence the attitude and behaviour of their parents.

The earth's environment has been degraded owing to man's interventions. Some of the environmental problems are global in the sense that the effects pass over national borders. Others are country or region specific. Natural resource degradation (particularly land degradation) is often regarded as the most crucial problem threatening the very survival of millions in Ethiopia. Famine is the other problem accountable for the death of hundreds of thousands in the country. One of the aims of this study was to examine the extent of these problems and the way in which they have been addressed in the Ethiopian school curriculum. The second and major aim of the study was to investigate students' awareness of and views about the problem of natural resource degradation and famine.

Two methods of data gathering were employed: Document analysis and field survey. Documents were gathered and analysed. Geography curricula were examined to see the extent to and ways in which issues related to natural resource use and management have been addressed. An awareness test and attitude scale were developed and administered to investigate students' awareness and views. More than 1100 students took part from junior and senior secondary schools of Kembata-Alaba-Tembaro zone, southern Ethiopia; and Awassa Teacher Training Institute.

Land Degradation in Africa

Land degradation has been declared the most immediate and urgent problem threatening the very survival of millions in the developing World. Africa is a case in point with 17% of its total land already made out of use. The problem has been spreading in an alarming rate with 3.7 million hectares of forest- and woodland disappearing every year.

The main causes of land degradation in developing countries are deforestation (owing mainly to population pressure and the resultant quest for more farming land), overgrazing and bad farming practices. Land degradation wrecks havoc on the life of people and the environment. The process of desertification is being accelerated to a great extent. Forced migration is another phenomenon often seen in areas where land degradation goes to the extreme. Poverty and malnutrition have become the fate of people in such areas.

Extent of Natural Resource Degradation in Ethiopia

During the last century, Ethiopia experienced an unprecedented loss in her natural resource base. The loss is so high that some of the resources are already on the verge of extinction. The following are only a few of the indicators of the extent to which natural resources have been degraded and depleted in the country.

- Land under forest shrank from 16% in 1950 to 2.4% at present.
- Annually, 150,000–200,000 hectares of forestland have been cleared mainly to secure farming land.
- Three fourth of Ethiopian highlands have already been rendered fragile so much so that their future use depends on the application of conservation methods of one sort or another.

The major causes of natural resource degradation in Ethiopia are known to be soil erosion due mainly to deforestation and land mismanagement; overgrazing; insecure tenure of land; and lack of awareness.

Natural resource degradation has resulted in effects that are quantifiable and non-quantifiable (or very hard to quantify). Among the latter are depletion of surface and subsurface water resources; unemployment and out migration; fragmentation of plots of farmland and long walking distances; shortage of food and malnutrition; and lack of fuel wood and building materials.

Attempts have been made to express the effects of natural resource degradation and depletion in economic terms. Accordingly,

- About 17% of the potential agricultural GDP is lost because of physical and biological soil degradation.
- Annual decrease in livestock production due to land degradation has been estimated to reach 1.1 million tropical livestock units (TLUs).
- The cost of deforestation is estimated to reach 6-9% of the GDP.

Measures have been proposed against the problem of natural resource degradation in Ethiopia. These include afforestation and reforestation, conservation oriented crop combination and land management, agroforestry, ensuring right of tenure and controlling the rate of population growth.

Famine in Ethiopia

Incidence of famine is by no means new to Ethiopia. The frequency of occurrence has, nevertheless, tremendously increased during the last century. Such an increased frequency of occurrence of famine and the subsequent appeal to the international community for help resulted in consideration of the country as a 'symbol of famine'. The young generation in Europe (and perhaps other parts of the world as well) got acquainted with the country more through the recurrent famines than anything else.

Several factors have been working behind famine in Ethiopia. Climatic vagary is one with drought playing the prominent role. Socio-economic factors are believed to be more detrimental than natural. Among the socio-economic factors are the constant fall in the rate of food production in the face of the ever growing population; the traditional system of production; deterioration of household resources; shortage of alternative employment opportunities; taxes and payments; the market; and war and political instability.

The consequences of famine are wide ranging. During the last decades, the country is believed to have suffered more than any other country. Loss of human life has always been compounded by fear of the next famine. Poverty and long-ranging economic problems are scars left by the recurrent famines.

Among the measures proposed against famine in Ethiopia are protection of the right to food and provision of famine relief; and increasing food production through application of diverse techniques. Such techniques include flood harvesting; micro irrigation; use of high yielding and early maturing varieties of crops; input supply; expansion of cultivated land; and intensification of crop cultivation.

Geographic Education and Natural Resource Management

There is a traditional tie between geographic education and the study of the man-environment relationship. The renewed interest in environmental matters since the 70's opened a great opportunity for school geography to revitalise its traditional ties to the environment and address environmental issues in a more systematic and aim-oriented fashion. A number of geography educators promote the view that the value of geography as a discipline and school subject is to be measured in terms of its contribution to the awareness of these contemporary environmental problems and their solutions.

World wide, geography and biology earned a high reputation for their contribution to the understanding of environmental matters. Assessment of geography syllabi for German schools justifies this assertion. Emphasis has been laid on the creation of awareness as to the natural foundations of life as evidenced by the Geography syllabus for one of the Federal States of Germany: Schleswig-Holstein. Environmental issues are found to be adequately incorporated into the syllabi. In the case of Germany the issues have been systematically integrated into the existing structure rather than treating them separately as used to be practised in traditional textbooks of geography and other subjects that address environmental matters.

Assessment of the place of issues related to the use and management of natural resources in the geography curriculum for Ethiopian schools shows that there were ample opportunities in the existing curriculum to address the issues. The way the issues were actually addressed is far from being acceptable. In the few instances where issues related to natural resource use and management were raised, discussions were politically motivated, figures outdated and concepts disintegrated with little or no logical flow. Splendid opportunities to make geography not only problem oriented but also a more exciting subject were lost.

Students' Awareness about Resource Base of Ethiopia and the problem of Natural Resource Degradation

In general, the level of awareness of the students who took part in this study was too low to be rated sufficient. Only one fourth of the students were able to give the required number of correct answers regarding the causes, consequences and solutions of land degradation. One fourth failed to give more than three of the nine answers.

Soil erosion has been considered as one of the three most important causes of land degradation by 63% of the students. Deforestation occupies the second position mentioned by 31%. Factors like overpopulation and overgrazing, which are stressed by experts and extension workers, appeared to have been highly undermined. Overpopulation as a factor of land degradation has been mentioned by 6% of the respondents.

That land degradation leads to decrease in production has been underlined by more than 60%. It is thus not surprising that 45% of the students considered famine as one of the three events that follow land degradation. Some of the most important consequences of land degradation like population displacement have been totally ignored.

Afforestation and reforestation have been recommended as the major solutions to land degradation. The others in the list of solutions were construction of waterways, terracing and use of fertilisers.

Analysis of students' performance in the awareness test indicates that a little less than two thirds of the participants were able to give correct answers to half of the fifteen items related to the use and management of natural resources. One third of the participants were not able to answer even half of the items in the awareness test. Performance increased with increase in level of education. More than 50% of students at the junior level failed to answer half of the items correctly. On the other extreme, 86% of the students at TTI answered more than half.

A shockingly low percentage of students (33% of the total and 23% of the students at the junior level) knew the apparently obvious fact that the rate of population growth in developing countries is relatively faster. Nearly half of the students approved the wrong statement that 'The present rate of the growth of Ethiopian population is one of the lowest in Africa'.

Students' awareness about the natural resource base of their own country is remarkably low. As many as 63% of the students wrongly indicated that 96% of the total area of the country is cultivable. Three out of four students could not locate areas affected most by the problem of land degradation. Only 44% of the students knew that the agricultural sector is the basis of livelihood of the vast majority of the country's population.

Students' Views about Use and Management of Natural Resources

On the whole, students were found to have favourable views about the value of natural resources. They had divided views with regard to the use and management of resources. The view underlying the philosophy of sustainability – "that natural resources are limited and hence be conserved and preserved" has been supported by 41%; one forth has rejected it. Worse still, about 44% of the respondents agree to the view that "in Ethiopia one should be worried more about satisfying the needs of the present generation than talking about preservation of resources for the future generation". Similarly, more than one forth agrees that "One should not blame people who sell fuel wood by cutting forests from community land because that is the only choice they have to sustain life".

Participants of this study had a highly favourable view about the contribution of the local community to the protection and management of natural resources. More than four fifths of the respondents had the optimistic view that it is possible to turn a rural village green by planting trees. They also believe that the local community could do this with little assistance from external sources.

Positive and strong views have been demonstrated with regard to the role of education in natural resource protection. Students have the responsibility to inform their parents and neighbours about the need for protection and careful use of natural resources; this has been endorsed almost unanimously. Students believe that knowledge gained in Ethiopian schools helps to improve the quality of land and increase agricultural productivity.

Students' Views about Famine

Climatic vagaries including drought were made most accountable to famine in Ethiopia. Lack of modern techniques and equipment of farming was next in the order. One fifth of the respondents attributed famine to laziness – a kind of self criticism which is not a common practice. Researchers in the area of food shortage and famine appear to be too shy to touch upon the role of work-culture in general and laziness in particular.

There are other cultural factors contributing to famine but given little or no attention in the literature. Tendency to sell farm products carelessly and at times 'extravagantly' during the harvest season; and spending too much for some cultural ceremonies like wedding are only two of such factors. In fact, 6% of the participants of this study have specifically mentioned wastefulness as one of the three major causes of famine in Ethiopia.

Hard work has been considered as the number one solution to famine. This accords with the students' view that laziness is one of the major forces behind famine. Students have also indicated that hard work alone may not prevent the occurrence of famine in Ethiopia. Use of fertilisers, selected seeds and modern techniques of farming were the other solutions proposed by more than one fifth of the students.

The famous allegation that 'corruption of government officials has been contributing to famine in Ethiopia' got agreement of 72%. Three fourths of the students also believe that peasants have been forced to sell their products at harvest to pay the obligations imposed by the government. That sale of crops at harvest leads to food shortage in the latter part of the year is supported by nearly 60% of the respondents.

Views of students about grain aid seemed to be divided, 65% agreed that it is shameful to appeal for grain handouts from other countries. One fifth of the respondents did not. More surprisingly, 71 students (6%) have, actually included appealing for assistance in their list of the top three solutions to the problem of famine in Ethiopia!

Factors Affecting Students' Awareness and Views

A t-test was used to examine the difference between groups of students in their awareness of and views about issues relating to the use and management of natural resources and famine in Ethiopia. A significant difference was found between students of the three levels (junior, senior and TTI) with regard to awareness about issues related to use and management of natural resources. Students at the senior schools have a better awareness than those at junior; and trainees of the TTI performed much better compared to the other groups. Thus awareness tended to increase with increase in level of education.

With regard to famine, no difference was found between views of students of the senior secondary level and trainees in the TTI. The difference between those at junior and senior levels was statistically significant with the latter having more favourable views about the causes and solutions of famine in Ethiopia.

Male students performed better in the awareness test than female students. Males had more favourable views about famine in Ethiopia. No significant difference was found in views about the use and management of natural resources.

No significant difference was found between students of the Arts and Science streams (with and without geography background). Students of the Arts stream had an additional opportunity to see into the issues related to the state of natural resources in Africa. Nevertheless, they performed poorly on the whole compared to their fellow students in the science stream. This may be explained in terms of the relative 'superiority' (in general knowledge) of students in the science stream compared to those of the Arts stream.

9.2 CONCLUSION

- Studies on the state of the Ethiopian environment indicate that the country suffered a tremendous loss of resources during the last decades. The process of resource degradation has continued unabated. This seems to be well known to the government and non-governmental organisations. A number of measures have long been taken to curb the rate of resource degradation and depletion in the country.
- Though education is believed to be among the most decisive instruments for environmental protection and natural resource management, the extent to which this instrument has been used and results of such a use have not been systematically investigated. Assessment of the place of natural resource use and management in the geography syllabi made it clear that there were opportunities for addressing environmental issues in general and the problem of natural resource degradation in particular. These opportunities have been largely misused or totally lost.
- One could infer, based on the findings of this study, that there is a remarkable deficiency in natural resource education. Only one fourth of the participants were able to give three correct responses about the causes, consequences and solutions to the most serious environmental problem wrecking havoc on the life of millions in the country: Land degradation. Student's awareness of some key issues like the impact of population growth on resource use and management is found to be too low to be tolerated.
- The participants of this study have only limited awareness about the natural resource base of the country. Their knowledge about the size of cultivable land and distribution of natural vegetation is surprisingly low. This means that students lack basic information required to appreciate the need for resource conservation.
- Much of the issues raised in the instrument used for this study were included in the geography textbooks. The generally low performance of students can therefore be taken as an indicator of the inability or failure of geographic education in Ethiopian schools to equip students with basic information about the natural resource base of the country, and use and management of natural resources. The way the textbooks were prepared appears to contribute the greatest share to such failure. The content of the textbooks relating to natural resources sounds more like a 'political pamphlet' than an academic instrument.
- Students had a favourable view as to the value of natural resources and potential contribution of the community to natural resource management. Their view got, however, sharply divided on the issue of preservation of such resources for future

generations. They seem to believe that it is meaningless to talk about future generations in Ethiopia where the present generation is struggling to have the minimum requirements to sustain life. This is thus one area of great challenge to be faced by environmental policies and education in the country. Any policy on environmental protection can be successful to the extent it addresses the actual situation and needs of the present generation. The tendency to apply the philosophy of 'sustainability' to countries of the Third world without further definition is thus bound to fail. After all, the idea of 'sustainability' as it is used now was originated on the basis of observations in the western world where consumerism is at the heart of almost all the environmental problems. Malnutrition is the rule in the third world. It is therefore extremely difficult to get the message of 'sustainability' across in such countries.

- Natural factors are made most accountable to famine. One in five students considered laziness as one of the three major causes of famine in Ethiopia. This view seems to be a bit strange. One can find little about this particular factor in the literature. Consistent with their view about the role of laziness, students proposed hard work as the main solution to famine. Students' view about "appealing for grain aid from other countries" appears to be not so progressive. One fifth of them thinks that it is not that shameful to appeal for grain aid from other countries. In Ethiopia, there is a wide spread discussion on the negative role played by grain assistance. Some farmers were said to avoid working even during good weather assuming that 'grain comes from Canada anyway'. About 6% of the participants of this study have marked 'appealing for grain assistance' as one of the top three solutions to famine in Ethiopia. This must be one of the issues to be addressed and critically discussed in schools.
- A significant difference was found between students of the different levels in their awareness of and views about natural resource use and management and famine. This is in accordance with the findings of other studies that education is one of the strong factors that determine awareness and attitude about environmental issues.
- A strong and significant difference was expected to prevail between students with and without geography background. The t-test revealed the opposite. The generally low level of awareness of students as a whole and poor performance of those with geography background reveal the failure of geography education in Ethiopian schools to communicate these issues (most of which were already incorporated into the existing textbooks). Poor content of the textbooks was indicated earlier to be one of the possible causes for such a failure. The failure could also be attributed to inability of teachers to handle the matter sufficiently and properly.
- Male students performed significantly better than female students. This is in general agreement with findings of studies conducted in other parts of the world. Boys generally tend to be more knowledgeable in environmental issues than girls. Girls, on the other hand, tend to demonstrate a more favourable attitude.

9.3 RECOMMENDATIONS

Natural Resource Management in Ethiopia: Too Important to be Left for Extension Workers

World-wide, issues relating to the use and management of natural resources and the problem of resource degradation seem to have an unprecedented attention. The same could be said for Ethiopia. A number of investigations have been carried out to identify the state of the country's resources, the extent of resource degradation and possible measures to correct past mistakes. Legislation meant to protect natural resources has been formulated and issued. There is, however, a growing understanding that legislative and economic measures are not able to guarantee long lasting protection and preservation of resources. The latter requires a fundamental change in attitudes and behaviour. Here lies a great role to be performed by education, whatever its mode is.

Education about the use and management of natural resources should be comprehensive enough to cover issues ranging from the very principles governing the interrelationships between components of the ecosystem all the way to techniques for protection and preservation of resources. The present tendency to use education as an instrument to 'scare' the audience by emphasising the consequences of environmental degradation and pollution should give way to a fundamental education on the value of resources.

Many of the school subjects have something to contribute to the protection and preservation of natural resources. Imparting information about the value, availability and geographical distribution of natural resources (in the world and in ones own country) should be the first thing to be done. Principles of resource use and management should then be emphasised taking specific resources (like water, land, etc.) in greater depth. There are school subjects that already address such issues to a certain degree. What is required of such subjects is presentation of the issues in a more systematic way so as to empower students with the required level of awareness. The danger of redundancy which characterises the existing curriculum for Ethiopian schools must be tackled by carefully monitoring the vertical and horizontal organisation of content.

The final thing for education to address is the problem arising from people's behaviour towards the use of natural resources. Emphasis should be laid on the need to control actions that damage the harmony in the ecosystem and bring about irreparable scars to the system. As future decision makers, students are entitled to have information about such misbehaviours. The presentation must be free from ideological dogmas that characterise discussions on the use of natural resources.

It is thus to be seen that the issue of natural resource use and protection is not to be left for legislators and economists. Neither should it be left for extension workers no matter how close they are to the grassroots population. Educators do also have an important part to play. No single school subject can address the issue in a meaningful and comprehensive manner. Nevertheless, some of the school subjects are more suited for the job than others. Biology and geography are among such subjects.

The Need for Modification and/or Change in the Substance and Structure of Ethiopian School Geography

Geography has, both as a discipline and school subject, been suffering from an identity crisis. There are moves to modify or change the very name ‘Geography’ both in schools and institutions of higher education. In Ethiopia, the name has been retained so far. The need to rethink the substance of geography in Ethiopian schools seems very urgent though.

Whatever the name might be, a ‘*systematic and aim oriented study of natural resources*’ should be the crux of geography in schools if the subject is to contribute to the understanding of the problems facing the country. Issues related to the use and management of natural resources should be at the heart of curriculum plans for all grades. The following are concepts that need to be developed over the grade levels.

Table 9.1 Concepts related to natural resource use and management and recommended to be integrated into geography curricula for Ethiopian schools

General (Global)	Ethiopia
Natural resources <ul style="list-style-type: none"> • Air • Water • Land 	Natural resource base of Ethiopia <ul style="list-style-type: none"> • Arable land • Pasture land • Water resources • Biodiversity • Minerals
Categories of natural resources <ul style="list-style-type: none"> • Renewable • Non Renewable 	Problem of natural resource degradation in Ethiopia <ul style="list-style-type: none"> • Extent of degradation • Causes of degradation • Consequences of degradation
Reserves and resources	Measures against resource degradation
Use of natural resources <ul style="list-style-type: none"> • Temporal patterns in the use of natural resources • Spatial patterns in the use of the major resources 	Energy and development: Prospect and problems <ul style="list-style-type: none"> • Hydropower – Motor for the future development? • Saving forests through use of alternative energy sources <ul style="list-style-type: none"> - Biogas - Solar - Improved stoves: Wise use of fuel wood
The future of natural resources <ul style="list-style-type: none"> • Concept of Sustainability 	Natural resource degradation and famine
Energy as a special resource <ul style="list-style-type: none"> • Energy and development • Conventional energy sources • Alternative energies <ul style="list-style-type: none"> - Hydropower - Wind - Biomass / Biogas - Solar 	

An invaluable document on the natural resource base of Ethiopia has been produced by the Environmental Protection Authority. The document identifies and discusses ten categories of natural resources: climatic, land, forest, mineral, water, livestock, inland fishery, apiculture, floristic and faunistic, and energy resources. Similarly, issues related to natural resource degradation have been well documented by the series of reports following the famous study called the ‘Ethiopian Highlands Reclamation Study’. It is strongly recommended that future geography curricula, both for schools and institutes of teacher education, make an intensive use of these and other documents on the state of and problems relating to the use and management of natural resources.

9.4 ZUSAMMENFASSUNG, FOLGERUNGEN, EMPFEHLUNGEN (Summary, Conclusion and Recommendations – German Version) ⁴

9.4.1 Zusammenfassung

Die Studie basiert auf der Prämisse, dass Schulen in der Lage sind, Beiträge zur Verringerung der Probleme, die sich aus der Nutzung natürlicher Ressourcen ergeben zu liefern. Sie können dies tun,

- indem sie zweckgerichtet und intensiv Umweltfragen behandeln und dadurch ein Bewusstsein und ein Verhalten schaffen, das auf eine geeignete Nutzung der natürlichen Ressourcen zielt,
- indem sie durch ihre einmalige Platzierung, inmitten der Landbevölkerung, zur positiven Beeinflussung der Gemeinden beitragen.

Es gibt auf der Erde erhebliche Umweltprobleme. Einige sind als länderspezifisch andere als regionspezifisch anzusehen. Die Zerstörung der natürlichen Ressourcen, insbesondere die Landdegradation, wird als das entscheidende Problem angesehen, welches das Leben von Millionen Menschen in Äthiopien bedroht. Hunger ist das andere Problem, verantwortlich für den Tod von Hunderttausenden.

Eines der Ziele dieser Arbeit war es, den Umfang der Zerstörung der Naturressourcen und den des Hungers in Äthiopien zu erfassen und zu untersuchen, wie diese Probleme als Themen in die Lehrpläne der Schulen aufgenommen worden sind. Das zweite und vorrangige Ziel dieser Studie bestand darin, das Umweltbewusstsein von Schülern und Studenten zu untersuchen und ihre Meinung über die Zerstörung der Naturressourcen und den Hunger herauszufinden.

Zwei Methoden der Datengewinnung wurden angewendet: Die Auswertung von Dokumenten und die Feldarbeit. Schriftliche Quellen wurden ausgewertet um Informationen zu erschliessen, in denen die Probleme der Zerstörung natürlicher Ressourcen und die des Hungers behandelt werden. Das Curriculum des Geographieunterrichts wurde überprüft, um den Umfang umweltrelevanter Themen und die Art und Weise, wie diese in der Schule eingesetzt wurden, zu erfassen. Darüber hinaus wurde ein Fragebogen entworfen, um das Bewusstsein und die Sichtweise von Schülern und Studenten zu Umweltproblemen, Lebensmittelknappheit und Hunger zu untersuchen.

Landdegradation in Afrika

Landdegradation wird als das dringendste Problem angesehen. Es bedroht Millionen Menschen in der Dritten Welt. In Afrika können bereits 17% des Landes nicht mehr landwirtschaftlich genutzt werden. Das Problem verschärft sich noch. Jedes Jahr gehen 3,7 Millionen Hektar Wald- und Forstfläche verloren.

Die Hauptgründe der Landdegradation in Entwicklungsländern sind Entwaldung, verursacht durch den Bevölkerungsdruck und die sich daraus ergebende Nachfrage nach landwirtschaftlicher Nutzfläche, sowie Überweidung und schlechte Bewirtschaftung. Landdegradation muss als verantwortlich für die Zerstörung der Umwelt und als Gefahr für das Leben der Menschen angesehen werden. Der Prozess der Desertifikation hat sich in erschreckendem Ausmaß beschleunigt.

⁴ Translated by Prof. Dr. Manfred J. Müller

Verstärkte Wanderungsbewegungen sind ein weiterer Vorgang, der überall beobachtet wird, wo die Landzerstörung extrem voranschreitet. Armut und Unterernährung sind zum Schicksal der Menschen in diesen Gebieten geworden.

Ausdehnung der Zerstörung natürlicher Ressourcen in Äthiopien

Während des letzten Jahrhunderts hat Äthiopien einen beispiellosen Verlust an natürlichen Ressourcen erfahren. Er ist so groß, dass einige von ihnen davon bereits an der Grenze der totalen Vernichtung sind. Im Folgenden sind einige Indikatoren aufgeführt, die den Grad der Degradation und der Erschöpfung der Naturressourcen des Landes belegen.

- Die bewaldeten Flächen verringerten sich von 16% (1950) auf 2,4% zur Zeit.
- Jährlich werden 150.000 bis 200.000 ha Waldland gerodet, hauptsächlich um landwirtschaftliche Flächen zu gewinnen.
- Drei Viertel (75%) der äthiopischen Hochländer sind bereits so geschädigt, dass ihre zukünftige Nutzung von der Anwendung entsprechender Erhaltungsmaßnahmen abhängt.

Die Hauptgründe der Zerstörung von Naturressourcen in Äthiopien sind bekannt. Es sind:

- Die Bodenerosion, hervorgerufen durch Entwaldung und Misswirtschaft,
- Überweidung,
- unsichere Besitzverhältnisse und
- fehlendes Umweltbewusstsein.

Die Zerstörung der Naturressourcen läuft auf Effekte hinaus, die einerseits quantifizierbar sind, andererseits aber nicht oder nur sehr schwer. Zu den letzteren sind der Mangel an Oberflächen- und Grundwasser zu rechnen, die Nichtbeschäftigung und Auswanderung, die Flurzersplitterung und große Hof-Feld-Entfernung, die Nahrungsmittelknappheit und Unterernährung und der Mangel an Brennholz und Baustoffen.

Die Folgen werden sichtbar in den Wirtschaftsdaten:

- Mehr als 17% der potentiellen landwirtschaftlichen Produktion gehen durch physikalische und biologische Bodendegradation verloren.
- Die Kosten der Entwaldung werden auf 6–9% des Bruttoinlandsprodukts geschätzt.
- Die jährliche Verringerung des Viehbestandes aufgrund der Landdegradation wird auf 1,1 Mio. tropischer Vieheinheiten (TLU) geschätzt.

Gegen die Zerstörung der Naturressourcen in Äthiopien ist eine große Zahl von Maßnahmen vorgeschlagen worden, darunter Aufforstung und Wiederaufforstung, auf Bodenerhaltung ausgerichtete Fruchtfolgen und Bodenbewirtschaftung, Agroforstwirtschaft, Sicherung der Besitzrechte auf Land und Kontrolle des Bevölkerungswachstums.

Hunger in Äthiopien

Das Auftreten von Hunger ist keineswegs neu in Äthiopien. Die Häufigkeit von Hungerkatastrophen hat im letzten Jahrhundert erheblich zugenommen. Sich daraus ergebenden Appelle an die internationale Gemeinschaft haben dazu geführt, dass man Äthiopien als ein Symbol des Hungers betrachtet. Die junge Generation in Europa (und vielleicht auch in anderen Teilen der Welt) hat das Land in erster Linie durch die wiederholten Hungerkatastrophen kennengelernt hat.

Zahlreiche Faktoren tragen zum Auftreten des Hungers in Äthiopien bei. Die Unstetigkeit des Klimas, in dem die Dürre eine entscheidende Rolle spielt, ist eine davon. Gegenüber den natürlichen werden sozio-ökonomische Faktoren allgemein als bestimmender angesehen. Unter den sozio-ökonomischen Faktoren sind der stetige Rückgang in der Nahrungsmittelproduktion vor dem Hintergrund einer wachsenden Bevölkerungszahl, das traditionelle Wirtschaftssystem, die Verschlechterung der Vorratshaltung in den Haushalten, die Verringerung alternativer Beschäftigungsmöglichkeiten, die Steuern und sonstigen Abgaben, der Markt sowie Krieg und politische Instabilität zu nennen.

Während der letzten Dekaden hat das Land wahrscheinlich mehr gelitten als irgendein anderes Land der Welt. Der Verlust von Menschenleben ist jeweils verbunden mit der Furcht vor dem nächsten Hunger. Armut und lang andauernde wirtschaftliche Probleme sind die übrigen Schrecken, die das Gesicht des Landes prägen.

Unter den Vorschlägen zur Bekämpfung des Hungers in Äthiopien sind vor allem der Schutz des Rechtes auf Nahrung und Vorkehrungen zur Abhilfe gegen Hunger zu nennen, sowie die Steigerung der Nahrungsmittelproduktion durch bessere Agrartechniken. Solche Techniken sind zum Beispiel „flood harvesting“, die Einführung ertragreichen und früh reifenden Saatguts, Anfangsversorgung (Soforthilfe), Ausdehnung der landwirtschaftlichen Fläche und Intensivierung der Bodenbearbeitung und des Pflanzenschutzes.

Geographische Ausbildung und Umweltmanagement

Zwischen der geographischen Ausbildung und dem Studium der Mensch-Umwelt-Beziehungen gibt es eine traditionelle Bindung. Das neuerliche Interesse an Umweltfragen seit den 70er Jahren bietet für die Schulgeographie hervorragende Möglichkeiten, diese Themen in einer systematischeren und zielorientierten Weise zu behandeln. Mehr noch, eine größere Zahl von Geographielehrern ist zu der Ansicht gelangt, dass der Wert der Geographie als Disziplin und als Schulfach gemessen werden sollte an dem, was sie beitragen kann zur Bewusstseinsbildung über die heutigen Umweltprobleme und zu deren Lösung.

Geographie und Biologie gelten weltweit als die Wissenschaften, die am besten zum Verständnis von Umweltproblemen beitragen. Die Einschätzung in den Lehrplänen für deutsche Schulen rechtfertigt diese Behauptung. Umweltthemen sind im Falle Deutschlands systematisch integriert in die gesamte Lehrplanstruktur und werden nicht einzeln behandelt wie es in traditionellen Lehrbüchern sowohl geographischen als anderen üblich ist.

Es gibt in den Lehrplänen für äthiopische Schulen genügend Möglichkeiten Themen zur Nutzung von natürlichen Ressourcen zu behandeln. Die Art und Weise, wie das tatsächlich geschieht ist allerdings weit davon entfernt, akzeptabel zu sein. Die wenigen

Beispiele, in denen Themen der Nutzung und des Managements von Naturressourcen aufgenommen wurden, sind politisch motiviert, die Abbildungen sind überholt und die Konzepte sind nicht integriert und haben nur einen geringen logischen Zusammenhang. Man kann sagen, dass die hervorragende Gelegenheit, Geographie nicht nur problemorientiert, sondern auch als interessantes Fach zu vermitteln, nicht genutzt wurden.

Die Rohstoffgrundlagen Äthopiens und das Problem der Zerstörung der Naturressourcen im Bewusstsein der Schüler und Studenten

Ganz allgemein war das Wissen der Schüler und Studenten (Probanden), die an dieser Studie teilnahmen, zu gering, als dass man es als ausreichend bezeichnen könnte. Nur ein Viertel von ihnen war z. B. in der Lage, die verlangten richtigen Antworten auf die Fragen nach den Ursachen, Folgen und Lösungen von Landdegradation zu geben. Ein weiteres Viertel konnte nicht einmal drei der insgesamt neun Antworten richtig formulieren.

Die Bodenerosion ist von 63% der Schüler und Studenten als einer der drei wichtigsten Gründe der Landdegradation erkannt worden. Die Entwaldung nimmt mit 31% die zweite Stelle der Nennungen ein. Faktoren wie Überbevölkerung und Überweidung, die sehr oft von Fachleuten und Beratern an der ersten Stelle rangieren, scheinen bei den Schülern und Studenten weitgehend unbekannt zu sein. Die Überbevölkerung als Ursache für Landdegradation macht nur 6% der Antworten aus.

Dass Landdegradation zur Verringerung der Produktion führt, wurde von 60% der Probanden unterstrichen. Es ist nicht überraschend, dass 45% der Schüler und Studenten den Hunger als eines der drei Ereignisse ansehen, die der Landdegradation folgen. Andere wichtige Konsequenzen der Landzerstörung, wie die Verdrängung der Bevölkerung, wurden völlig ignoriert. Aufforstung und Wiederaufforstung wurden als die wichtigsten Maßnahmen gegen die Landzerstörung empfohlen. Die anderen Antworten in der Liste der Lösungsvorschläge waren der Bau von Entwässerungsgräben, das Terrassieren der Hänge und der Einsatz von Düngemitteln.

Die Auswertung der Leistung der Schüler und Studenten im „Bewusstseins-Test“ ergab, dass etwas weniger als zwei Drittel der Teilnehmer in der Lage waren, auf die Hälfte der fünfzehn Fragen mit Bezug zum Nutzen und zum richtigen Umgang mit den natürlichen Lebensgrundlagen die richtigen Antworten zu geben. Es muss aber auch erwähnt werden, dass ein Drittel der Teilnehmer nicht in der Lage war, auch nur die Hälfte der Fragen des Tests zu beantworten. Die Leistung wuchs mit der Ausbildung. Mehr als 50% der Schüler des „junior levels“ konnten weniger als die Hälfte der Fragen richtig beantworten. Die Studenten des TTI hingegen beantworten zu 86% mehr als die Hälfte.

Erwähnt wurde schon, dass das Bevölkerungswachstum als wesentlicher Faktor der Landdegradation deutlich unterschätzt wurde; nur 6% der Probanden nahmen es in ihre Liste der Faktoren auf. Ein niedriger Prozentsatz der Schüler und Studenten (33% insgesamt und 23% der Schüler des „junior levels“) wußte nicht, dass die Wachstumsrate der Bevölkerung in den sich entwickelnden Ländern deutlich höher liegt, als in den entwickelten Ländern. Fast die Hälfte der Schüler und Studenten akzeptiert die falsche Feststellung, dass die gegenwärtige Wachstumsrate der äthiopischen Bevölkerung eine der niedrigsten in Afrika ist.

Das Wissen der Schüler und Studenten über die Grundlagen der natürlichen Ressourcen ihres eigenen Landes ist erstaunlich gering; 63% der Studenten stimmten der falschen Aussage zu, dass 96% der Gesamtfläche des Landes landwirtschaftlich nutzbar sei. Drei von vier Schülern und Studenten konnten keine Gebiete lokalisieren, die von dem Problem der Landdegradation betroffen sind. Nur 44 % der Studenten wussten, dass der primäre Sektor (Landwirtschaft) die Grundlage des Lebensunterhalts der großen Mehrheit des Landes ist.

Ansichten der Schüler und Studenten über die Nutzung und das Management natürlicher Ressourcen

Insgesamt konnten ausgewogene Ansichten über den Wert der Naturressourcen festgestellt werden. Dennoch haben sie unterschiedliche Auffassungen im Hinblick auf die Nutzung dieser Ressourcen. Die Ansicht, die der Philosophie der Nachhaltigkeit zugrunde liegt, „dass natürliche Ressourcen begrenzt sind und deshalb erhalten und geschützt werden müssen“, wurde von 41% unterstützt; ein Viertel hat diese Meinung zurückgewiesen. Bedenklicher ist, dass ungefähr 44% der Probanden der Ansicht zustimmen, „in Äthiopien sollte man sich mehr Gedanken über die Befriedigung der Bedürfnisse der gegenwärtigen Generation machen“ und nicht über die Erhaltung der Ressourcen für die zukünftige Generation zu reden. Ähnlich erschreckend ist die Tatsache, dass ein Viertel der Aussage zustimmt: „Man sollte Menschen nicht verurteilen, die Feuerholz verkaufen, das sie in Wäldern der Gemeinde schlagen, weil dies die einzige Möglichkeit ist, um ihr Leben zu erhalten“.

Die Teilnehmer an dieser Studie hatten eine sehr positive Meinung über den Beitrag, den die Gemeinden zum Schutz und zur richtigen Behandlung der natürlichen Ressourcen leisten können. Mehr als vier Fünftel von ihnen sind optimistisch und glauben, dass es möglich ist, die Dörfer durch das Pflanzen von Bäumen grün zu gestalten. Sie sind der Auffassung, dass dies durch die ländlichen Gemeinden nur mit geringer Hilfe von außen geleistet werden kann. Eine ernste und positive Sichtweise zeigen die Probanden im Hinblick auf die Erziehung zum Schutz und zur Pflege der Umwelt. Dass Schüler und Studenten die Verpflichtung haben, ihre Eltern und Nachbarn über die Notwendigkeit des Schutzes und des sorgfältigen Umgangs mit den natürlichen Grundlagen aufzuklären, wird von ihnen einmütig bestätigt. Sie glauben, dass Kenntnisse die in den Schulen Äthiopiens vermittelt werden, hilfreich sind, um die Qualität des Landes zu verbessern und die landwirtschaftliche Produktivität zu erhöhen.

Die Meinung der Schüler und Studenten zum Hunger

Die Unregelmäßigkeiten im Witterungsverlauf, besonders die Dürren, werden in erster Linie für den Hunger verantwortlich gemacht. Das Fehlen moderner Techniken und landwirtschaftlicher Geräte wird als zweiter Grund genannt. Überraschend ist, dass ein Fünftel der Antwortenden Faulheit als Grund für den Hunger nennt – eine Art der Selbstkritik, die keine allgemeine Praxis ist. Wissenschaftler die Untersuchungen über Nahrungsknappheit und Hungersnöte durchführen, sind vielleicht zu schüchtern, das Problem der Arbeitsmoral allgemein und der Faulheit insbesondere anzusprechen. Das Ergebnis dieser Studie ist ein Indikator dafür, dass die Notwendigkeit besteht, diesen Punkt kritischer zu betrachten.

Weiteren kulturellen Faktoren wird in der Literatur wenig Aufmerksamkeit geschenkt. Die Neigung, die landwirtschaftlichen Produkte sorglos und in der Erntezeit verschwenderisch zu verkaufen sowie hohe Ausgaben für Feste, z. B. Hochzeiten, sind nur zwei dieser Faktoren. Sechs Prozent der Probanden haben Verschwendung als einen der drei Hauptgründe für das Auftreten von Hungersnöten in Äthiopien genannt.

Harte Arbeit wird als wichtigste Maßnahme zur Lösung des Hungerproblems betrachtet. Das stimmt mit der Auffassung der Schüler und Studenten überein, die Faulheit als eine der Hauptkräfte hinter dem Hunger nennen. Die Befragten haben erkannt, dass harte Arbeit allein das Auftreten von Hungersnöten in Äthiopien nicht verhindern kann. Der Einsatz von Düngemitteln, ausgewähltem Saatgut und modernen Bewirtschaftungsmethoden wird von mehr als einem Fünftel der Schüler und Studenten vorgeschlagen.

Die bekannte Behauptung, dass Korruption von Mitarbeitern der Regierung zum Auftreten von Hungersnöten führt, fand bei 72% Zustimmung. Drei Viertel der Studenten glaubten auch, dass die Bauern wegen der vom Staat auferlegten Abgaben gezwungen sind, ihre Produkte gleich nach der Ernte zu verkaufen. Dass dies zu einer Nahrungsmittelknappheit im Verlauf des Jahres führen kann, wird von 60% der Befragten behauptet.

Die Ansicht über Getreidehilfen scheint geteilt zu sein. 65% stimmen der Meinung zu, dass es beschämend ist, von anderen Ländern Getreidelieferungen zu fordern. 20% waren dieser Auffassung nicht. Überraschend ist, dass 71 Probanden (6%) solche Forderungen in der Liste der 3 wichtigsten Vorschläge für die Lösung des Hungerproblems in Äthiopien aufnahmen.

Faktoren mit Einfluß auf Bewusstsein und Ansichten

Es wurde ein t-Test durchgeführt, um zwischen den Gruppen der Schüler und Studenten Unterschiede herauszufinden. Ein signifikanter Unterschied ergab sich zwischen den Schülern und Studenten der 3 Jahrgangsstufen (junior, senior und TTI) im Hinblick auf das Umweltbewusstsein. Die älteren Schüler (senior und TTI) haben ein besseres Umweltbewusstsein als die jüngeren Schüler. Mit der Erweiterung der Bildung verbessert sich also auch das Umweltbewusstsein.

Im Hinblick auf den Hunger konnte zwischen den Schülern der „senior schools“ und den Studenten des TTI kein Unterschied der Ansichten festgestellt werden. Der Unterschied zwischen den Schülern der „junior schools“ und denen der „senior schools“ war signifikant. Die älteren Schüler haben eine bessere Einsicht in die Gründe und die Lösungsansätze für das Problem Hunger in Äthiopien.

Männliche Probanden schnitten in dem „Bewusstseinstest“ besser ab als weibliche. Sie hatten auch klarere Vorstellungen vom Hunger in Äthiopien. Im Hinblick auf die Nutzung und die Bewirtschaftung der Naturressourcen wurde zwischen den Geschlechtern kein signifikanter Unterschied festgestellt.

Zwischen den Schülern mit den Schwerpunkten „Arts“ (sozialwissenschaftliche Ausrichtung) und „Science“ (naturwissenschaftliche Ausrichtung) wurde kein signifikanter Unterschied festgestellt. Schüler der sozialwissenschaftlichen Ausrichtung hatten mehr Gelegenheit, die Situation der natürlichen Ressourcen in ganz Afrika kennenzulernen. Trotzdem leisteten sie insgesamt weniger im Vergleich zu ihren Mitschülern aus dem naturwissenschaftlichen Zweig. Das könnte dadurch erklärt werden, dass allgemein das Wissen der naturwissenschaftlich ausgerichteten Schüler besser ist.

9.4.2 Folgerungen

Untersuchungen zum Zustand der Umwelt in Äthiopien ergeben, dass das Land während des letzten Jahrhunderts unter dem großen Verlust natürlicher Ressourcen gelitten hat. Dieser Prozess der Degradation hält unvermindert an. Regierungsstellen und anderen Organisationen ist diese Tatsache sehr wohl bekannt. Maßnahmen wurden getroffen, um den Umfang der Erschöpfung und Zerstörung natürlicher Ressourcen zu verringern.

Eine gute Ausbildung gehört zu den entscheidenden Maßnahmen, die Umwelt zu schützen und die natürlichen Ressourcen zu schonen. Trotzdem sind Anwendung und Ergebnisse bisher nicht untersucht worden. In den Lehrplänen der Geographie gab es Gelegenheiten, Umweltthemen im allgemeinen und die Landzerstörung im besonderen in das Curriculum aufzunehmen.

Diese Gelegenheiten wurden jedoch nicht richtig oder gar nicht genutzt. Aufgrund der Ergebnisse dieser Studie kann man sagen, dass es ein bemerkenswertes Defizit in der Umwelterziehung gibt. Nur ein Viertel der Teilnehmer an der Untersuchung war in der Lage, drei richtige Antworten auf die Fragen nach den Gründen, den Konsequenzen und möglichen Lösungen für die Millionen Menschenleben vernichtende Landdegradation zu geben. Das Wissen um Schlüsselprobleme, wie die Wirkung des Bevölkerungswachstums auf Nutzung und Bewirtschaftung der Landesressourcen, muss als zu niedrig angesehen werden, als dass es noch toleriert werden kann.

Die Teilnehmer an dieser Studie haben ein lediglich begrenztes Wissen über die natürlichen Lebensgrundlagen des Landes. Ihre Kenntnisse über die Flächengröße des kultivierbaren Landes und die Verbreitung der natürlichen Vegetation ist überraschend niedrig. Das bedeutet, dass den Schülern und Studenten grundlegende Informationen fehlen, die für das Verständnis der notwendigen Erhaltungsmaßnahmen der Ressourcen erforderlich sind. Viele der Themen, die in dieser Studie angesprochen worden sind, sind in Lehrbüchern der Geographie behandelt. Die allgemein niedrige Leistung der Schüler und Studenten muss als Hinweis eines unzulänglichen oder fehlerhaften Geographieunterrichts gedeutet werden. Schließlich soll dieser die Schüler mit den notwendigen Informationen über die natürlichen Grundlagen des Landes sowie über ihre Nutzung und ihren Schutz versehen. Die Art und Weise, wie die Lehrbücher gestaltet sind, scheint den größten Anteil an diesem Mangel zu haben. Die Lehrbücher scheinen in Bezug auf die Naturressourcen eher ein politisches Pamphlet zu sein als ein akademisches Instrument.

Studenten gaben eine vernünftige Einschätzung sowohl von der Bedeutung der Naturressourcen als auch von dem potentiellen Beitrag der Gemeinschaft im Umgang mit diesen. Im Hinblick auf die Erhaltung der Ressourcen für künftige Generationen ist ihre Sichtweise zwiespältig. Sie scheinen zu glauben, dass es bedeutungslos ist, an künftige Generationen zu denken, während die heutige Generation um das Existenzminimum kämpft. Deshalb ist dieses Thema eine große Herausforderung im Hinblick auf Umweltpolitik und Umwelterziehung. Jede Politik zum Schutz der Umwelt kann erfolgreich sein, in dem Maße, in dem sie die tatsächliche Situation und die Bedürfnisse der jetzigen Generation anspricht. Die Tendenz, die „Philosophie der Nachhaltigkeit“ ohne genauere Vorstellungen auf Länder der Dritten Welt zu übertragen, ist deshalb zum Scheitern verurteilt. Schließlich ist die Idee der Nachhaltigkeit, wie sie zur Zeit aufgefasst wird, auf der Grundlage von Beobachtungen in der westlichen Welt entstanden, in der

übersteigertes Konsumenten denken die Ursache fast aller Umweltprobleme ist. Hingegen ist Unterernährung in der Dritten Welt die Regel. Es ist deshalb äußerst schwierig, solchen Ländern die Botschaft der Nachhaltigkeit zu vermitteln.

Vor allem natürliche Faktoren werden für den Hunger verantwortlich gemacht. Jeder fünfte Student bzw. Schüler hält Faulheit für einen der drei Hauptgründe des Auftretens von Hunger in Äthiopien. Diese Auffassung ist etwas seltsam. In der Literatur findet man über diesen besonderen Grund für das Auftreten von Hunger nur wenig. Im Einklang mit ihrer Auffassung über die Rolle der Faulheit, schlagen die Schüler und Studenten harte Arbeit als Lösung zur Beseitigung des Hungers im Land vor. Die Forderung der Schüler und Studenten, „um Getreidelieferungen von anderen Ländern zu bitten“, erscheint nicht besonders fortschrittlich. Ein Fünftel von ihnen betrachtet die Bitte um Hilfe von anderen Ländern nicht als beschämend. Es gibt in Äthiopien eine breite Diskussion über die negative Wirkung solcher Getreidehilfen. In der Annahme, dass Getreide sowieso aus Kanada kommt, sollen einige Bauern selbst bei guten Witterungsbedingungen die Feldarbeit vernachlässigt haben, so wird behauptet. Mehr als 6% der Probanden haben Getreidehilfslieferungen als eine der drei wichtigsten Maßnahmen zur Bekämpfung des Hungers in Äthiopien bezeichnet. Dieses Problem muss eines der Themen sein, die in Schulen behandelt und kritisch diskutiert werden.

Zwischen den Schülern und Studenten unterschiedlicher Altersstufen wurde ein signifikanter Unterschied beim Umweltbewusstsein, beim Verständnis für den Umgang mit den Naturressourcen und bei der Einschätzung des Hungerproblems festgestellt. Dies ist in Übereinstimmung mit Ergebnissen anderer Studien, in denen Ausbildung und Erziehung als wichtigste Faktoren angesehen werden, um das Bewusstsein und das Verhalten bei Umweltthemen zu beeinflussen.

Zwischen den Schülern und Studenten mit bzw. ohne geographischen Hintergrund wurde ein signifikanter Unterschied vermutet. Der t-Test offenbarte etwas anderes. Das allgemein niedrige Umweltbewusstsein der Studenten insgesamt und die geringen Leistungen derjenigen, die Geographieunterricht hatten, belegen das Versagen des Geographieunterrichts diese Themen zu vermitteln. Die meisten dieser Themen werden in Schulbüchern behandelt. Früher wurden die schlechten Inhalte der Schulbücher für das Versagen verantwortlich gemacht. Es könnte aber auch die Unfähigkeit der Lehrer, den Gegenstand ausreichend und sorgfältig zu behandeln, ursächlich sein.

Männliche Schüler und Studenten leisten signifikant mehr als weibliche. Das stimmt allgemein mit Ergebnissen überein, die durch Untersuchungen in anderen Teilen der Welt gewonnen worden sind. Jungen neigen dazu, mehr über Umweltthemen zu wissen als Mädchen. Auf der anderen Seite sind Mädchen aufgeschlossener.

9.4.3 Empfehlungen

Der Umgang mit den Naturressourcen: Zu bedeutend, um ihn den „extension workers“ zu überlassen.

Themen, die sich der Nutzung der Naturressourcen, dem Umgang mit ihnen sowie dem Problem ihrer Degradation widmen, genießen weltweit Aufmerksamkeit. Das gilt auch für Äthiopien. Um den Zustand der Naturressourcen, die Ausdehnung ihrer Degradation und mögliche Maßnahmen zur Korrektur begangener Fehler zu erkennen, sind umfangreiche Forschungen in Gang gesetzt worden. Gesetzliche Bestimmungen zum Schutz natürlicher

Ressourcen sind formuliert und erlassen worden. Es gibt jedoch zunehmend die Meinung, dass gesetzliche und wirtschaftliche Maßnahmen den Schutz und die Erhaltung der Ressourcen auf Dauer nicht garantieren können. Diese erfordern nämlich einen grundlegenden Wandel in Einstellung und Verhalten der Menschen. Hier liegt eine große Aufgabe für die Erziehung, wie auch immer sie vorgenommen wird.

Der Unterricht über die Naturressourcen und den Umgang mit ihnen sollte so umfassend sein, dass er Themen behandelt, die von den wichtigsten Wechselbeziehungen zwischen den Kompartimenten des Ökosystems bis zu den Techniken ihres Schutzes und ihrer Erhaltung reicht. Die augenblickliche Neigung, Umwelterziehung als ein Instrument zu nutzen, mit dem man seine Zuhörer erschreckt, indem man vor allem die Konsequenzen der Umweltbelastung betont, sollte einer grundlegenden Unterrichtung über die Werte der Ressourcen weichen.

Zum Schutz und zur Erhaltung unserer Umwelt können viele Schulfächer einen Beitrag leisten. Als erstes sollten Informationen über den Wert, die Verfügbarkeit und die geographische Verbreitung natürlicher Ressourcen (auf der Erde und im eigenen Land) vermittelt werden. Grundsätze der Nutzung und des richtigen Umgangs mit Ressourcen sollten dann hervorgehoben und an speziellen Beispielen vertieft werden. Es gibt bereits Schulfächer, die solche Themen bis zu einem gewissen Grad anbieten. Gefordert werden muss in diesen Fällen, dass die Behandlung der Themen in einer systematischeren Weise vorgenommen wird, um die Schüler auf das geforderte Niveau des Umweltbewusstseins zu bringen. Auf die Gefahr der Redundanz, die das geltende Curriculum für Äthiopien kennzeichnet, muss geachtet werden. Eine sorgfältige Überprüfung der vertikalen und horizontalen Gliederung der Inhalte ist notwendig.

Die letzte Forderung an die Umwelterziehung ist die Behandlung des Problems, das aus der Einstellung der Menschen zu den Naturressourcen hervorgeht. Mit Nachdruck sollte die Notwendigkeit der Beschränkung solcher Handlungen verfolgt werden, die das Gleichgewicht in Ökosystemen zerstören und nicht zu heilende Narben im System hinterlassen. Als zukünftige Entscheidungsträger haben Schüler und Studenten den Anspruch, Informationen über das Fehlverhalten von Menschen zu erhalten.

Es ist festzustellen, dass das Thema Nutzung und Schutz der Naturressourcen nicht allein den Gesetzgebern und der Wirtschaft überlassen werden kann. Auch den „extension workers“ sollte es nicht überlassen bleiben, ganz gleich, wie nah sie der Landbevölkerung stehen. Auch Lehrer spielen eine wichtige Rolle in diesem Spiel. Kein Schulfach allein kann das Thema in sinnvoller und zusammenfassender Weise behandeln. Dennoch sind einige Schulfächer, zu nennen sind in erster Linie Biologie und Geographie, besser geeignet für diese Aufgabe als andere.

Die Notwendigkeit für eine Veränderung und/oder einen Wechsel von Inhalt und Struktur der äthiopischen Schulgeographie

Die Geographie leidet nicht nur als wissenschaftliche Disziplin sondern auch als Schulfach unter einer Identitätskrise. Es gibt Bestrebungen, den Namen „Geographie“ sowohl in der Schule als auch in Institutionen höherer Bildung zu ändern. In Äthiopien hat man den Namen bis jetzt beibehalten. Was genau den Namen ausmacht, ist nicht recht deutlich. Ob er geändert wird oder nicht, mag später diskutiert werden. Die Notwendigkeit, die Inhalte der Geographie in äthiopischen Schulen zu überdenken, scheint sehr dringend.

Wie immer der Name sein wird, ein systematisches und zielorientiertes Studium der Naturressourcen sollte der Kern der Geographie in Schulen sein, wenn das Fach zum Verständnis der Probleme, die das Land betreffen, beitragen soll. Themen, die die Nutzung und den Umgang mit den Naturressourcen betreffen, müssen im Zentrum der Lehrpläne aller Klassen stehen. Die folgende Übersicht enthält Konzepte, die für alle Klassenstufen differenziert weiter zu entwickeln sind.

Tabelle 9.1a Konzepte zu Nutzung und Management natürlicher Ressourcen als Empfehlung für die Geographielehrpläne an äthiopischen Schulen

Allgemein (Global)	Äthiopien
<p>Naturressourcen</p> <ul style="list-style-type: none"> • Luft • Wasser • Land <p>Formen der Naturressourcen</p> <ul style="list-style-type: none"> • erneuerbar • nicht erneuerbar <p>Reserven und Ressourcen</p> <p>Die Nutzung von Naturressourcen</p> <ul style="list-style-type: none"> • Zeitmodelle der Nutzung • Raummodelle der Nutzung <p>Die Zukunft der Naturressourcen</p> <ul style="list-style-type: none"> • Das Konzept der Nachhaltigkeit <p>Energie als besondere Ressource</p> <ul style="list-style-type: none"> • Energie und Entwicklung • Herkömmliche Energiequellen • Alternative Energien <ul style="list-style-type: none"> - Wasserkraft - Windenergie - Biomasse / Biogas - Sonnenenergie 	<p>Die natürliche Ressourcengrundlage</p> <ul style="list-style-type: none"> • Ackerland • Weideland • Wasservorräte • Biodiversität • Mineralien <p>Das Problem der Degradation der Naturressourcen</p> <ul style="list-style-type: none"> • Ausmaß • Gründe • Folgen <p>Maßnahmen gegen die Degradation</p> <p>Energie und Entwicklung: Ausblick und Probleme</p> <ul style="list-style-type: none"> • HEP – Motor für die zukünftige Entwicklung? • Schonung der Wälder durch die Nutzung alternativer Energiequellen <ul style="list-style-type: none"> - Biogas - Sonnenenergie - Verbesserte Kochherde: Vernünftige Nutzung von Brennmaterial <p>Degradation der Naturressourcen und Hungersnot</p>

Von der Umweltschutzbehörde wurde ein unschätzbare Dokument über die grundlegenden Naturressourcen erstellt. In dieser Zusammenstellung werden zehn der Ressourcen genannt und diskutiert: Klima, Land, Wald, mineralische Bodenschätze, Wasservorräte, Viehbestand, Fischreichtum, Bienenzucht, Pflanzen- und Tierwelt und Energievorkommen.

In ähnlicher Weise wurde die Degradation natürlicher Ressourcen, in einer Serie von Artikeln dokumentiert, der berühmten „Äthiopischen Hochland-Erschließungs-Studie“. Zukünftigen Curricula sowohl für Schulen als auch für Lehrerbildungsinstitutionen wird deshalb dringend empfohlen, aus diesen und anderen Untersuchungen über den Stand der Probleme bei der Bewirtschaftung der Naturressourcen den entsprechenden Nutzen zu ziehen.

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B. APPENDIX I

INSTITUTE OF GEOGRAPHY, GEOGRAPHIC EDUCATION AND REGIONAL SCIENCE
UNIVERSITY OF FLENSBURG, FEDERAL REPUBLIC OF GERMANY

**A Questionnaire to be Completed by Students of Grades Eight and Eleven, and
Trainees of Awassa Teacher Training Institute (Awareness Test: Final Version)**

Dear Student,

This questionnaire is meant to gather information for a study on an aspect of environmental education. We hope that the research outcomes contribute to the betterment of Education in Ethiopian schools and teacher training institutes.

Please note that the response you give will not have any negative impact on you as a student or your school or teachers. Furthermore, you do not need to write your name on the questionnaire. What is needed is the response you give to the issues raised. Just feel free and write only what you think is correct!!

Yours Faithfully,

Aklilu Dalelo

PART ONE: Please give the required information either in writing or by putting an (X) mark on the appropriate space.

Note:

1. All issues in this questionnaire (including those addressed in masculine terms) apply equally to male and female students.
2. You may raise your hands up and ask for clarification.
3. There is no time limit.

1) Name of the school _____

2) Your age _____

3) Your sex: Male _____ Female _____

4) Your grade Level _____

5) Stream (for students of grade 11): Art _____ Science _____

Vocational _____

PART TWO: Please give your response to the following inquiries as completely as you can.

1) What do you think are the main causes of land degradation (decrease in the quality of the land)? Please write only THREE of such causes which, you think, are the most serious ones.

1.1.

1.2.

1.3.

2) Would you please mention some of the consequences of land degradation. Write only THREE of the consequences that you think are the most important.

2.1.

2.2.

2.3.

3) Please mention only THREE of the possible strategies to minimise or control the problem of land degradation.

3.1.

3.2.

3.3.

4) What are the causes of the recurrent famine in Ethiopia? Please write only THREE of the causes which, you think, are the major ones.

4.1.

4.2.

4.3.

5) What should be done to minimise or control the occurrence of famine in Ethiopia? Please write only THREE of the ways you think are most appropriate.

5.1.

5.2.

5.3.

PART THREE:

A. Read the following statements and choose one of the three alternatives given in the boxes at the right hand side of the statements. If you think that the statement is true, circle (T), if it is not true, circle (NT), and if you are not sure circle (NS).

STATEMENTS	True (T)	Not sure (NS)	Not true (NT)
1. The land in the southern half of Ethiopia is more degraded than that in the northern half.	T	NS	NT
2. The present rate of growth of Ethiopian population is one of the lowest in Africa.	T	NS	NT
3. The high livestock population in Ethiopia is creating pressure on the existing grazing land.	T	NS	NT
4. Kembata, Sidama and Wolaita are known in Ethiopia for their high density of population.	T	NS	NT
5. More than two-third of the foreign currency of Ethiopia is derived directly from agricultural products.	T	NS	NT
6. Overgrazing can change a fertile land to a useless desert.	T	NS	NT
7. Nearly 40 per cent of Ethiopian population depend directly on farming for their livelihood.	T	NS	NT
8. Plant litter not only adds humus to the soil but also increases the amount of rain water that goes down into the soil.	T	NS	NT
9. The rate of population growth in developed countries like Germany is faster compared to that in less developed countries like Kenya.	T	NS	NT
10. The remaining forestlands of Ethiopia are concentrated in the central highlands of Gondar, Wollo and Tigray.	T	NS	NT
11. More than 96 per cent of the total area of Ethiopia can be cultivated.	T	NS	NT
12. More than half of the population in Ethiopia uses electric power for cooking.	T	NS	NT
13. Use of animal dung and crop residue as fuel adversely affects the productivity of land.	T	NS	NT
14. Cutting and carrying grass elsewhere is more important than letting animals graze on field itself.	T	NS	NT
15. Erosion by wind is bringing more damage in Ethiopia than erosion by running water.	T	NS	NT

C. APPENDIX II

INSTITUTE OF GEOGRAPHY, GEOGRAPHIC EDUCATION AND REGIONAL SCIENCE
UNIVERSITY OF FLENSBURG, FEDERAL REPUBLIC OF GERMANY

A Questionnaire to be Completed by Students of Grades Eight and Eleven, and Trainees of Awassa Teacher Training Institute (Awareness Test: Final Version)

Dear Student,

This questionnaire is meant to gather information for a study on an aspect of environmental education. We hope that the research outcomes contribute to the betterment of Education in Ethiopian schools and teacher training institutes.

Please note that the response you give will not have any negative impact on you as a student or your school or teachers. Furthermore, you do not need to write your name on the questionnaire. What is needed is the response you give to the issues raised. Just feel free and write only what you think is correct!!

Yours Faithfully,

Aklilu Dalelo

PART ONE: Please give the required information either in writing or by putting an (X) mark on the appropriate space.

Note:

1. All issues in this questionnaire (including those addressed in masculine terms) apply equally to male and female students.
2. You may raise your hands up and ask for clarification.
3. There is no time limit.

1) Name of the school _____

2) Your age _____

3) Your sex: Male _____ Female _____

4) Your grade Level _____

5) Stream (for students of grade 11): Art _____ Science _____

Vocational _____

PART TWO:

A) Please rate the following environmental problems on the basis of their seriousness. First decide whether they are 'very serious' or 'serious but not very much' or 'not serious'; and then indicate your opinion by putting an (X) mark on the appropriate box in the table.

Note: (X) mark can be put only once for each of the problems listed.

Environmental Problems	Very serious	Serious but not very much	Not serious
1. Soil erosion			
2. Deforestation			
3. Famine			
4. Desertification			
5. Overpopulation			
6. Drought			
7. Shortage of grazing land			
8. Shortage of farm land			
9. Low productivity of farm land			
10. Variability of rains			

B) Please write the three most serious problems from the ten listed above in order of their seriousness. It means that the most serious will be written as 1st, the second most serious as 2nd and so on.

1st. _____

2nd. _____

3rd. _____

PART THREE:

Please read each of the following statements very carefully and decide whether you 'strongly agree', 'agree but not very much', 'disagree but not very much', or 'strongly disagree'. If you can not agree or disagree, mark 'Undecided'. Put an (X) mark inside the appropriate box to indicate your opinion.

Note:

* One statement can have an (X) mark only once.

* Natural resources in this questionnaire refer to soil, water and natural vegetation.

Ser. No.	Statements	Strongly Agree	Agree but not very much	Undecided	Disagree but not very much	Strongly disagree
1	The quality of life in Ethiopia is dependent on the quality of vegetation and soil.					
2	It is not fair to make government officials accountable to the occurrence of famine in Ethiopia.					
3	Anybody using the natural resources today should consider the right of the next generation to use the same and must conserve while using.					
4	Education of the community can not bring much improvement with regard to the protection of natural resource.					
5	In Ethiopia, one should be worried about satisfying the needs of the present generation rather than talking about preservation of resources for the future generation.					
6	The earth has a limited resource base and hence can support only a limited number of population.					
7	Misusing or overusing the land means damaging the very basis of human life.					
8	Students have responsibility to inform their parents and neighbours about the need for protection and careful use of natural resources.					
9	The local communities have to take the initiative themselves to protect natural resources rather than waiting for governmental directives and instructions.					
10	Corruption of government officials is one of the principal causes of famine in Ethiopia.					
11	The local communities can work out and implement mechanisms to stop the misuse and overuse of natural resources.					
12	One should not blame people who sell fuel wood by cutting forests from community land because that is the only choice they have to sustain life.					
13	The government has been contributing to famine in Ethiopia by imposing different forms of taxes and fees on farmers.					
14	It is possible to turn a rural village green by planting trees on private and public land.					
15	Drought alone may not lead to the outbreak of famines.					
16	Education being offered in Ethiopian schools does not help to improve the quality of land and thereby increase agricultural production.					
17	Selling grain for cheap price during the harvest time can lead to a shortage of food in the latter part of the year.					
18	It is shameful to appeal repeatedly for a grain aid from other countries.					
19	It is preferable to secure an additional piece of farmland than keeping the land under forest cover.					
20	Both the degree and frequency of occurrence of famine in Ethiopia may decrease if people work a bit harder.					
21	Farmers sell their grain during harvest for cheap price because they are often forced to pay taxes and other contributions during this particular time.					

D. APPENDIX III

Photo 1 A rural house involving use of a large amount of biomass (Butajira, Southern Ethiopia)



Photo 2 Use of biomass for fencing (Rift Valley region)



Photo 3 Supply of firewood for Addis Ababa from Entoto mountain



Photo 4 Dung cakes prepared for use as fuel (Addis Ababa)



Photo 5 One of the most densely settled areas (Kedida Gamella District, Southern Ethiopia)



Photo 6 Road side erosion (Near Adilo town, Southern Ethiopia)



Photo 7 Free grazing (near Lake Ashenge, Northern Ethiopia)

