


THE STATUS OF ENVIRONMENTAL EDUCATION IN ERITREAN JUNIOR SECONDARY SCHOOLS

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**A minithesis submitted in fulfilment of the requirement for the degree of M.Phil in
the Faculty of Education, University of Western Cape**

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ABSTRACT

Key words:

Environmental Education, Eritrean Junior secondary schools, education policy, integrated Environmental Education, curriculum, textbooks, methodologies, assessment, teacher training, instructional materials.

Environmental Education (EE) can be very broadly interpreted to mean all education or narrowly to refer to Nature studies. For the purpose of my minithesis, I used the interpretation of Fien, i.e., Environmental Education as education *about, through* and *for* the environment. The central question my minithesis tries to answer is “ what is the present status of EE in Eritrean junior secondary schools?” I look at the extent to which EE is included in the education policy of Eritrea, at how EE is included in the curriculum, how it is taught and assessed, the kind of training available for teachers and the availability of instructional materials for the teaching of EE in Eritrean junior secondary schools. The purpose of this minithesis is to give a broad overview of the present situation with regards to teaching EE. In doing so, I discuss some of the factors that are considered to have a significant influence on the status of EE in Eritrean junior secondary schools.

The government of Eritrea for the people of Eritrea has formulated a National Environmental Management Plan (NEMP-E) in 1995. The responsibility for formal EE is in the ambit of the Ministry of Education, which is essentially the policy maker for the formal education sector. However, there seems to be a lack of a comprehensive plan or clear guidelines at a national level for the implementation and support of EE at school level.

In Eritrean junior secondary schools, EE has been included in the Geography, Science and English curricula. The textbooks aim to educate students in knowledge *about*, *through* and *for* the environment. Despite the positive attitudes teachers had to all three forms of EE, the results revealed that in the classroom teaching, and assessment more emphasis was given to education *about* the environment, i.e., the emphasis is on information transfer and recall.

It appears that some of the reasons why teachers do not fully infuse EE in their classroom might be due to large class size, overcrowded curriculum, short periods, lack of awareness of EE, lack of instructional materials and lack of institutional and administrative support.

Environmental Education was implemented as a subject at the TTI (Teacher Training Institute) in 1995. This implies that teachers before 1995 had no formal exposure to EE. The aim of the EE course is for trainees to acquire knowledge and understanding *about* the environment, develop skills *through* the environment and attitudes and interest *for* the environment. The EE lecturer at the TTI had a positive attitude to all aspects of EE. What strikes me though is that despite the many and exciting learning activities that trainees experience in their TTI course (mainly skill development and consciousness raising), very few questions in the exam tested this learning.

Although the minithesis shows that there is a certain amount of EE policy, teaching and training in place, there is still much development work that needs to be done. The study concludes that to improve the status of EE in Eritrean junior secondary schools, more research is needed on effective integration of EE into the curriculum; on a systematic rigorous assessment of the prescribed textbooks which include EE themes and are used by teachers of EE; on ways EE can be enhanced and supported; on how teachers can be supported; and on how EE training can draw on non-government organizations involved in EE.



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DECLARATION

I declare that The status of Environmental Education in Eritrean junior secondary schools, is my own work, that it has not been submitted before for any degree or examination in any other university, and that all the sources I have used or quoted have been indicated and acknowledged by complete references.

FREWEINI GEBREAB

JUNE 2000

SIGNED:-----



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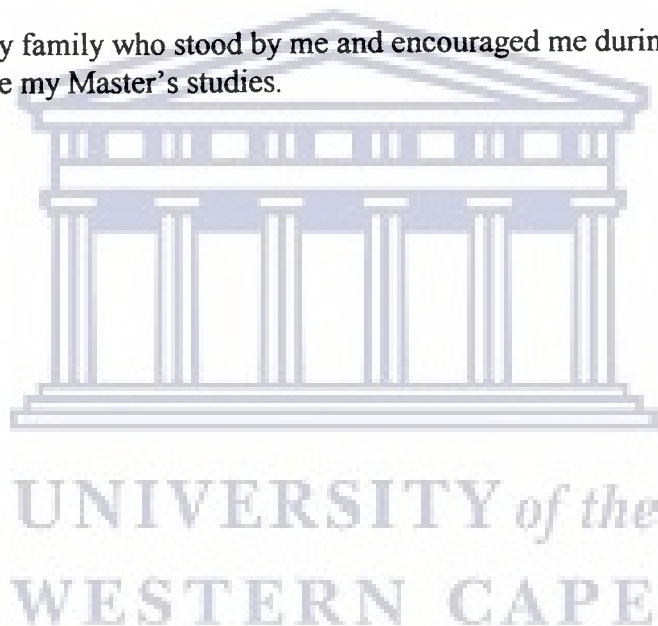
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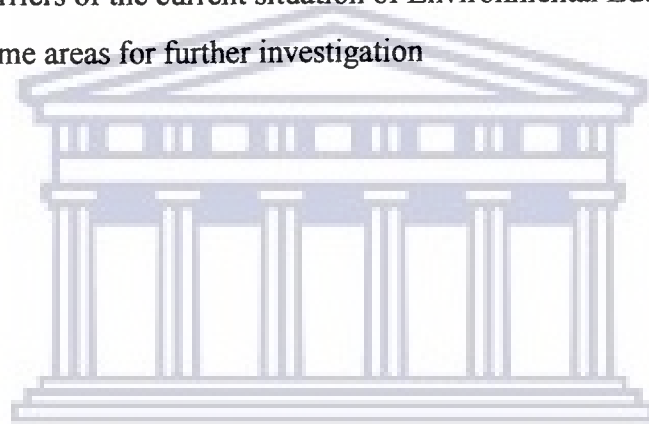
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SECTION A

ENVIRONMENTAL EDUCATION

INTRODUCTION

A movement is growing as people perceive what they think is a declining quality of life due to the threats imposed by the degradation of their common human life support system, caused by irresponsible exploitation of biophysical and human resources, irresponsible attitudes to overpopulation and irresponsible attitudes to gross inequalities. The emerging realization that we share a common finite global biophysical environment is uniting many people in the west and east and in the first and third world nations as they work together to address the many interrelated problems that exist.

A growing concern for the environment has emerged during the last three decades of the twentieth century. The conservation of nature, a concern for the ecology, an environmental consciousness and an endeavour to ensure sustainable living on our planet earth stimulated many individuals and organizations to take an interest in the environment.

The task of developing international strategies and many declarations began from the late 1960s to prevent further damage to the environment. Among the most important were Recommendation 96 of the 1972 Stockholm Conference (Bak 1997a:66), the Belgrade Charter (UNESCO-UNEP 1975), the Tbilisi Declaration (UNESCO 1977), the World Conservation Strategy (IUCN 1980), the Brundtland Report (WCED 1987) and the Earth Summit (Agenda 21) (UNCED1992). Environmental organizations like the United Nations Educational Scientific and Cultural Organization (UNESCO) in 1945, the International Union for the Conservation of Nature and Natural Resources (IUCN) in 1948, the Organization for Economic Cooperation and Development (OECD) in Europe, the World Wild life Fund for Nature (WWF) in 1961, the North American Environmental Education Association (NAEEA) in Europe in 1992, and the National Institute for

Environment (NIE) in the USA in 1993 took an interest in the environment and aimed at achieving sustainable life on Earth.

Environmental theorists too became numerous. They argued that people should be made aware of the environment, of the urgent need for conservation and of the fact that the harmonious ecological interrelatedness could be disturbed by the behaviour of the individual (White in Clarke 1975:99-106; Goudie 1990:3; and Blignaut 1993:1). It became clear that educating people and raising their awareness about the environment was considered as one way of tackling environmental problems. It was argued that personal life styles and behaviour, which are in harmony with the environment, could be developing through education and teaching (UNESCO 1977:12; Robottom in Bowen 1994:133; Ballantyne and Packer 1996:25-32). As a result of many representatives over the last three decades, both developed and developing countries have started implementing environmental principles and guidelines in nature conservation and in education.

The 1975 Belgrade Charter acted as an influential policy statement, which advocated the implementation of EE as a subject in schools. The Tbilisi Declaration (UNESCO-UNEP, 1978) provided set of guidelines for an EE approach in the formal, non-formal and informal education sectors. The declaration's stated goals were that people should acquire knowledge, values, attitudes and practical skills, which would help them to solve environmental problems. It was advocated that this could be done through holistic education in and of the 'total environment'.

Originally, EE topics were included in natural sciences only. Since then, however, the question of whether people who were experts or specialists in the natural sciences only, could handle environmental problems, has caused increasing concern (Williams 1985, Robottom 1987, Hart in Engleson and Disinger 1993, Tilbury 1994). However, the first International Conference on EE in formal education which was held in Tbilisi, emphasized the role of education in solving environmental problems, and stressed that EE should be integrated into various aspects and wide-ranging subjects of formal education at all levels.

Many departments of education and teacher education institutions worldwide responded to the call for the inclusion of EE as an area of learning in the curriculum. Educationists and environmentalists drew heavily on the principles and characteristics of EE provided by declarations and conferences such as the Belgrade Charter (1967) and the Tbilisi Conference (1977).

According to Kidanemariam (1997:1), in Eritrea for about one hundred years before independence, successive colonial rulers misused and abused the environment for their own interests. The continuous political and armed struggle hampered the wise utilization and conservation of natural resources. This resulted in serious environmental degradation. According to Kiros (1995:30) and Kidanemariam (1997:1), the main areas of environmental degradation in Eritrea are forest degradation, soil degradation, wildlife degradation, degradation of marine resources, degradation of water resources and industrial pollution. In the present Eritrean situation this can be classified into three interrelated fundamental problems of concern. These are environmental security, food security and health security (Tesfamichael 1995:4). Environmental security, food security and health security in Eritrea, according to Tesfamichael (1995:6), could only be successful in Eritrea:

- ▶ if citizens develop the necessary awareness, knowledge and understanding of the environment;
- ▶ if they have positive and balanced attitudes towards it; and
- ▶ if they have skills, which enable citizens to participate in determining the quality of the environment.

What this points to, is the importance of education in addressing Eritrea's environmental concerns. This minithesis will focus specifically on the contribution the junior secondary curriculum hopes to make in promoting environmental awareness, knowledge, attitudes and skills.

In Eritrea as in many developing counties, a large part of the health problems seems to originate from malnutrition and the urgent solution to many of these problems would require the solution to the basic needs of food and safe drinking water.

Presently, the greatest challenge to Eritrea is to reverse the damage and to manage the environment sustainably. This minithesis accepts the assumption that it is through education that the foundation for this must be started, to enable students to achieve sustainable development in the future. Environmental Education is recognized as being of great importance to Eritrea's development. In order to manage the environment sustainably, this minithesis shall pursue the claim that Eritrea's students must be encouraged to study, respect and actively care for their environment.

According to Mucunguzi (1995:239), the junior secondary school level is a crucial learning time for two reasons. The first is that it provides the possibility that all students attend all lessons or subjects before they specialise in selected fields. Secondly, this is the period most suitable for consolidating already acquired skills and for further acquisition of skills for a sustainable utilization of resources.

According to Tesfamichael (1995:5), the aims of EE in Eritrea are to:

- ▶ develop the necessary understanding and knowledge of the environment as a whole and the important concepts associated with it.
- ▶ develop the important skills necessary for identifying and analysing the important environmental issues and problems existing in Eritrea and be able to address important alternative solutions that correspond to the realities existing in the nation.
- ▶ develop positive attitudes, values and sense of judgements towards the preservation and management of the environment in Eritrea and express concern, responsibility and devotion towards the environment.
- ▶ raise the participation of the people in preserving and managing the environment.

Based on the above aims of EE, it could be said that the outcome of EE in Eritrea could be closely associated with both national and international values of education. I shall return to these aims in more detail in chapters four, five and six, when I shall investigate how these have shaped some of the EE lessons I observed, how these aims are understood by some of the teachers and the lecturer whom I interviewed and how these aims are reflected in the curriculum and prescribed textbooks

I have had access to.

Although no EE was incorporated as a special subject in the national curriculum of Eritrea, education has always been associated with the environment. In post-independent Eritrea efforts have been outlined for the integration of environmental studies in a more systematic way, but more comprehensive research is required to accomplish this. The plans have not yet been finalized due to lack of human resources, material and financial shortages. However, efforts are still going on to integrate EE in the curriculum and many activities, which could lead to positive action on the environment, have been conducted. For example, the plans by the General Department of Education to introduce environmental clubs, the pilot project school afforestation programme and the workshop conducted with all Science and Geography teachers to discuss major concerns of the environment and practical ways of implementing EE were positive steps towards this aim. The most important one is the discussion document written by Tesfamicael (1995) which is titled 'Integration of EE in the National Education System of Eritrea'.

Although education on its own will of course not solve all environmental problems, this minithesis does start from the assumption that education can make a significant contribution to addressing Eritrea's environmental challenges. The focus of this minithesis will fall on the junior secondary phase by looking at the current situation of EE in this school phase. But before I investigate this, I want to present the position on which I will base my analysis.

CHAPTER ONE

WHAT IS ENVIRONMENTAL EDUCATION?

Environmental education is a complex concept open to various interpretations. This approach to education has largely been a response to the ever deepening environmental crises. The environmental crises have manifested themselves globally as evidenced by large-scale biophysical destruction, global warming, ozone depletion etc. These environmental issues have complex interacting social, economic and political dimensions.

Perhaps the most comprehensive definition of EE is that contained in the draft of the United States Environmental Education Act (USEEA):

Environmental Education is an integrated process which deals with man's interrelationship with his natural and man-made surrounding, including the relationship of population growth, pollution, resource allocation and depletion, conservation, technology, and urban and rural planning to the total human environment. Environmental Education is a study of the factors influencing ecosystems, mental and physical health, living and working conditions, decaying cities and population pressures. Environmental Education is intended to promote among citizens the awareness and understanding of the environment, our relation to it, and the concern and responsible action necessary to assure our survival and to improve quality of life (Linke 1993:83-84).

This statement has widely been accepted as a valid interpretation of EE.

Irwin sketches a broad view of EE:

Environmental Education is a world socio-ecological phenomenon of many dimensions. It is a sophisticated and holistic concept embracing ecological knowledge and understanding, total people environment relationships, ethics, politics, psychology, sociology and public participation in decision-making. It aims primarily to educate about human interaction with the environment. The bottom line of concern is human behaviour towards the environment (Irwin 1991:4).

The definition of Stapp (1979:3) is also included here. It is both concise and appropriate.

Environmental Education is a process aimed at developing a world population that is aware of and concerned about the total environment and its associated problems, and which has the knowledge, attitude, motivation, solutions of current problems and the prevention of new ones.

The IUCN (1971) has perhaps produced the most comprehensive and still most widely accepted definition of EE. To the IUCN:

Environmental Education is the process of recognizing values and clarifying concepts in order to develop skills and attitudes necessary to understand and appreciate the interrelatedness among man, his culture and his biophysical surroundings. Environmental Education also entails practice in decision-making and self-formulating of a code of behaviour about issues concerning environmental quality (IUCN 1971:7).

Goals, aims and objectives of Environmental Education

The goals of EE according to the Belgrade Charter (1975) are:

To develop a world population that is aware of, and concerned about, the environment and associated problems and which has the knowledge, skills, attitudes, motivations and commitment to work individually and collectively towards solutions of current problems and the prevention of new ones (UNESCO-UNEP 1976:1-2).

Effective Environmental Educational programmes should provide all students with the opportunity to acquire:

- ▶ an awareness and concern for the 'health' of the planet earth and its people- the total environment.
- ▶ the knowledge, skills, attitudes and values needed to protect, care for and improve the natural, social and personal environment.
- ▶ patterns of behaviour, personal life style choices and willingness to take action that reflects

this care for the environment (IUCN 1970; Queensland Department of Education 1993).

These aims correspond with definitions set by a number of EE educators and authorities.

Representatives at the 1977 Tbilisi Intergovernmental Conference on EE developed a set of objectives which could be classified in five categories: awareness, knowledge, attitudes which include values, skills and participation in action (Belgrade Charter 1975; Tbilisi 1977; Ramsey et al 1992:36; Joubert and Steenkamp 1995: 32-37). In combination with the aims and goals, the objectives of EE can be regarded as a framework for curriculum development in EE. These objectives of EE are:

Awareness: - to help students acquire an awareness of and sensitivity to the total environment and its allied problems.

Knowledge: - to help students acquire basic understanding of the biosphere, the principles of an ecosystem and how it functions; how people and the environment interact; how problems and issues arise and how they can be solved.

Attitudes: - to help students to acquire social values and strong feeling of concern for the environment and the motivations for actively participating in its protection and improvement.

Skills: - to assist students to acquire the skills for solving environmental problems.

Participation: - to help students develop a sense of responsibility and urgency with regard to environmental problems; to ensure appropriate action to solve problems.

At the World Inter-governmental Conference on EE at Tbilisi, in 1977, twelve guiding principles for effective EE were adopted. These principles were suggested as guidelines for the development of all EE programmes. These guiding principles are as follows.

Environmental Education should:

- ▶ consider the environment in its totality- natural and build, technological and social (economic, political, cultural, historical, moral, aesthetic);
- ▶ be a continuous life long process, beginning at the preschool levels and continuing through all formal and non-formal stages;
- ▶ be interdisciplinary in its approach, drawing on specific content of each discipline in making possible a holistic and balanced perspective;
- ▶ examine major environmental issues from local, national, regional and international points of view so that students receive insight into environmental conditions in other geographical areas;
- ▶ focus on current and potential environmental situations while taking into account the historical perspective;
- ▶ promote the value and necessity of local, national and international cooperation in the prevention and solution of environmental problems;
- ▶ explicitly consider environmental aspects in plans for development and growth;
- ▶ enable learners to have a role in planning their learning experiences and provide an opportunity for making decisions and accepting their consequences;
- ▶ relate environmental sensitivity, knowledge, problem-solving skills and value clarification to every age, but with special emphasis on environmental sensitivity to the learners' own community in early years;
- ▶ help learners discover the symptoms and real causes of environmental problems;
- ▶ emphasize the complexity of environmental problems to develop critical thinking and problem-solving skills;
- ▶ utilize diverse learning environments and a broad array of educational approaches to teaching-learning about and from the environment with due stress on practical activities and first-hand experience.

These 12-guiding principles, according to Irwin (1992:3), still provide the foundation for practices

of EE on global, national and regional scale.

For the purpose of this study, the IUCN (1971) definition of EE has been chosen. The definition of IUCN is widely regarded as a useful working definition. In the words of Irwin (1991:5), the IUCN definition embraces what he regards as the essential elements of the concepts and this includes:

- ▶ the interrelatedness of people, their culture and their biological surroundings;
- ▶ that people hold values and attitudes which relate to the environment; and
- ▶ that “skills”, including decision-making and the formation of norms are integral aspects.

Eminent in the IUCN definition according to Irwin is that EE is a holistic approach and it involves three domains of human development, which are the cognitive, the affective and the psychomotor. In recent years, the concept was broadened when the elements of social development and sustainability with all its dimensions were added.

The next question is: How can all this be incorporated into the school curriculum? Various arguments have been put forward; some environmental theorists have advocated a separate “EE” subject in the curriculum. Such a separate subject will allow teachers and students to focus specifically on EE aspects as highlighted by the various definitions. Other theorists have argued for an integrated approach. Okot-Uma and Wereko-Brobby have recognized the integratedness of EE in schools.

In its formal pedagogical sense, EE implies an integrated course cutting across traditional subject areas including both the pure science and the social sciences. A basic objective of such a course aims to enhance an awareness, understanding and concern for the environment and its associated problems, through dissemination of information and constituents pertinent to aspects of the environment in relation to human activities (as cited by Leketi 1992:6).

This definition entails what can be regarded as an integrated approach to teaching cutting across subject disciplines and the promotion of EE goals such as the development of awareness, understanding, knowledge, skills and attitudes.

An integrated approach similar to the one identified above is also recognized by Opie who describes EE as:

... not only concerned with teaching peoples about the environment. It is also not only concerned with teaching pupils to conserve the environment. It is a method of teaching which can be applied to any subject, and which makes the teaching-learning experience stimulating and enriching (as cited by Leketi 1992:6).

Zoller interprets an EE approach in the school setting as:

...exposing of students to actual existing environmental problems in the immediate environment, learning by self experience via the inquiry method; direct interaction between student's cognitive systems which in turn entails a change in subject matter; and a change in the traditionally accepted role of teachers that the latter (the teacher) should be, in many cases, the servant, not the master in the learning process (as cited by Leketi 1992:5).

Environmental Education, as defined at the Tbilisi conference, differs from what is known as Environmental Studies which dominated school practices for many years. The subject Environmental Studies aimed at transmitting facts about the biological environment, whilst EE is seen to play a much wider role. The emphasis in EE is on education provided for all people on environmental themes and issues at appropriate levels. Environmental Education, comprehensively, is seen as education *about, through and for* the environment; which includes not only an integrated development of environmental knowledge, attitudes/ values and behaviour, but also addresses the commitment of people to environmentally responsible behaviour (Johnson in Bakshi and Naveh 1980:81; Tilbury 1995:206-207; and Ballantyne and Packer 1996:28).

A framework of EE formulated at the Tbilisi Conference (1977), specified the environmental approach to education as follows:

Environmental Education properly should constitute a comprehensive life long education, one responsive to changes in a rapidly changing world. It should prepare the individual for life through an understanding of the major problems of the contemporary world, and the provision of skills and attitudes needed to play a productive role towards improving life and protecting the environment with due regard given to ethical values (UNESCO 1977:24).

The behavioural objectives of EE are more extensive than those of other subject areas, since they reflect not only intellectual skills but also a range of characteristic attitudes consistent with the basic conservationist aims of improving quality of life and promoting sustainable development.

The aim of EE is to produce an individual who is “sensitive to the dimension of quality in her or his environment” and enable her or him to recognize environmental problems and to be inclined to participate in coping with environmental problems. The distinguishing feature is the orientation toward concern for the quality of life and commitment to environmental conservation (Linke1993:91).

Environmental Education for Sustainability (EEFS)

The World Conservation Strategy (WCS) (IUCN/UNEP/WWF 1980) in the early eighties embraced the concept of sustainability when it explored the links between economic growth and environmental preservation. A document titled, *Caring for the Earth: a strategy for sustainable living* (1991) highlighted the role of education in bringing about changes towards sustainable life styles. It suggests that the priority action needed to enable communities to care for their own environments are those which: give them greater control over their lives and livelihoods; enable them to meet their needs in sustainable ways; and enable them to conserve their environment (Huckle 1995:7). It also established education for sustainability as the central goal of EE in the 1990s (Tilbury 1995:198; Smyth 1995:10). Environmental Education for sustainability was confirmed by the Earth Summit (Agenda21). The emphasis shifted to education *about, through* and *for* the environment, which presented a re-orientation of EE towards sustainability (Tilbury 1995: 206-207); Palmer and Neal 1994:19; and Fien 1993b:15-16).

Tilbury (1995:195-212) believes that through EEFS students consider the desirability and possibility of a greater economic, social and political society in future. He argues that social changes in the light of sustainable development can only be realized through the interaction of teachers and students within the educational process. Although this is a rather ambitious claim for EE, I want to highlight the importance of formal education in developing environmental awareness, understanding, skills and attitudes.

Characteristics of Environmental Education in formal education

The characteristics of EE in formal education (following the various definitions offered) could be summarized as follows:

Effective EE:

- ▶ is holistic, considering the total environment- the natural, social and personal environment as well as the interrelatedness and harmony between its parts;
- ▶ incorporate concepts such as the ecology and others which are fundamental to an understanding of the values and attitudes that accompany such understanding;
- ▶ builds awareness of the interrelatedness of local, national and global environments, enabling students to understand the connections between everyday actions and the wider community;
- ▶ encourages problem-solving by searching for solutions to real environmental issues;
- ▶ examines issues of local to global significance in their political, cultural and socio-economic contexts, exploring the underlying values in a sensitive and open-minded manner;
- ▶ generates action by encouraging individuals to take responsibility for the care and shaping of their own environment;
- ▶ uses a variety of teaching and learning strategies and resources, including field studies, simulations, action research, information technology, personal experiences and co-operation learning methods;

- ▶ tries to be student-centred, allowing students to contribute to the planning of their own learning experience;
- ▶ is community oriented, involving individuals and organizations outside the school where appropriate- emphasizes active participation;
- ▶ is part of a life long learning process;
- ▶ is exemplary, in that school, teachers and students have a responsibility to model the behaviour they are promoting;
- ▶ is relevant and inclusive, providing subject matter, language learning opportunities and assessment methods that meet the needs of all the students and the community;
- ▶ has direct experience at its core and is field-based; presents opportunities in a variety of environments; is integrated with other learning and includes sensory, aesthetic and practical experiences;
- ▶ emphasizes the complexity of the environmental problems and stimulates critical thinking to address environmental and developmental issues in just and human ways;
- ▶ focuses on value education and the fostering of environmental attitude which facilitates partnerships in the process of decision-making at all levels and stages;
- ▶ is flexible and adaptable; and
- ▶ operates in open situations (Queensland Department of Education 1993:7-8; Tilbury 1994:14-15).

Models of Environmental Education

According to Blignaut (1991:6), Environmental Education within formal education was initially concerned with transferring 'knowledge' *about* the biophysical environment (nature- study in 1920s). Outdoor education, a method of education *through* in the outdoor environment, usually *about* and more recently *for* conserving the natural and built environment among other objectives was introduced in the 1950s, and has enriched education by stimulating active learning. During the 1960s ecology which focuses on the study of the interrelationships in the natural and man modified

environment, was introduced.

A more wide spread understanding of the holistic philosophy and the consequent emphasis on integration led, in the late 1960s, to the introduction of environmental studies, an integrated subject *about, for* and some times *through* both the natural, built and social environments (Blignaut 1991:6). This introduced a more holistic structure for dealing with interrelations, the balanced between cognitive and affective development and theory and practice.

Fien (1993b:15-49) interprets EE as education *about* the environment, education *through* the environment and education *for* the environment as follows:

Education about the environment

Education *about* the environment is about the provision of information on environmental issues and the teaching of appropriate technical and intellectual skills.

Education for the environment

Education *for* the environment involves the development of an interest in and concern for the environmental conservation and the inclusion of other associated attitudes and values.

Education through the environment

Education *through* the environment describes any form of education conducted outside of the traditional classroom. It is characterized by a particular pedagogical technique rather than by a set of behavioural objectives. According to Fien (1993a: 13-15, 1993b: 42-43), it is a student-centred approach that views the environment as a vehicle for the student's development.

In summary, EE can be very broadly interpreted to mean all education or narrowly to refer to Nature

Studies. For the purpose of my minithesis I shall use the above interpretation of Fien's three distinctions in terms of which I shall broadly analyse my empirical finding in chapters three, four, five and six.



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CHAPTER TWO

A BRIEF OVERVIEW OF THE EXPERIENCE OF DEVELOPING COUNTRIES IN THE DEVELOPMENT OF ENVIRONMENTAL EDUCATION IN SCHOOLS

Introduction

In many colonial countries before independence, the educational system was clearly stratified into highly academic schools for expatriates and schools that the colonizers tried to make relevant to agriculture and local community concerns for the majority of the indigenous people (Vulliamy 1988:145). Schools everywhere tend to reproduce the structure of the society of which they are a part.

The global environment movement, which began in Stockholm in 1972, put the ideals of sustainable development on the world's development agenda, which also reached Africa's developmental programmes. Drought, famine and starvation, armed conflict and uncontrolled emigration ushered in a new environmental ethic. The critical issue which Africa has to resolve is how best to use its resources to develop the lives of its people, while ensuring that future generations will also have access to those resources.

Teaching about environmental concerns in the developing countries is very important. Vulliamy supports the notion that through the integration of EE in the curriculum at all levels and within every subject offered in schools in developing countries, knowledge about the environment and understanding of information, skills to take action and the development of attitudes and behaviour could be developed to protect the environment.

According to Beeby as cited by Vulliamy (1988:148), classroom teaching in developing countries

is characterised by a formalistic, didactic style. He claims, this is due to the fact that teachers have themselves had very limited education and training. According to Little and Oxenham as cited by Vulliamy (1988:148), the vast majority of questions asked in school examinations in developing countries test factual recall, rather than comprehension or application skills. This encourages the rote teaching of factual information.

Generally, according to Samonec-Miciuk (1999:572), in most developing countries the implementation of EE in schools is not effective due to lack of essential methodological preparation and adequate qualification.

Because Eritrea is considered a “developing country” (notwithstanding the contested nature of the label), I want to highlight what is happening in other developing countries with regards to EE. By way of comparison, I hope to offer a contextualized and informed discussion about the current situation with regards to EE in Eritrean junior secondary schools. As a way of drawing links between different countries, I shall discuss EE in various developing countries under the following headings: government policies, EE curricula in schools, teacher training and teaching methodologies. Where available I shall note the various barriers to the implementation of EE in schools in some of these countries.

Environmental Education in Nigeria

Nigeria is one of the developing countries that are committing themselves to the improvement of EE as a means of improving the environment. It has suffered from considerable pollution and degradation.

Governmental policies in Nigeria

Environmental Education consists of knowledge of the physical environment, resources, culture, history and social systems (Adara 1996:237). After the Tbilisi Conference in 1977, EE was

addressed in both the national and regional education systems. NGOs, international agencies and citizen groups encouraged the integration of EE into educational policies and curricula. According to Adara (1996:237), Social Studies in Nigeria are regarded as the vehicle through which EE has been promoted since 1971. However, environmental related topics are also taught in subjects like Geography, History, Civics and Ethics, Citizenship Education, Economics and Arts.

Environmental Education in social studies programmes in Nigeria

The learning area, Social Studies, is “an organised integrated study of man (sic) and his environment, both physical and emphasizing cognition, functional skills, desirable attitudes and actions for the purpose of creating an effective citizenry” (Adara 1996:237).

The current Social Studies curriculum in Nigeria seems not to adequately empower the citizen for responsible action. Therefore, according to Adara (1996:238), urgent review is necessary to determine how EE elements can be highlighted and effectively infused into the curriculum. Specifically, enabling strategies are needed which comprise EE in social studies education in terms of curriculum design, objectives, learning experiences, content structuring and evaluation.

Curriculum models in Nigeria

In Nigeria, the following elements and approaches to integrate EE have been adopted (Adedayo and Olawepo 1997:84):

- ▶ The introduction of specific EE units into existing subjects. Topics of EE are created and infused in each of the social science subjects.
- ▶ The restructuring of the whole content of different subjects to include EE components in a major way.
- ▶ Introduction of new subjects such as citizenship or human ecology with a strong EE component. Official design of curricula to incorporate EE directly is just being attempted

in Nigeria.

- ▶ Establishing school conservation clubs for social students in line with one of the provisions of the Conservation Education Strategy.
- ▶ Integrating the contents of various subjects by teachers in a cross-curricular arrangement, through team teaching.
- ▶ The generation of EE topics and incorporating them into lessons by teachers.

Teacher training programme in Nigeria

For effective EE, 'competent' teachers within a social context approach are needed. These competencies, including knowledge, skills, values and attitudes, according to Adara, are currently lacking in the local education system of Nigeria. This means an EE curriculum is in place, but the actual competencies of teachers in teaching EE are lacking. On the training of subject teachers, two EE units have been established: one at the university of Calabara and the other at the college of education. A series of workshops have been mounted for secondary school Science and Social Studies teachers in various states of Nigeria (Adedayo and Olawepo 1997:85).

Field trips in Nigeria

According to Adedayo and Olawepo (1997:90), most secondary school subjects have field trips or excursions incorporated into them. Opportunities given to teachers and learners during excursions can be used to inculcate the skills of observation, data collection and interpretation of environmental issues. Subjects like Geography and Economics have practical components, which can be done on EE topics.

The role of NGOs and other organizations in Nigeria

Some interested groups, agencies and institutions exist both in Nigeria and abroad, which are actively promoting EE through funding of seminars, workshops and other activities. Such agencies

include UNESCO, the WWF for Nature, the Nigerian Conservation Foundation and International Centre for Conservation Education (Adedayo and Olawepo 1997:91).

Environmental Education in Uganda

According to Mucungunzi (1995:233), Uganda has a diversity of environmental resources of which few have been exploited for development purposes.

Governmental policy in Uganda

At present, Uganda is in the process of establishing a policy on the utilization of resources. The challenge is that of how the people of Uganda can acquire a new world outlook, new values and new attitudes to be able to develop and implement policies and activities for a social, ecological and economic transformation and the building of new life (Mucunguzi 1995:233).

Environmental Education in the curriculum in Uganda

A National Curriculum Development Centre has been established; constantly modified in Uganda, but it still lacks emphasis on a multidisciplinary foundation which recognizes the contribution of the Physical Science, Social Science and Humanities towards environmental degradation and conservation (Mucunguzi 1995:235).

According to Mucunguzi (1995:236), the curriculum at the primary level states that “...the syllabus should enable students to understand their environment and the use of modern scientific knowledge acquired to improve their way of living”. He claims that there is a lack of emphasis on imparting basic skills, the approach is disciplinary-based and interpretation is largely dependent on the teacher. Although there are inadequacies in practice, the objectives have good intentions. However, one of the main weaknesses in the curriculum is that there is no emphasis on social, economic and ecological environments as opposed to mere biological environments. According to UNEP (1988)

as cited by Mucunguzi (1995:236), the syllabi at the secondary level have sections committed to the environment. For example, the Geography syllabus states that "...students should be...aware of their immediate environment, help acquire appropriate attitudes and skills with which to interpret and develop their environment". Here also emphasis is on the physical and biological environment, with less regard for the social environment. The transmission of knowledge is only by teachers. Resource materials, refresher courses and close supervision of teachers are rare.

At primary teacher training college, the syllabus is less integrated and still disciplinary-based in approach (Mucunguzi 1995:237).

Environmental issues at the university level, according to Afunadula as cited by Mucunguzi (1995:237), are fairly adequately handled, however the approach is disciplinary-based, factual and academic with less emphasis on creativity and innovation.

In general, EE in the formal sector of education in Uganda has been and is still characterised as:

- ▶ lacking integration of social and ecological principles that affect the environment.
- ▶ disciplinary-based, mainly within the biological fields.
- ▶ factual and academic without being dialectical and analytical.

Future approaches to Environmental Education in formal education in Uganda

The future approaches to Environmental Education in the formal sector of education in Uganda according to Mucunguzi (1995:238) need to be as follows:

- ▶ Critical re-examination of the curriculum content and methods of dissemination of vital information to the learners.
- ▶ Content of the curriculum should include the physical, biological and social environments in an integrated approach.

- ▶ The environment, conservation and development aspects should be defined as proposed by the World Conservation Strategy (IUCN/UNEP/WWF, 1980).
- ▶ The learners should be clearly informed about the importance of improving the quality of life.
- ▶ A better approach to formal EE should be based on a multidisciplinary basis. It should occur as a holistic approach to education as well as to the environment.
- ▶ Teacher training institutions should include in their courses both basic and specialized knowledge of human and environmental relationships.
- ▶ Teachers should be able to be equipped to select, develop and implement the theory and practice in the curriculum.
- ▶ Quality of teachers and instructors should be upgraded by constant training and supervision.
- ▶ Training institutions should engage in the development and provision of resource materials for use in the teaching.
- ▶ Environmental Education should appear as a complete school programme in which theory and practice are combined.
- ▶ Teachers should be encouraged to adopt a problem-centred approach to teaching, starting with the experience of students and thereafter introducing new innovations and knowledge to the students.
- ▶ The Ministry of Education should help in the acquisition of the transport, camping and audiovisual facilities necessary for successful practical EE.

Mucunguzi concludes by claiming that EE based on a multidisciplinary approach is the only effective way of raising awareness and concern about the environment and associated problems.

Environmental Education in the Caribbean

The Caribbean is a highly populated area relative to its size, which results in the overuse, and abuse of ecosystems throughout the Caribbean.

Governmental policy in the Caribbean

The responsibility for formal EE is in the ambit of the Ministry of Education, which is essentially the policy-making body for the formal education sector. According to Bynoe and Hale (1997:65), more than 50% of the National Environmental Action Plans (NEAPs) studied have indicated links between EE and policy on the environment. This shows that the Caribbean government has made significant progress in developing policies on the environment. However, according Bynoe and Hale (1997:61), there is a gap between policy on EE and the actual implementation of these policies. Therefore, there must be a need for greater political commitment, at the national level, to the priority of environmental conservation and EE and to consider them as tools for the sustainable development of the Caribbean region as a whole.

Teaching learning methodologies in Environmental Education in the Caribbean

Teachers tend to rely on a traditional teaching style where students are passive and the teacher is the transmitter of information. Rote memorization is still the norm of the learning process here. Students are measured by the number of pages they write in their notebooks (Medina 1990:69). From this we can understand that teachers are not well prepared in that most of them lack an understanding of basic concepts in social and physical sciences. Teachers must manage classes of 40-50 students or more and because of limited facilities, schools often operate both a morning and afternoon session. Due to these factors, teachers have little time to prepare lessons with an EE component.

Teacher training in the Caribbean

There exist in-service teacher training which could alter the traditional techniques used for teaching of EE (Medina 1990:70). However, when training is available, teachers find it difficult to obtain time to attend.

Teaching materials in the Caribbean

There is lack of teaching materials for teaching of EE. Specially there is scarcity of materials about the local environment, which makes it difficult for teachers to incorporate EE into the existing syllabus. Texts and other materials have tended to describe exotic environments and did not reflect the students' own community (Medina 1990:70).

In general, EE in the Caribbean is not effective due to lack of appropriate curricula, inadequate teaching materials and methodologies to facilitate the integration of EE in the formal programme, inadequate material funding and insufficient emphasis on specialized teacher training in environmental issues (Bynoe and Hale 1997:61).

Environmental Education in Kenya

Governmental policies and programmes in Kenya

A National Environment Secretariat was set up in 1974 under the Ministry of Environment and Natural Resources (Martha 1997:172). According to Martha, a number of conferences and workshops were held regarding EE topics since 1978. Twenty years ago these workshops and conferences together with government ministries, NGOs and individuals bear testimony to commitment to the management and conservation of the environment. In 1986 a national conservation policy was established and EE was integrated into the curriculum.

Environmental Education in school curricula in Kenya

However, since 1985, a year before the official policy, environmental themes had already been integrated as an initial move at primary school level, into Science, Agriculture, Home Economics, Geography, History and Civics curricula. The environmental topics included are soil erosion, over grazing, afforestation, waste disposal, energy consumption, pollution and conservation of wildlife

and water resources (Lindeh in Lindeh et al 1992:17-18).

On the secondary level, EE is integrated into Biology, Agriculture, Geography and Chemistry curricula. The environmental topics included are soil erosion, biodiversity and ecosystems, over grazing, desertification and afforestation, waste disposal, energy consumption and pollution, conservation of wildlife, marine/coastal areas, natural and water resources (Lindeh in Lindeh 1992:17-18).

Teaching and learning methods of EE in Kenyan schools

Various methods of teaching and learning of EE have been developed in Kenyan schools. These include inquiry, process method, value clarification (such as role playing and simulation) and conceptualisation (formation of ideas, concepts, etc.). Environmental issues such as the management of natural resources, industrial sites, the role of sciences and technology, increasing population and human settlement, schools and roads may be studied in different disciplines.

These variables, according to Martha (1997:174), require an enormous diversity of learning materials, the application of technology, creativity, inventiveness and reflective thinking. It also requires that the needs, capabilities and environment of the target group must be understood to ensure satisfactory results.

Ellena Asuko Wanaska (in Lindhe et al 1992:26) reported that the Kenyan Institute of Education follows a practical approach to develop EE curricula. Among the approaches are curriculum design, preparation of the syllabus, in-service training of teachers, preparation of materials, needs assessment and implementation.

Constraints regarding EE in Kenya

Although the Kenyan government and the people were committed to the protection of the

environment, the following constraints have been seen (Martha 1997:175):

- ▶ lack of comprehensive EE strategy up to 1992;
- ▶ what is taught in school may not be practised at household and community levels;
- ▶ lack of clear links between government, industrial and private sectors, as well as NGOs and individuals involved in EE initiatives.
- ▶ insufficient teacher training; and
- ▶ lack of participation of women and community in solving environmental problems.

Environmental Education in primary education in Southern and Eastern Africa

Environmental Education in the education policy

Most of Southern and Eastern Africa have National Environmental Action Plans in which EE is included (Taylor 1998:206). However, the provisions for EE in education policy in the regions are inadequate for the development of national programmes of EE and constitute a major barrier to its development in primary education (Taylor 1998:208).

Although there are action plans, the lack of explicit guidelines to facilitate the implementation of policy is considered to be a significant barrier to the development of EE in the regions. The further development of EE in primary education in the regions is dependent upon the education administrations which in turn depend on the guidance that should be provided in education policy and the associated implementation framework. But, since these are lacking, EE is slow in developing.

Environmental Education in the curriculum

The teaching approaches that are used in Southern and Eastern Africa, according to ASESP Secretariat as cited by Taylor (1998:203), place emphasis on the cognitive aspects of education. The

teaching of environmental topics in the regions is dominated by the scientific disciplines. This shows that EE is not included across the full range of disciplines in the curriculum. Thus, a multidisciplinary approach to the teaching of EE is not applied in any of the countries. This indicates that teaching focuses on knowledge *about* the environment without directly addressing attitudes to and behaviour in the environment (Taylor 1998:209).

As a result, examinations in Southern and Eastern Africa assess mainly factual recall and recognition (Taylor 1998:209). Taylor argues that assessment of this nature fails to address the broader aspects of EE, such as the affective aspects and the higher order thinking skills such as critical thinking, analysis and interpretation. It also does not consider many aspects of the fundamental principles of EE. He suggests that for further development, changes to the examination systems are fundamental for effective EE.

Pre-service teacher training

Out of the 10- Southern and Eastern Africa countries, teacher training in EE at the pre-service level was identified in Kenya, Namibia, Malawi and Uganda (Taylor 1998:210). However, emphasis is only on scientific disciplines and on the cognitive aspects of environmental topics. According to Vulliamy as cited by Taylor (1998:210), the teaching approach is teacher-centred. This is apparently because of the following reasons:

- ▶ over-loading of the curriculum;
- ▶ lack of flexibility in the timetable;
- ▶ lack of financial support;
- ▶ lack of essential facilities and resources; and
- ▶ large class size.

In-service teacher training

With the exception of Namibia, National programme for in-service teacher training in EE is not identified (Taylor 1998:211).

Taylor suggests that the quality in teacher training can be improved with a commitment to reform in other aspects of education administration, such as examination, resources and instructional materials.

Instructional materials

According to Taylor (1998:208), instructional materials were identified in five of the countries sampled (Mozambique, Kenya, Namibia, Zimbabwe and Botswana).

He found that the instructional materials were inadequate in terms of content, quality or availability for the effective teaching of EE. In addition, the instructional materials emphasized the scientific aspects of the environment and favoured the use of teacher-centred teaching approaches.

In Southern and Eastern Africa, there is little potential for teachers to develop their own instructional materials. This is due to the relatively low entry requirements to teacher training college and limited training that student teachers receive. As a result, teaching in the regions depends mainly on the Ministry of Education produced instructional materials (World Bank 1988).

Taylor concluded that the current provisions for EE in primary education in Southern and Eastern Africa are insufficient for the comprehensive development of national programmes. The major barriers include inadequate provisions for EE in education policy, deficiency in teacher training in EE and lack of instructional materials.

SECTION B

ENVIRONMENTAL EDUCATION IN ERITREA

In chapter 2, the experience of developing countries in the implementation of EE in schools was discussed. It was found that a variety of factors influence the implementation of EE in schools.

This section will focus on the status of EE in Eritrean junior secondary schools. The study will depend upon the four criteria used by Taylor in my analysis of the status of EE in Eritrean junior secondary schools. I used Taylor's approach because, according to Beeby, cited by Vulliamy (1988:148), in developing countries in Eastern and Southern Africa and Eritrea, teachers have very limited education and training and there is a lack of material resources for teaching EE. This study assumes that Eritrea is faced with similar constraints to those of Southern and Eastern Africa.

I find the criteria relevant for my study, which shares a similar context to the study done by Taylor. By using his approach, I will look at the extent to which EE is included in education policy, at how EE included in the curriculum, the kind of training available for teachers and the availability of instructional materials present for teaching EE in Eritrean junior secondary schools.

CHAPTER THREE

ENVIRONMENTAL EDUCATION AND EDUCATION POLICY IN ERITREA

According to Taylor (1998:202), inclusion of EE in the governmental policy is an indication of an awareness of EE and a commitment to its development. Moss, as cited by Taylor (1998:202), argues that those provisions for EE at the government level are assumed to have an influence on the content of EE in formal education. Moss claims that the inclusion of EE in education policy is necessary not only in terms of mobilizing the appropriate intra-sectoral bodies (resources) within the education administration to act in a cohesive manner, but also in the development and planning of long term programmes in EE.

A number of countries now have National Environmental Action Plans in which EE is included Taylor (1998:208). Taylor supports the notion that lack of explicit guidelines to facilitate the implementation of policy are considered to be barriers to the development of EE.

If EE is to become fully integrated into the school curriculum, it must assume greater importance within the education administration and thus be supported more widely and effectively (Taylor 1998:209). The strategy or framework might include, among others - the establishment of a working group relating to the development of EE, creation of terms of reference for intra-sectoral bodies within the Ministry of Education, the provision of technical assistance to all those bodies involved, and generally monitoring the progress of the implementation of policy provisions (Taylor 1998:208).

The EE policy of Eritrea is similar to those of other developing countries. Most developing countries like Eritrea have National Environmental Action Plans in which EE is included (Taylor 1998:206). This indicates that in most developing countries and Eritrea, there is an awareness of EE and, at least in general, commitment to its development. Whilst the inclusion of EE in education policy is considered to be a positive feature, most of the developing countries and Eritrea lack a comprehensive framework for effective implementation of EE (Taylor 1998:208).

I am going to analyse the following documents in relation to education *about, through* and *for* the environment. The documents are: the National Environmental Management Plan for Eritrea (NEMP-E), a discussion document entitled *Integration of Environmental Education in the National Education System of Eritrea*, the Pilot project school Afforestation Programme in Eritrea, and official syllabuses. By analysing these documents, I shall investigate how EE is interpreted in the education policy.

1) **National Environmental Management Plan for Eritrea (NEMP-E)**

The Government of Eritrea, for the people of Eritrea has formulated a National Environmental Management Plan for Eritrea (NEMP-E) in 1995. This plan was achieved through the coordinated efforts of several Ministries. Policy guidance and the coordination for the process were provided by the Ministerial Council on the Environment, composed of the Ministries of Agriculture, Construction, Energy, Mines and Water Resources, Health, Local Government, Marine Resources, and Trade and Industry (NEMP-E 1995:viii). It was presented and revised at the conference held in Asmara 2-3 February and 8-9 February 1995.

According to NEMP-E (1995:3), life and development in Eritrea are firmly based on natural resources. Therefore, the NEMP-E has been trying to ensure that human activities in both inland and coastal areas result in long lasting benefits. In other words, it pushes for a policy of sustainable development. It provides the basic policy document for action in the environmental sector and lays out a strategy for action for conservation activities. It is seen not just as a plan, but as a mechanism to ensure that current developments taking place allow resource use options that might become desirable in the future. The emphasis is on optimising resource use with a commitment to sustainable development. The nature of the NEMP-E is summarized as follows:

The Eritrean National Management Plan is the blueprint for coordinating the protection and enhancement of Eritrea's natural resources, so that optimal social and economic development can be achieved in consonance with the rational and sustainable use of these resources, for current, as well as future generations (NEMP-E 1995:viii).

Within the NEMP-E the Ministry of Education states that “the priorities of the immediate action are to incorporate national *environmental issues and concern* in the curriculum and technical training courses; and *environmental awareness* be included in all schools” (NEMP-E 1995:109). So the policy focuses on three main areas: environmental issues, environmental concern and environmental awareness. In order to address environmental issues effectively, students would need knowledge *about* the environment, that is, information about what the aspects and dynamics of a particular ecosystem are. In addition, they are encouraged to develop knowledge *through* the environment, knowledge of how to go about addressing environmental problems; that is, knowledge of problem-solving, collective decision-making, negotiation and facilitation skills. Moreover, students would need knowledge *for* the environment, that is, a certain environmental ethic which encourages them to care about the environment, to be actively involved in sustaining it and to have an awareness of the importance of a healthy environment.

The guiding principles of the NEMP-E include:

- ▶ A recognition of the strategic importance of conserving natural resources and maintaining environmental quality as part of national economic growth;
- ▶ Developments of integrated and multiple use of natural resources and strategies at the same time as ensuring local involvement and equity in environmental management;
- ▶ Recognition that if sustainable development is to be achieved, changes in peoples’ attitude and practices may be necessary. Planning and management must promote values that support a new ethic of sustainable living (NEMP-E 1995:6).

It seems that as though the second and especially the third principles have implications for education. First, for local involvements to be effective, there needs to be an active and informed citizenry. Here education can contribute by educating students not only in knowledge *about* the environment, but also equip them with skills in negotiation, decision making, etc., that is knowledge *through* the environment. Second, the principle calling for a change in peoples’ attitudes can be

supported by an educational curriculum whereby students in school are exposed to and encouraged to participate in environmental projects motivated by an environmental ethic. This would be knowledge developed *for* the environment.

In the guiding principles of this policy document, improving “quality of life” and “sustainable development” are explicitly addressed. According to NEMP-E (1995:1), “the environment, as the natural capital of Eritrea, perceived as a common heritage for all Eritreans of present as well as future generations and all Eritreans have an obligation to protect the environment”. This emphasis on quality of life and sustainable development seems to be based on theories about EE. According to Linke (1993:90-91), the distinguishing feature of EE is the orientation toward concern for the quality of life and commitment to environmental conservation. Tilbury (1995:199) believes that through EE for sustainable development students consider the desirability and possibility of a greater economic, social and political society in future.

2) The Integration of Environmental Education in the National Education System of Eritrea: Discussion document

Significant progress made by the government is the inclusion of EE in the education policy. One of the aims of the Eritrean junior secondary school education according to the Ministry of Education is “to develop an understanding and an appreciation of science and technology together with the promotion of care and concern for environment” (MoE 1999a:2)’. This indicates that the junior secondary school education level in Eritrea aims to broaden the environmental outlook of students and raise their participation in practical work activities. According to Tesfamichael (1995:10), at this stage the main focus in relation to EE is to consolidate primary level studies in a deeper way so that a broader understanding of the unity of the origin in all living things is created and more practical work and participation are done to drive the students towards more responsible participation in the environment.

A draft paper which is entitled *The Integration of EE in the National Education System of Eritrea*

was submitted for discussion of the NEMP-E 1995 conference. It was presented by Tesfamichael from the Ministry of Education in Asmara, January 6, 1995. After this discussion document was submitted, within the NEMP-E the MoE states the following: “the priorities of the immediate action are to incorporate national environmental issues and concern in the school curriculum and technical training courses and environmental awareness be included in all schools” (NEMP-E 1995:109).

According to Tesfamichael (1995:2), to improve the livelihood of the people and the strategy of the development of the country and its resources, the major issues addressed in Eritrea prior to independence (1991) had been the question of land, food and health, that is, the development of a policy and practice for sustainable and environmentally sound development. It is through education that the foundation for this must be started, to enable students to achieve sustainable development in the future. This view comprises the inclusion of a basic understanding of the natural environment, the built environment, the social environment and cultural environment. If an informed understanding is to be developed in the citizens of Eritrea, the integration of EE in the National Education System of Eritrea is necessary. That is why this draft paper has been submitted for discussion by Tesfamichael.

In this discussion document the following aims of EE are mentioned:

- ▶ to develop a necessary understanding and knowledge of the environment as a whole and the important concept associated with it;
- ▶ to develop important skills necessary for identifying and analysing important environmental issues and problems existing in Eritrea and to be able to address important alternative solutions that correspond to the realities existing in the nation;
- ▶ to develop positive attitudes, values and sense of judgements towards the preservation and management of the environment in Eritrea and express concern, responsibility and devotion towards the environment;
- ▶ to raise the participation of the people in preserving and managing the environment (Tesfamichael 1995:5).

The aims of EE in Eritrea as mentioned in this document highlight the objectives of EE: knowledge and understanding, skills, attitudes and participation. In order for people to develop the understanding and knowledge of the environment as a whole and the important concepts associated with it, education can contribute by educating students in knowledge *about* the environment. This would help students to acquire a basic understanding of the biosphere -the principles of an ecosystem and how it functions; how people and the environment interact; how problems and issues arise and how they can be solved.

Students would need also knowledge *through* the environment in order to develop important skills necessary for identifying and analysing the important environmental issues and problems existing in Eritrea and to be able to address important alternative solutions that correspond to the realities existing in the nation. This would help students to address constructively the environmental issues and problems existing in Eritrea. By building first-hand experience, practical investigations and interaction with the natural and built environments, students hopefully come to appreciate the complex interrelationships that exist among people, culture and biophysical surrounding (Palmer and Neal 1994:33).

Students also need knowledge *for* the environment in order to develop positive attitudes, values and sense of judgements towards the preservation and management of the environment. In this case, students would motivate and commit themselves to and participate in preservation and management of the environment, because they care about it and its preservation for future generations.

The principle of raising of peoples' participation in preserving and management of the environment can be supported by an education whereby students in school are exposed to and encouraged to participate in environmental projects. In this case students offer the opportunity to use their acquired knowledge and skills in taking thoughtful, positive action individually and/or collectively towards solving and preventing environmental problems in Eritrea. In doing so it is hoped that, according to Fien as cited by Bak (1997:43), students would develop political literacy which would enable

them to solve environmental problems locally as well as globally.

3) **The pilot project school afforestation programme in Eritrea.**

According to Tesfamichael (1995:4), the ecological problems in Eritrea could be grouped in three interrelated fundamental problems of concern. These are environmental security, food security and health security. He argues that if natural resources are scientifically and properly managed, there is sustainable development which leads to food security, health security and environmental security. As mentioned in the introduction, Tesfamichael argues that sustainable development in Eritrea could only be successful if people develop:

- ▶ the necessary awareness, knowledge and understanding of the environment;
- ▶ positive and balanced attitudes towards it; and
- ▶ skills which enable people to participate in determining the quality of the environment.

This implies that in order for the people to fully participate in the improvement of the quality of life, effective EE programmes must be developed. However, at present in Eritrea, natural resources are not managed properly for sustainable development. The continuous war and drought hamper wise utilization. One of the greatest problems in Eritrea at present is environmental degradation, especially deforestation.

According to the MoE (1995:1), in order to succeed in the restoration of forests and to stop further environmental degradation, forestry must be incorporated into the school curriculum of Eritrea and students must be involved in tree planting. That is why this pilot project school afforestation programme in Eritrea has been prepared on March 20, 1995. Therefore, the justifications for the establishment of this project are based on the consequences of environmental degradation.

The main aim of this pilot project is to introduce the concept of sustainable development to rural communities through the participatory role of students (MoE 1995:2). The central claim of the MoE

is that “restoration of forests can succeed only through the participatory role of youth in schools and outside of schools”.

The committee members of this project are: the Director of the school, Geography and Science teachers; the Chairperson of the local Government; agents of the Ministries of Agriculture, Land-Water-Environment and Health; Religious leaders; the Chairperson of Youth Association; the Chairperson of Women Association and the Chairperson of Parents committee.

This project started to be implemented in schools in 1997. An example of this is the Kern secondary school which is situated North West of Asmara.

The main objectives of the pilot project on school afforestation programme are:

- ▶ to introduce practical education (knowledge and skills) necessary for students to sensitively manage the environment;
- ▶ to inculcate a sense of personal responsibility towards the conservation of forests;
- ▶ to utilize the time and energy resource of students in protecting the environment through planting trees in schools and their compounds;
- ▶ to develop the concept of environmental protection;
- ▶ to create awareness about the consequence of deforestation and thereby to stimulate active mass participation in planting trees; and
- ▶ to involve youth outside the schools, together with parents, concerned ministries and international organizations in restoring forests (MoE 1995:3).

First, in order to develop the concept of environmental protection, students would need knowledge *about* the environment. This involves knowing why trees are important for maintaining the quality of the environment, the role of trees in an ecosystem, the important economic role of trees in preventing environmental conditions that drain the economic resources of the country, the contribution of forests in the biological food chain, etc. Second, the afforestation programme also

allows students the opportunity to develop an understanding and knowledge about how to protect the environment. This would include knowing how to plant trees properly, how to nourish their growth, how to get the broader community involved in taking responsibility for managing the forest. Students develop knowledge *through* the environment in order to develop skills necessary for them to sensitively manage the environment. These skills could be problem-solving skills, communication skills, personal and social skills, numeracy skills, information skills etc. Third, the development of awareness among the total population about the consequences of deforestation can be supported by an education which educates students in knowledge *for* the environment. This would help students to acquire a sensitivity and awareness to the consequences of deforestation and develop a conceptual awareness of how individuals and collective actions influence the relationship between the quality of life and the quality of the environment and thereby stimulate active mass participation in planting trees. Knowledge *for* the environment would be also necessary in order to inculcate a sense of personal responsibility towards the conservation of natural resources. This would help students to acquire interest, value and concern for the environment, thereby they would utilize their time and energy resources in protecting the environment through planting trees in their schools and compounds. Through this, active mass participation would be emphasized by involving or participating youth outside schools, Parents, concerned Ministries and International Organizations in restoring forests.

3) Official Syllabuses

In Eritrean junior secondary schools, Environmental Education topics are only included in Geography, Science and English. I had access only to the Geography syllabus and I shall look more closely at its stated aims in order to see how EE is incorporated in this subject.

The current Geography syllabus was formulated by the Curriculum Development Institute, Geography Panel, in October 1993. It is based on the Junior Secondary School Curriculum. It started to be implemented in 1995. The general Geography syllabus outline for junior secondary school has the following aims:

- ▶ to introduce Geography as subject;
- ▶ to help students discover the symptoms and causes of environmental problems;
- ▶ to increase knowledge and skills necessary for individuals to sensitively manage the environment;
- ▶ to encourage a sense of personal responsibility towards the preservation of natural resources;
- ▶ to help student to develop positive values and attitudes towards the environment (MoE 1994a:iii).

In order to address the knowledge necessary to manage the environment, education can contribute by educating students in knowledge *about* the environment, that is, knowledge about information, ideas and concepts on ecological biospheres, environmental dynamics, and the symptoms and causes of environmental problems. This gives students the opportunity to understand the workings of the natural world, as well as the symptoms and causes of environmental problems that surround them.

Geography hopes to contribute also by educating students in knowledge *through* the environment in order to develop skills to sensitively manage the environment, how they interact with these problems, how these problems arise and how they can be resolved. This represents a good opportunity for students to use a whole range of skills in a way which is both relevant to their lives as well as useful to future citizens. These skills hopefully would help students to discover the symptoms and causes of environmental problems which surround them, how decisions are made about them and how they participate in the decision-making process.

Moreover, Geography students would need knowledge *for* the environment in order to encourage them to develop a sense of personal responsibility towards the preservation of natural resources so as to develop positive values and attitudes towards it. This hopefully encourages students to explore their personal response to a relationship with the environment and environmental issues. The aims of the Geography syllabus are linked to the development of attitudes and values, elements of human understanding and behaviour necessary for the development of sustainable and caring of the environment. In this way it is hoped that students would be provoked and challenged into making

a positive and constructive contribution to the future and well-being of their country.

In summary, I have discussed how EE is interpreted in the education policy by analysing the four policy documents in terms of education *about, through and for* the environment. The responsibility for formal EE is in the ambit of the MoE, which is essentially the policy making for the formal education sector. Within the NEMP-E, the MoE focuses on three main areas: environmental issues, environmental concern and environmental awareness. In order to address environmental issues, students would need knowledge *about* and *through* the environment and in order to address environmental concern, students would need knowledge *for* the environment and linking these to the development of Eritrean youth. This shows that the Eritrean government has made significant progress in developing policies on the environment and linking these to the development of Eritrean youth. According to Kiros (1995:31), the Eritrean government and people are aware of the environmental crises and they are taking preventive and control measures. For example, individuals and communities are in favour of legislation by the government against pollution and deforestation.

Despite the above significant progresses, with regard to education policy there are two problems for the effective implementation of EE in Eritrea (Tesfamichael 1995:3) and which still exist at present. These are: the lack of expertise to study, plan and integrate EE into the curriculum; and the lack of a comprehensive plan or guidelines at a national level. Taylor (1997:208) considers that an implementation strategy or framework needs to support policy provisions. Taylor argues that for effective EE, there must be explicit guidelines to facilitate the implementation of the policy. The further development of EE in Eritrean junior secondary schools will depend upon the guidance that should be provided in education policy and the associated implementing framework. But since these are lacking in Eritrea, EE is slow in developing. In my last chapter I shall return to some considerations of taking the development of EE in Eritrea forward.

The National Education System in Eritrea has the following strategies in the development of EE programme in general (Tesfamicael 1995:6-7):

- ▶ The integration of EE into the educational plans and programmes with a clear consideration of the macroeconomic plans of Eritrea in general and the environmental plans in particular.
- ▶ The integration of EE into the life long process of education at all levels, in different forms, and in all aspects and components of the national education system in a way that takes into consideration the diversity in the Eritrean society.
- ▶ The integration of EE by linking its objectives and strategies with appropriate objectives, strategies and content in existing programmes within the broad learning areas of the different components of the national education system. (This is what my minithesis hopes to focus on).
- ▶ The relation of EE programmes with practical and objective activities that assure the social participation of citizens in the practical solution of problems.
- ▶ The training of teachers and other required technical staff in order to institutionalize environmental activities into all aspects of the educational system. (This is also what my minithesis tries to focus on).
- ▶ Assure the participation of community and society at large in promoting EE and the practical implementation of environmental programmes through various activities.

These strategies indicate that there is a commitment to promote EE in the National Educational System in Eritrea. By discussing the factors that are considered to have a significant influence on the status of EE in Eritrean junior secondary schools, it is hoped that my minithesis may provide useful information; when the MoE has entered into the progress of conducting surveys and studies, which will lead to the eventual revision of the curriculum, at a national level in the coming few years. The integration of EE is going to be one of the important aspects of this educational reform.

In the next chapter, I will analyse how EE is included in curriculum (content, teaching methodologies and assessment of EE) of Eritrean junior secondary schools. Taylor (1998:203) acknowledges that the inclusion of provisions for EE in education policy is not exclusively indicative of the presence of EE in a country's school classrooms. In other words, the existence of a policy of EE does not guarantee that EE is in fact practised in classrooms. There is often a gap

between policy and practice. Having discussed the policy, I shall now turn to the practice framework, as captured in the actual curriculum of Geography, Science and English. In chapter five, I shall look at how teachers actually understand their classrooms. But first, a discussion of the prescribed curriculum.



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CHAPTER FOUR

ENVIRONMENTAL EDUCATION AND CURRICULUM IN ERITREA: DOCUMENTARY ANALYSIS

I will start from the assumption that the development of EE in the curriculum is an essential element of a basic education as it has the purpose to nurture the foundation of knowledge, interest and understanding, hopefully leading to a caring and a concerned attitude for the environment. Moreover, an EE approach in schools aims to develop students into critical thinkers, social inquirers and problem solvers or active participants in environmental and political or even education decision-making (Stevenson 1987:72).

In this chapter I will analyse how EE is included in three subjects in the curriculum of Eritrean junior secondary schools by discussing the content of EE themes and topics, the teaching methodologies of EE topics and assessment of EE. I will analyse these as I did with policy in chapter three, in terms of education *about* the environment, education *through* the environment and education *for* the environment. I will base my analysis on the available documents on special environmental initiatives in schools as well as the syllabus, including textbooks. Later in chapter five, I shall look at how teachers perceive the curriculum, based on my classroom observations and interviews with teachers.

4) Content of Environmental Education themes and topics as prescribed in the textbooks of Eritrean junior secondary schools

As I have discussed in chapter one, the goal of introducing EE in the school curriculum is to develop students' understanding of the working of the environment, to make them capable of addressing environmental issues, to encourage them to adopt a responsible attitude towards the environment

and to educate them to behave in an environmentally conscious manner both during schooling and in later life.

According to the final report of the Tbilisi Conference (Adedayo and Olawepo 1997:84), EE should not be just one more subject to add to an existing programme of studies; it should be incorporated into existing programmes at any level. This is because the existing school timetable is already overcrowded. It is argued by Adedayo and Olawepo that EE in school should follow an integrated approach to education within existing school curricula, which contain many opportunities to develop EE. The extent to which EE is included in the curriculum is based on a consideration of those subjects in which EE themes are identified. According to UNESCO-UNEP (1983) cited by Taylor (1998:203), EE should be incorporated into the school curriculum as a multidisciplinary theme; which means the content of the curriculum should include the biological, physical and social environment in an integrated approach. By a multidisciplinary approach it is meant that EE is integrated into other established disciplines where appropriate. As mentioned in chapter one, Okot-Uma and Wereko-Brobby as cited by Leketi (1992:6) have recognized the effectiveness of an integrated approach to EE in schools:

In its formal pedagogical sense, EE implies an integrated course cutting across traditional subject areas including both the pure sciences and social sciences. A basic objective of such a course aims to enhance an awareness, understanding and concern for the environment and its associated problems, through dissemination of information and constitutes pertinently to aspects of environment in relation to human activities.

This description entails what can be regarded as an integrated approach to teaching EE; cutting across subject disciplines. It promotes EE goals such as the development of awareness, understanding, knowledge, skills and attitudes.

A different approach in part is advocated by Kidanemariam. According to Kidanemariam (1997:6), after a careful study of the educational system of Eritrea in general and the school curriculum in particular, the following approaches of introducing EE into the Eritrean system are proposed:

Treat EE as a separate subject at the primary level. The rationale behind this is that at the primary level students do not have enough knowledge of other subject areas. At this stage they are being introduced to the different subject areas step by step. So, integrating EE with other subjects will not be easy and meaningful. Besides, it helps EE to occupy a special place as an independent subject in its own right and will enable it to lend itself to serious and in-depth study. And it was proposed to adopt the interdisciplinary approach at the junior secondary school level and the multidisciplinary approach at the secondary level. The reason here is that when students reach the junior secondary school level, they will have enough knowledge of the different subject areas taught in school and integrating EE with other subject areas will be possible and meaningful.

In Eritrean junior secondary schools environmental themes have been included in Science, Geography and English curricula. This means that an integrated approach to EE has been adopted at this level of Eritrean schooling.

First I will summarize briefly what the textbooks are about by noting the contents and sections of each subject area and I will analyse the content of the textbook mainly in terms of what information the students are supposed to learn from the textbook. Later I will analyse the learning activities prescribed in the textbooks as a way of developing skills pertaining to environmental issues, as well as encouraging a certain moral stance towards the environment.

Geography textbook

According to the syllabuses of junior secondary school the contents included in grade six Geography are as follows:

- ▶ Introduction to Geography
- ▶ Soil as natural resources
- ▶ The rock of the earth as natural resources
- ▶ Minerals as natural resources
- ▶ Natural resources
- ▶ Natural vegetation and Wildlife as natural resources

- ▶ Air and Water resources

All these contents are environmental topics except for perhaps the first chapter. In the next section, I will mention the topics in each chapter and I will discuss briefly what the chapter is about.

Chapter One: Introduction to Geography

- ▶ What is Geography?
- ▶ Fields of modern Geography

This unit considers that Geography is a wide subject and it studies everything supported by the earth's surface. In this unit the facts to be studied in Geography, i.e. natural features and cultural feature, are considered.

Chapter Two: Natural resources

- ▶ Kinds of natural resources
- ▶ The diminishing of natural resources
- ▶ Conservation of natural resources

In this chapter, the means by which natural resources are diminished and the major aims of conservation of natural resources are discussed.

Chapter Three: Soils as natural resources

- ▶ Why do we study soils
- ▶ Characteristics of soils
- ▶ Formation and fertility of soils
- ▶ Soil profile

- ▶ Soil texture
- ▶ Colour of soils
- ▶ Soil erosion
- ▶ Soil conservation
- ▶ How to make soil fertile and maintain soil

In this chapter, the main causes of soil erosion and the best way to control soil erosion are studied.

Chapter Four: Natural vegetation and wildlife as natural resources

- ▶ Natural vegetation
- ▶ What is Wildlife
- ▶ Conservation of natural vegetation and Wildlife.

In this chapter, the uses of natural vegetation and wildlife, and how to conserve natural vegetation and wildlife are discussed.

Chapter Five: The rocks of the earth as natural resources

- ▶ Distribution of Rocks in Eritrea
- ▶ What are Igneous Rocks?
- ▶ Metamorphic Rocks
- ▶ Sedimentary Rocks

In this chapter, the uses and types of rocks and their distributions in Eritrea are discussed

Chapter Six: Minerals as natural resources and conservation

- ▶ What are the uses of Minerals

- ▶ Types of Minerals
- ▶ Methods of Mining
- ▶ Mineral occurrence in Eritrea
- ▶ Conservation of Minerals

In this chapter, the importance of minerals, types of minerals, methods of mining, occurrences in Eritrea and measures to be taken to protect mineral resources are discussed.

This, in summary, is prescribed in the textbook of grade six Geography. I will analyse these themes and topics in terms of education *about, through and for* the environment by using examples from the textbook.

As described in the Geography textbook (MoE 1994a), it is hoped that Geography would contribute by educating students in knowledge *about* the environment, i.e., information about:

- ▶ difference between renewable resources and non-renewable resources (MoE 1994a:13);
- ▶ causes of soil erosion such as deforestation and overgrazing (MoE 1994a:26);
- ▶ maintenance of soil fertility by crop rotation, fertilisers and green manuring (MoE 1994a:28);
- ▶ importance of geographical terms related to soil such as, weathering, soil profile, soil texture etc. (MoE 1994a:21-24);
- ▶ importance of natural vegetation as source of food, fuel, as pasture of land, as source of raw materials, as protection of soil erosion etc. (MoE1994a:35-36);
- ▶ difference between wildlife and domestic animals and between carnivorous and herbivorous animals (MoE 1994a:42-43);
- ▶ the causes of the decrease and distribution of wildlife in Eritrea (MoE 1994a:43-44);
- ▶ the negative consequences of deforestation on soil and wildlife and the natural environment at large (MoE 1994a:44);
- ▶ the economic importance of rocks and their differences (MoE 1994a:62-69);

- ▶ the importance of air and water for living things (MoE 1994a:73);
- ▶ the causes of air pollution and the diseases caused by air pollution (MoE 1994a:74-75);
- ▶ the consequence of acid rain, for example:
 - acid rain makes soil acidic and less productive;
 - acid rain erodes stones and bricks;
 - acid rain kills plants by turning their leaves to yellow;
 - acid rain pollutes lakes and then kills plants and animals in the lake (MoE 1994a:75)
- ▶ the causes and remedies for air and water pollution (MoE 1994a:76);
- ▶ the types and uses of minerals and their distribution in Eritrea (MoE 1994a:84-89);
- ▶ the concept of mineral conservation (MoE 1994a:92-93).

The Geography textbook also hopes to educate students in knowledge *through* the environment in order to develop different skills. For example in chapter two, the following activities are prescribed:

- ▶ The teacher has to make a short trip to the surrounding area with the students. Then students have to answer the following questions:
 - What natural resources do students observe?
 - Which sources are diminishing? Why?
 - What can we do to conserve these diminishing resources?

Through these activities it is hoped that students develop skills of careful observation of natural resources, skills of inference and skills of problem-solving, i.e., skills to solve the problems of the diminishing resources.

In chapter two, one of the aims of conservation of natural resources is “to use natural resources wisely” (MoE 1994a:15). In chapter three under the heading of *Forests in Eritrea*, the following sentence is written: “It is now our responsibility to reafforest the land (MoE 1994a: 42),” and under the heading of *What is Wildlife?* , “Wild lives are of great economic value to many countries in

Africa”(MoE 1994a:44). Here, education can contribute by educating students in knowledge for the environment, in order to encourage students to develop a sense of personal responsibility towards the wise use of natural resources, towards the reforestation of the land and towards the importance of wild animals in the national economy. The textbook aims to develop the students’ positive attitude, value and interest towards natural resources. It is hoped that students will use their acquired knowledge and skills in taking thoughtful, positive action individually and/or collectively towards solving and preventing environmental problems such as soil erosion, deforestation and destruction of wildlife. So although overwhelmingly, the Geography textbook aims to transmit information *about* the environment, it also tries to develop some skills through engagement in the environment as something worth conserving. In this way, the textbook is not in contradiction with the interpretation of EE that holds that all three kinds of environmental knowledge are important.

Science textbook

Like with the Geography textbook, I will mention the contents in this subject and then I will analyse them in terms of education *about, through* and *for* the environment. According to the syllabus of junior secondary school, the contents included in grade seven Science are the following:

- ▶ Health and Disease
- ▶ Reproduction
- ▶ Beginning to Agriculture
- ▶ Matter around us
- ▶ Heat and Temperature
- ▶ Light and Sound
- ▶ Electricity and Magnetism

From these themes, those which deal directly with environmental issues are Health and Disease and Beginning to Agriculture. Of course, matter, temperature, light and electricity are vital aspects in

the biological cycle, but I shall concentrate on the two main topics that themselves constitute an environmental issue.

Chapter One: Health and Disease

- ▶ What is Health?
- ▶ What is Disease?
- ▶ How can we prevent disease?
- ▶ Infectious disease in Eritrea
- ▶ First Aid

In this chapter, the causes of diseases that are easily transmitted, the means of prevention of disease, and the different First Aid applications for different types of injuries are discussed.

Chapter Three: Beginning to Agriculture

- ▶ Composition of soil
- ▶ Soil fertility
- ▶ Improving fertility of soil
- ▶ Mixed farming
- ▶ Main crops in Eritrea
- ▶ Pests destroying crops
- ▶ Livestock production

In this chapter, the compositions of soil, the means to improve soil fertility, the safety measures taken during using pesticides, the main types of crops found in Eritrea, the types of pests destroying crops, the ways of improving livestock production and the meaning of mixed farming are considered. There are some overlaps with Geography as, for example, in the section on improving soil fertility.

The Science textbook (MoE 1994b) aims to educate students in knowledge *about* the environment, i.e., in providing information about:

- ▶ composition of soil, i.e., soil is composed of minerals, humus, water, air and living thing (MoE 1994b:55);
- ▶ classification of soil, i.e., soil is classified as sandy, clay and loam soil (MoE 1994b:59);
- ▶ improvement of the fertility of soil. As prescribed in the textbook some of the methods of improving soil fertility are: crop rotation, conservation of soil, adding manure or artificial fertiliser, planting legume plants and fallowing (MoE 1994b:61-62);
- ▶ advantages of ploughing farms before planting. Ploughing breaks up and turns the soil over and then the air moves in and out the soil freely, allows proper drainage of water and weeds become buried (MoE 1994b:66);
- ▶ main crops in Eritrea. The main crops in Eritrea are cereals, pulses, oil seeds, vegetables, fruits and fibre crops (MoE 1994b:67);
- ▶ ways of improving cattle production, i.e., selecting the best type of cattle, breeding, artificial insemination (taking semen from the male and introducing into the reproductive organ of the cow), feeding the best type of food and caring for their health (MoE 1994b:70).

In the Science textbook the following activity is prescribed in order to develop students' environmental skills:

- ▶ By visiting the farm areas, students are asked to observe the ploughing system used by farmers and finding a means to improve it.

In this case it is hoped that students develop skills of observation about the ploughing system used by farmers and problem-solving skills, i.e., to seek a solution for improving the ploughing system. Moreover, students are asked to apply their information of soil classification (example, "soil is classified as sandy, clay and loam soil" (MoE 1994b:59)). Students are given a variety of soil samples which they have to group in their proper classification. In this case students develop the

skill of application of information of soil types into different groups in terms of their sizes and colours. This is knowledge developed *through* the environment, by working with actual soil samples.

“Livestock are economically important” (MoE 1994b:70). The textbook aims to develop an awareness in students that livestock have economic value. It is not just an awareness raising, but also the development of an active environmental ethic which hopes to encourage students to care for livestock through their responsible interactions in the ways of improving their production, i.e., in selection of the best type of cattle, in breeding carefully, in feeding with the best type of food and in caring for their health.

Grade seven English syllabus

Environmental Education is supposed to be integrated in the English syllabus, but there is only one theme, which deals directly with an environmental issue. That is in chapter Seven- Importance of Forests. I, unfortunately, did not manage to secure a copy of the English textbook. However, the English teacher of Debarwa junior secondary school gave me the following reading passage concerning the importance of forests.

Before 1999, Debarwa junior secondary school was dirty and full of dust. The wind blew dust and the soil from the open fields into the school. The dust went into the classrooms and into the students' hair and eyes. The students and the teachers were unhappy. In the school compound, sheep, donkeys ate all the grass. When the grass was eaten, the soil changed into dust. Soon Debarwa junior secondary school will be full of trees. The compound will look beautiful and the trees will protect the school.

Even if this reading passage is contextual, it has certain environmental implications. First, in order for students to get knowledge or information about the causes and effects of grass destruction, they need knowledge *about* the environment. For example from the reading, students should get information that donkeys and sheep can be the causes of grass destruction through overgrazing and they should know also that loss of soil is a consequence of grass destruction. Second, students are encouraged to develop knowledge *for* the environment in order to develop a sense of personal

responsibility towards the beautifying of the immediate surroundings of the school and coming to care for it.

2) Teaching-learning methodologies of Environmental Education themes as prescribed in the textbooks

The infusion of EE into the formal curriculum implies not only the inclusion of EE topics into the existing subjects but also a teaching/learning process that complies with agreed objectives and guiding principles of EE as discussed in chapter one.

As discussed in chapter one, Zoller as cited by Leketi 1992:5, interprets EE approach in school setting as "... exposing students to actual existing environmental problems in the immediate environment, learning by self experience via the inquiry method; direct interaction between students' cognitive systems which in turn entails a change in subject matter; and a change in the traditionally accepted role of teachers that the latter (the teacher) should be, in many cases, the servant not the master in the learning process." Effective EE according to the Tbilisi guiding principles of EE, should utilize diverse learning environments and a broad array of educational approaches to teaching and learning about and through the environment with due stress on practical activities and first-hand experiences (Irwin 1992:3).

Besides being an educator, the teacher becomes also a reflective practitioner, a facilitator of knowledge, a mediator in problem solving situations and a manager of actions in real situations. The problem solving characteristics of EE require that the teacher should also be a researcher. This implies that he or she should be able to analyse, evaluate and interpret, not only information, but also circumstances/situations. These capacities it is argued should also be developed in students. The general teaching approach adopted in EE is to create a learning situation in which students are actively involved in the learning process. Student involvement is a key to learning.

Environmental Education teaching methodology can be summarized as follows:

Effective EE should:

- 1) utilize diverse learning environment;
- 2) use a variety of teaching approaches;
- 3) stress practical activities;
- 4) stress first-hand information;
- 5) use an inquiry/discovery method;
- 6) follow a collaborative interaction with fellow students;
- 7) draw on actual environmental problems in the immediate environment;
- 8) focus on a type of teaching- learning approach in which the teacher becomes a co-discoverer and a reflective practitioner;
- 9) focus on a problem-solving approach.

In other words, EE methodology is student-centred, collaborative and experiential.

I will be analysing the teaching-learning methodology prescribed in the Geography and Science textbooks of Eritrean junior secondary school in terms of the above criteria and broadly in terms of student-centred and teacher-centred. This latter distinction is not an either-or choice. Instead, teachers should be able to move flexibly and effectively between the two by asking: “when is which approach more appropriate?”

In general, education *about* the environment involves provisions of information, facts, ideas and generalizations on environmental issues. It is often learning by memorization and understanding, and it is teaching by lecturing of appropriate technical and intellectual explanations. This type of teaching and learning is in general teacher-centred. Of course, facts about the environment can be discovered by students themselves, making learning about the environment student-centred, but in general, the transmission of facts is primarily done by an expert in the field, the teacher, and transmitted to the students, making the methodology teacher-centred.

Education *through* or in the environment is often characterised by another pedagogical technique. It develops skills, competencies and critical thinking in students. It is learning through practice, repetition, active participation and involvement. It is teaching through training, guided exercises, field studies, experiments, surveys, discussions or participation in nature activities. This type of teaching and learning is in general student-centred.

Education *for* the environment develops in students values, attitudes, responsibility, interest, concern and ethics for the conservation and maintenance of the environment. It is learning by doing, active participation and teaching by dialogue and by role modelling. This form of education is in general student-centred, in that it is aimed at developing student behaviour in a way that implies the internationalization by the student of environmental values.

Grade six Geography textbook

Chapter two: The following activities are prescribed:

- 1) The teacher has to make a short trip to the surrounding area with his students. Then students have to answer the following questions.
 - What natural resources do students observe?
 - Which resources are diminishing? Why?
 - What can we do to conserve these diminishing resources?

Chapter three: The following activities are prescribed:

- 1) Group discussion: By grouping students into three or four groups, they must answer the following questions:

- If you are living in an eroded area, how could you conserve the soil? This might be by interviewing the farmers.
 - What are the causes of erosion around your locality and what are the methods to check erosion?
- 2) Teachers must take the students to the surrounding areas, and students must report about deforestation and afforestation programmes in the village. Students might do this by observing their surroundings.
- 3) Students must be encouraged to plant trees in the compound of their houses and schools.

There seem to be different activities or teaching-learning methodologies implied in the grade six Geography textbook. These activities can be summarized as field trip, group discussion, active observation and taking notes, physical activities (such as the tree planting) and surveying (through observation and interviewing). These are related to the following Tbilisi guiding principles of EE.

Effective EE should:

- ▶ Emphasize the complexity of environmental problems to develop critical thinking and problem solving skills;
- ▶ Utilize diverse learning environments and a broad array of educational approaches to teaching and learning about and from the environment with due stress on practical activities and first-hand experience;
- ▶ Help the students to discover the symptoms and real causes of environmental problems.

And the activities mentioned are related also to developing an environmental ethic. According to the Queensland Department of Education (1993:7-8) and Tilbury (1994:14-15), effective EE generates action by encouraging students to take responsibility for the care and shaping of their own environment. This would be a learning to care for the environment by doing some activities that

reflect and encourage such caring.

Students would get different environmental knowledge from the activities prescribed in the textbook. For example, the field trips are activities that are aimed at gathering information, especially from sources other than textbooks, and by highlighting the complexity of, say, the cause of soil erosion. The group discussion is also part of an information sharing learning activity. Students share the information they have gathered with the others in their discussion group and learn through the sharing. Again the active observations of phenomena on the field trip and the note taking that goes with it, focus on students building up information about, say, the availability of natural resources in their area, information about how people like farmers cope with erosion, which crops are rotated, etc. This would be knowledge developed *about* the environment.

It is hoped also that students in addition to gaining relevant information, would also develop skills from the activities prescribed in the textbook. For example, field trips could provide students with the vehicle for activities through which the students learn best by doing more in their environment (Hurry 1980:60). By obtaining information at first-hand, they could develop skills in data recording and hypothesize on the data collected. Field trips hope to provide meaningful experiences for the students by enabling them to use all their skills during the experiences. They could for example, develop:

- ▶ skills of watering and planting trees, i.e., a competence. This would give the students confidence in their own ability.
- ▶ skill of interactive and comparative learning in group discussion, i.e., in group discussion there is active learning in which all students participate by cooperating among themselves. Since the students conduct the teaching and learning process, it is a student-centred learning process. This process helps develop students' skills of articulation, listening, critical thinking and problem-solving.
- ▶ skills of problem-solving and skills of research in the conservation of soil.
- ▶ skill of careful observation of the deforestation and afforestation programme.

Therefore, through the activities prescribed in the textbook of Geography, students develop knowledge *through* the environment.

By encouraging first-hand experience, practical investigations and interactions with nature and the built environment, students will hopefully come to appreciate the complex interrelationships that exist among the people, culture and biophysical surrounding (Palmer and Neal 1994:33). One of the student activities prescribed in the textbook in chapter three is: “students must be encouraged to plant trees in the compound of their houses and schools.” Here education can contribute also in educating students in knowledge *for* the environment in order to develop a sense of personal responsibility towards the conservation of diminishing natural resources. In this case, students will hopefully develop positive attitudes and are encouraged to plant more trees around their compounds.

Grade seven Science textbook

There are some activities prescribed in the grade seven Science textbook, which must be done by the teacher as well as by the students. The activities prescribed in grade seven Science textbook are the following:

- ▶ An experiment which shows the presence of water and air in the soil (MoE 1994b:55-56).
- ▶ An experiment which shows the characteristic of manure by adding it in a beaker of water (MoE 1994b:63).
- ▶ A visit to the Ministry of Agriculture (MoA); students are asked to know the types of commercial fertilizers commonly used in their area (MoE 1994b:63).
- ▶ A visit to the farm areas; students are asked to observe the ploughing system used by the farmers and finding a means to improve it (MoE 1994b:64).

The above teaching methods or activities prescribed in the grade seven Science textbook can be summarized as experimentation, surveying, collecting information, and observation. These activities

are similar to those activities recommended by Nam (1995:115). According to Nam, greater attention should be given to such teaching-learning processes as field study, experiments, survey, discussion, and participation in nature conservation activities rather than by giving lectures. In order to address the environmental issues, for example, about the measures done to improve livestock production, about the safety measures taken during using pesticides and to address the ways of improving ploughing method effectively, students would need knowledge about the environment, i.e., information about the aspects and dynamics of these environmental issues. For example, they need information about:

- ▶ types of commercial fertilisers commonly used in their areas by visiting and asking the MoA;
- ▶ different ploughing systems used by farmers by visiting and observing the farm areas;
- ▶ types of pesticides which are commonly used in Eritrea by studying the textbook;
- ▶ the ways of improving Livestock production in Eritrea and the safety measures done during using pesticides by studying the textbook.

Students would need also knowledge *through* the environment, how to address environmental issues, i.e., the aims of learning activities are also to develop skills of:

- ▶ research and as a result gaining knowledge on how to test for water and air in soil and how manure works as a nourishment for the soil by doing an experiment.
- ▶ interviewing officials at the MoA in order to know the types of commercial fertilisers used in Eritrea;
- ▶ observation of improving the ploughing system used by farmers by visiting and observing the farm areas;

Besides knowledge *about* the environment and *through* the environment, students are also encouraged to develop knowledge *for* the environment, i.e., a certain environmental ethic in which they care about the environment, are actively involved in sustaining it and have an awareness of

importance of a healthy environment. For example, students are guided to develop a positive attitude and interest towards taking safety measures when using pesticides, when improving livestock production and during improving ploughing methods by visiting and observing the farm areas.

3) Assessment of Environmental Education themes

Assessment is communication between teacher and students, communication which helps the student demonstrate and appreciate what has been learned, and the teacher to plan tasks and first-hand experiences that will promote future learning or development of attitudes or concerns (Palmer and Neal 1994:153).

The inclusion of EE in examinations should reflect the status given to EE in the curriculum. Vulliamy as cited by Taylor (1998:209), suggests that the content of examinations have fundamental effects upon the topics taught in the classroom. He argues that the EE content in the school examinations provides an impression of the likely formats of classroom teaching of EE. So one can learn a lot about the status of EE by analysing the test and exam papers. Assessment should relate to the central teaching objectives for EE, i.e., knowledge and understanding, skills, problem solving, attitudes and application. This means that exam questions of EE should also assess higher order cognitive skills and wise action rather than merely simple recall of factual knowledge.

Examples of assessment in the first semester Science examination for grade seven (1999):

1) ----- improves soil fertility.

- a) Crop rotation
- b) Adding manure
- c) Fallowing
- a) all

2) Name the two types of natural fertilizers.

Out of the 40 questions asked in the examination, 34 questions are of these types. Examination of this nature assesses factual recall and recognition.

Examples of assessment in the first semester Geography examination for grade six (1999):

1) ----- means erosion control and wise use of soil.

- a) Deforestation
- b) Overgrazing
- c) Conservation
- d) all

5) The upper layer of the soil is called -----.

There were 16 questions asked in the examination and all of them are of these types. These types of questions also assess only information or factual recall.

Examples of a first semester English test for grade seven (1999):

After a reading text is given, the following questions are asked:

- 1) A lot of young trees -----(plant) in the soil.
- 2) Animals----- (stop) from entering the compound.

These questions seem to be testing grammar skills, and as such are only indirectly linked to something environmental.

The questions asked in the exams of Geography and Science assessed mainly factual recall and recognition. It is clear that assessment of this nature fails to assess the broader aspects of EE, such as the affective aspects like appropriate value and behaviour, as well as the higher order thinking skills, such as critical thinking, problem-solving, analysis and interpretation. From such types of questions, students would get only knowledge *about* the environment. This is because, these questions assess only information recall.

However, the questions should also assess skills of students in order for students to have knowledge *through* the environment. These skills can be skills of diagram identification, skills of reading maps, case studies asking for analysis, interpretation and problem-solving of environmental related topics. More difficult to formulate would be questions that assess the affective aspects such as value and behaviour in order for students to have knowledge *for* the environment. However, simple examples could be, “ what advice would you give your neighbour if you noticed that he did not rotate his crops?” or, “what would you do if you needed wood for making a fire to cook food?”

In response to factual recall type of questions, junior secondary school teaching is likely to focus upon the information transmission in order to maximise students' chances of success in examinations. Based on the emphasis on information recall reflected in the exam and test papers, it seems likely that most of the teaching will be teacher-centred. As I have mentioned earlier on, this has its practice in EE, but it seems that the overwhelming emphasis on information recall exams would leave little room in actual classroom learning activities that are student-centred. And yet, that forms a crucial and important part of developing students' EE skills and attitudes. In summary, the stress on knowledge *about* the environment in the exam, rather than knowledge *through* and *for* the environment points to 'gaps' of EE in schools that need to be addressed.

Vulliamy (1988:153) suggests that, one of the most important reforms required to promote EE would be a change in examination methods. This could be done by restructuring the examination questions to include higher order cognitive skills rather than just simple recall of factual knowledge. If changes to the examination system are fundamental to ensure that effective EE is taught in the classroom,

then a lack of commitment on the behalf of the examination board to develop the appropriate methods for assessing all aspects of EE could severely debilitate the effectiveness of its development (Taylor 1998:210). Progress in the development of an EE programme in junior secondary schools will remain limited where examination boards fail to respond to the particular demands of assessing the broader aspects of EE. The influence that the content and method of assessment have in classroom teaching is highly significant.

In summary, EE themes are included in Geography, Science and English. As prescribed in the content of these textbooks, students are supposed to learn *about*, *through* and *for* the environment. Different teaching methods or activities are also prescribed in these textbooks. These activities are aimed to help students to develop knowledge and understanding, skills and attitudes about the environmental issues prescribed in the textbooks. However, as we have seen from the questions asked in the exam/test, the nature of assessment is focussed mainly on factual recall. Through these types of assessment, students would get only knowledge *about* the environment. However, students should develop knowledge *through* the environment and *for* the environment as well. In order for students to get knowledge *through* and *for* the environment, exam/test questions should assess the higher order thinking, such as critical thinking, analysis and interpretation and the affective aspects such as value and wise behaviour.

In this chapter, I have looked at the environmental themes found in three subjects, prescribed learning activities and types of assessment questions. The next chapter will focus on how teachers perceive their prescribed textbooks, their teaching methodologies and classroom practices.

CHAPTER FIVE

EMPIRICAL INVESTIGATION OF TEACHERS' VIEWS OF ENVIRONMENTAL EDUCATION

For my empirical investigation two different methods were chosen. One method was interviews with Debarwa junior secondary school teachers on the specific situation in the school. The second method was class observation in Debarwa junior secondary school.

A) Interviews with junior secondary school teachers

I planned to interview six junior secondary teachers in order to determine their experience and perceptions about the status of EE in Eritrean junior secondary school in terms of how they include EE in the curriculum. I thought that interviews would help me to obtain information on different views and experiences of teachers. I hoped that the interviews would enable me to gain insight into how and why they practise EE the way they do. The teachers I planned to interview were Geography, Science, English, History, Maths and Physical Education teachers. Only these subject areas are taught in Eritrean junior secondary schools. I selected all these subject areas to see whether EE, according to UNESCO-UNEP(1983) cited by Taylor(1998:201), was integrated into the curriculum on a multidisciplinary basis. The teachers I planned to select for the interviews had to have at least three years of teaching experience. I felt that this experience would make them knowledgeable about the subject areas they taught.

The interviews were planned to take place in Eritrea. In preparation, I formulated interview questions while still in South Africa, prior to my departure to Eritrea.

At first, most of the interview questions were closed questions (mainly of a “yes” or “no” response), such as: “are there available charts/posters in your school?” I did a trial interview with these questions while still in South Africa. However, I soon realized that I

faced problems with these questions. These closed types of questions were specific and frequently restricted the options available to the interviewee. I understood that these questions couldn't give me detailed and varied information from the interviewees about my research project. Therefore, I changed these questions to open type of questions with the help of my advisor, for example, "what available charts/posters are there in your school?" I tried these types of questions with someone again, and I found them helpful in that they could reveal more about the individual's priorities and frame of reference, whilst also giving recognition to the interviewee by letting her/him talk while I would listen. They are also perceived to be "easy" to answer and do not pose much of threat to the individual. Finally I formulated 28 questions. (See appendix A)

The interview questions focused on six main areas, and these are as follows:

1) General details from the teacher

Example: "How many years have you been teaching?" Such types of questions I thought would help me to know the teaching experience of the teachers so that I would understand how knowledgeable they are about the subject areas they teach. Also, they would help me understand the wider context of these teachers.

2) General interpretations of an Environmental Education and subject content

Example: "How would you describe an EE theme in your subject?" Such types of questions I thought would help me to know about the teachers' own awareness and knowledge of EE.

3) Curriculum

a) Methodology of teaching-learning of EE themes

Example: “Give an example of how do you teach an EE theme in your classroom.” These types of questions I thought would help me to know the type of EE teaching methods used by teachers as well as giving me information about how teachers see themselves attaining their EE objectives.

b) Assessment/examination of EE themes

Example: “Can you give me an example of a test or exam you set that was based on an EE theme?” By knowing the type of questions set in a test or exam, I thought I would know how students are assessed and on what basis they are assessed. I was hoping that it would also give me some insight into what teachers regard as important EE issues.

4) Instructional resource materials

Example: “What available EE charts/posters are there in your school?” Such types of questions I hoped would help me to get information about the availability of instructional materials in school and the means by which students get access to resources, including textbooks.

5) Institutional and administration support

Example: “In what ways does the school support environmental projects?” Such types of questions would help me to get information about the availability of funds for field trips, the way in which the school and the administration support environmental projects and other means of getting sources of funding. It would show, I hoped, whether the school in general encouraged, through support, EE initiatives of teachers.

6) In-service Teacher Training

Example: “have you ever participated in workshops or any other seminars regarding environmental concerns? When? Where? Did you find it useful?” Such questions aimed to inform me whether teachers are trained to teach EE themes.

By focusing on these broad areas, I hoped to gain insight into the status of EE in schools, as viewed from teachers’ perspectives.

I translated the interview questions into Tigrigna (the mother language of Eritrea) within three days. This is because English in Eritrea is a second language. Translating the questions could help the interviewees give responses without difficulties. If I had not translated them, the interviewees might not have been able to answer the question due to the problem of language.

The interviews took place in Debarwa. Debarwa is a sparsely populated town which is about 30 km. from the capital city of Eritrea, Asmara. Most of the people of this town are poor in that they depend in most cases on agriculture. A few of them are merchants and construction workers. Debarwa junior secondary school is a small school of 32 teachers and 2000 students. Teachers teach two shifts of students. The school has no fence surrounding it and except at the entrance, there are no trees planted inside the school.

I chose Debarwa junior secondary school, because I taught in this school for about five years and I knew that the director and the teachers are cooperative. It also meant that the teachers I planned to interview would feel relaxed with me and hopefully not perceive me as a threatening stranger.

Fortunately, unlike the other schools in Eritrea, Debarwa junior secondary school students did not go for harvesting to help the farmers during the period I visited (Dec- Jan). As a result I started my work immediately.

Before I interviewed the teachers, I met the director in order to get permission from him. I told him the general purpose of my research and the research method I was going to use. He was kind, cooperative and generous and he gave me permission to do anything that I wanted to do. I showed him my interview questions and he became interested in the questions. This might be due to the assumption that the director felt that the interview questions might help the teachers in getting knowledge and awareness about the environment.

First, I examined the junior secondary school textbooks, because this would help me familiarize myself with the subject, in which EE themes are included. I found that EE themes are included only in the Geography, Science and English syllabi. I therefore decided to interview only teachers who taught these subjects. The director told the concerned subject teachers that I would like to interview them, and they indicated that they were willing to be interviewed.

I held preliminary meetings with the Geography, Science and English teachers to provide background, discuss the purpose of the research and to clarify uncertainties. This I thought would help me set the tone of the interaction. The teachers were initially scared to be interviewed and a typical question they asked at the preliminary session was how they had to prepare for the interviews. This might be due to the limited knowledge and awareness teachers had about EE and they were perhaps perceiving the research as a kind of “evaluation” of their competencies.

I assured the teachers that I would not mention their names in my minithesis so that they could relax and answer the questions freely. I informed them also that I would like to interview them not about the whole subject area they taught, but only about the EE themes found in their subject area for each of them. I told them that I would like to use a tape recorder because I would not be able to memorize or write down all the information they would share. Furthermore, I said that I would like to take photographs while I was interviewing them because I would like to keep a visual record of the interview. (See

Appendix B). All the teachers responded positively to what I wanted to do.

For the Geography and Science teachers the interview was in Tigrigna while for the English teacher in English, since she is a foreigner in Eritrea. The interviews took place in an empty small classroom which was far away from the disturbances of students and the time of the interview was during the free period the teachers had. The teachers were interviewed separately.

Within one day about two hours of taped-recorded data were gathered using interviews. This was due to the cooperation of the director and particularly of the teachers.

The data collection method was semi-structured interviews. The aim was to determine teachers' understanding of and involvement in EE. The value of semi-structured interviews is to enable sufficient probing of the response made by the interviewees while at the same time controlling the tendency to deviate from the topic in question. According to Behr, as cited by Klein (1997:32), the advantage of semi-structured interviews is that it allows for flexibility. I also used this flexibility during the interview. For example I asked questions like "How?", "Why?", "When?", and I was able to clarify uncertainties with the interviewees. (The main interview questions are shown in appendix A.)

During the interview day, guests from the Ministry of Health visited in order to give lessons about AIDS for all students. It was interesting to observe that every student participated actively. I took photographs of this presentation. (See appendix B). I assumed that this presentation would help my research, because giving lessons and information about health problems like AIDS can be considered a positive step towards making students aware of the consequences of AIDS for the environment.

In the next section I will analyze teachers' responses to the interview questions in terms of education *about, through* and *for* the environment.

Analysis of teachers' interviews

1) General details from the teachers

The Geography teacher trained in the Teacher Training Institute for one year before he became a teacher. He has been teaching for about 12 years. Before he came to Debarwa, he taught in Asmara. In Debarwa he teaches grade seven and six. The Science teacher is a Diploma graduate. He has been teaching for about 10 years. Before he came to Debarwa, he taught in Mendefera. In Debarwa he teaches grade seven. The English teacher is a foreigner in Eritrea (originally from Phillipines). She has been teaching for about 23 years. She came to Eritrea through an employment agency. Now she teaches English to grade seven.

2) General interpretation of Environmental Education and subject content

I found that the interviewed teachers' understanding of environmental issues and their concepts of environmentalism were limited in some cases. The interviewees all described EE differently. For example, according to the Science teacher EE is "a general knowledge about the environment and it is deep knowledge of how to keep the environment." The Geography teacher described EE as "knowledge of different rocks, soils, rivers, wildlife and natural vegetation." And according to the English teacher EE can be described as:

Environmental concern for everyone and how to care for the environment. It is the study of ecology which is an important issue for the development of a nation. It is the understanding of the cause and effect of endangering species. It entails knowledge of the importance of the environment to human life and how it could contribute to the development of nations.

According to these teachers EE is knowledge *about*, *through* and *for* the environment. Particularly for the Geography teacher, it is about information of the various elements of nature; for both the Science and English teachers it is also knowledge of how to care for the environment; and for the English teacher it includes a social dimension. It is hoped that these teachers enable their students to develop environmental understanding, skills and

commitment and thereby would “environmentalise” their teaching. With this it is likely that programmes would be effective in producing environmentally literate students as circumscribed in chapter one. A key aim is for teachers to develop in their students an awareness of their environment that will lead to a personal sense of involvement and eventually to the shaping of an environmental ethic (Lucas 1993:105). Although the teachers interviewed did not express an aim directly, their interpretation of EE is not in conflict with it.

3) Curriculum

i) Methodology of EE themes

As it is discussed by Tilbury (1994:14), an effective EE uses a variety of teaching and learning strategies and resources, including field studies, simulations, action research, information technology, personal experiences and cooperative learning methods.

Environmental Education should prepare students for life through the development of ethical values, through an understanding of the major problems of the contemporary world and through the provision of skills and attitudes needed to play a productive role towards improving life and protecting the environment (UNESCO 1977:24). The distinguishing feature of EE according to Linke (1993:90-91) and Lucas (1993:105) is the orientation toward concern for the “quality of life” of beings and commitment to environmental conservation.

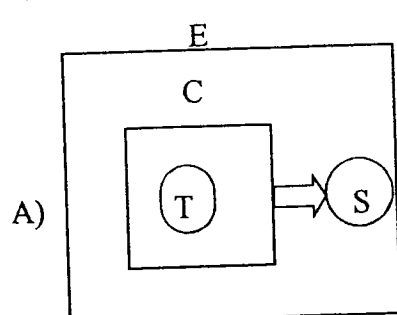
In the teaching-learning process, teachers are no longer merely dispensers of factual knowledge and the only participants actively engaged in higher order thinking process (Stevenson in Robottom 1987:75). Since EE is problem-oriented, a problem-solving approach is primarily recommended; for example, the discussion projects techniques (Adara 1996:245). That is, the goal of EE requires students to be engaged in problematic inquiry through discussion of a critical and reflective analysis of environmental issues. One of the characteristics of EE in formal education is to emphasize the complexity of problems and

stimulate critical thinking in order to address environmental and developmental issues in just and human ways (Tilbury 1994:15). This approach encourages participatory learning with the teacher acting as catalyst and team member.

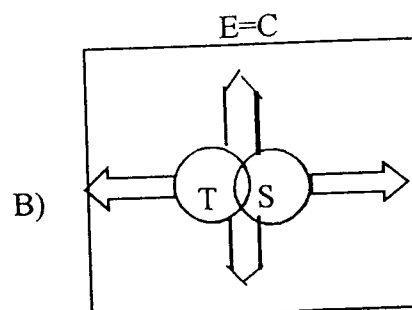
Didactics for EE is participatory and suited to holistic thinking. It includes the following.

- ▶ Techniques which develop network rather than linear, sequential thinking;
- ▶ Transaction and interactive models of teaching in which students interact with each other and their environment and the teacher acts as a facilitator rather than as a transmitter of information;
- ▶ Lesson content which is relevant to the students and their experience of the environment, in particular actual field work;
- ▶ Development of sensory perception and critical observation skills, in particular through field work;
- ▶ Teaching methods specially aimed at developing the students' attitudes and values, example open discussions about feelings, simulations, role modelling;
- ▶ Synthesis of analytical, critical, lateral thinking and creative skills through problem-solving and problem-posing exercises;
- ▶ Environmental action or learning for empowerment through community-based, integrated environmental projects; and
- ▶ Process as well as product evaluation in terms of ongoing assessment of knowledge, attitudinal and behavioural components (Blignaut 1991:11).

Stapp (1977:74-75) discusses two types of teaching-learning situations in EE.



Teacher as conveyer of information



Teacher-student interaction

Where:

E= Environment

T= Teacher

C= Content

S= Student

In method A the teacher (T) is a conveyor of information. The teacher assumes little responsibility for the content (C) of the lesson. The teacher becomes familiar with the information to be imparted and then assumes the role of expert in conveying the information to the learner (L) and then assumes the role of expert in conveying the information to the learner (L).

Because of the attitude of the teacher, the environment (E) is seen frequently by the teacher and students as outside of the classroom. It does not appear to be linked to the work being done in it. This method encourages a linear, unidirectional relationship between the teacher and the learner.

In method B the teacher is more of a facilitator than a lecturer. He participates to a greater or lesser extent in the selection of the content material for each lesson. With this method the student participates more in the acquisition of knowledge. There is constant interaction between the teacher and the learner. The environment becomes part of the learning situation and events in the environment may lead to changes in the content of lessons. And so the teacher and the learner interact continuously with the environment (Stapp 1979:20).

In summary, the teaching methodologies used in EE as mentioned in chapter four are the following:

- 1) use of diverse learning environments;
- 2) a variety of teaching approaches;
- 3) stress on practical activities;

- 4) encouragement of first hand experiences;
- 5) drawing on actual environmental problems in the immediate environment;
- 6) use of the inquiry/discovery method
- 7) collaborative interaction with fellow students
- 8) teacher becomes a co-discoverer, a reflective practitioner;
- 9) promoting a problem-solving approach.

In other words, EE teaching methodology is student-centred, collaborative and experiential.

Like I did for chapter four, I am going to analyze the methodologies of chapters five and six in terms of the above criteria.

When the teachers were asked how they teach EE themes in their classroom, their responses were varied. According to the English teacher:

In the teaching of EE themes I make use of asking questions about their environment, especially about the village, pointing out what they can do for the environment and how can they take care of their environment.

This type of teaching is an open discussion method in which students express their feelings and share their ideas. Through this type of teaching, students can develop positive attitudes and values to care for their environment. This type of teaching is similar to the teaching method expressed by Blignaut (1991:11) who holds that the teaching methods of EE are specifically aimed at developing students' attitudes and value. This can be done through, for example, open discussion about feelings, simulations and role modelling. Here, the methodology can contribute by educating students in knowledge *for* the environment in order to develop personal responsibility towards the environment. The methodology contributes also by educating students in knowledge *about* the environment, i.e., in providing information about how to care for the environment. Moreover, this methodology can contribute also in educating students in knowledge *through* the environment in order to develop skills, i.e., how to go about caring for the environment.

The Science and the Geography teachers had similar responses to the question of how they taught environmental themes. According to the Geography teacher:

In the teaching of EE themes, for example, in the lesson of 'types of soil', first I asked students to bring samples of soil to the class. We classified the soil into different parts according to their colour and size, because, soils are different in size and colour. Then we identified the best type of soil for plant growth. This is done in terms of the colour of the soil, i.e., if a soil is dark or dark brown, it contains a large amount of humus, hence it is the best type of soil and if the colour of the soil is light brown or gray, there is little humus, and hence, it is not fertile soil for plant growth.

In order for the students to identify and classify soils, the Geography and the Science teachers concentrated on educating students in knowledge *about* the environment, that is, they provided students with knowledge about the presence of humus. And in order to develop skills of classification and identification of soils, these teachers concentrated also in educating students in knowledge *through* the environment, that is, they encouraged students to develop these skills through experiential learning and through working with actual soil samples. It seems also that, these teachers can contribute to their students' environmental literacy by educating students in knowledge *for* the environment by equipping students to use their acquired knowledge and skills in taking thoughtful, positive action individually and/or collectively towards using the best types of soils in their farming areas. This teaching method tends to be student-centred through experiential learning. It would seem that through the above teaching and learning methodologies, students would get information, develop skills, attitudes and values about their environment, if what the teachers said is in fact happening in the class.

So far I have discussed how teachers teach the EE themes in their subject in classroom. Now I will discuss how teachers would differentiate the teaching of EE themes of their subject in an environmentally sensitive way from teaching it in a way that is not linked to EE.

According to the English teacher:

Teaching an EE theme should be linked towards the knowledge of the environment. Since most of the students come from rural areas, they have to learn how to conserve and how to care for their environment.

According to the Science teacher:

Teaching EE themes should not be specific in the classroom only. For example, in the lesson of 'soil and water conservation', students should visit farmers and should ask them how they conserve their soil and water.

According to the Geography teacher:

Teaching about EE themes should be practical, i.e., what students learned theoretically in class must be followed by practice. For example in the teaching of the lesson about rocks, students should bring different types of rocks to class. They should learn the characteristics of rocks by classifying them into different parts according to their colour, size and hardness, since, rocks are different in colour, size and hardness.

According to these teachers, EE links directly with the environment beyond the immediate classroom. In other words, they tend more towards Stapp's B model of teaching. They not only encouraged information about this environment, but also indicated an awareness of the need for student engagement with this environment. Furthermore, there is also reference to moral aspects of EE. It would seem therefore that all three aspects of EE are present at Debarwa.

If the teaching of EE themes is different from other topics, the expectation of the teacher at the end of the lesson of an EE theme should be similarly different. The interviewed teachers were asked about their expectations of their students after they taught EE themes, and their responses were as follows:

The expectation of the English teacher was: "I expect my students to be more aware of the importance of taking care of the environment and how the environment affects their life."

And the expectation of the Geography teacher, for example, on the topic “of soils as natural resources” was:

For students to be able to distinguish among the three layers of the soil, to develop the skills of identifying soils according to their size and colour, to know the causes of soil erosion, to develop the skills of identifying eroded areas, and to develop the skills of soil conservation.

And the expectation of the Science teacher from his students after he taught, for example, the topic “Beginning to Agriculture” was:

For students to be able to get information about composition of soil, the advantage of ploughing farms before planting, to know the ways to improve cattle production, to develop skills of construction of dams, skills of conserving soil and skills of planting trees so as to conserve soil.

The Geography and Science teachers’ expectations were for students to gather information about composition of soil, the advantage of ploughing and the ways of improving cattle production, i.e., knowledge *about* the environment and also to develop skills of soil classification, construction of dams, skills of conserving soil and skills of planting trees, i.e., knowledge *through* the environment. Only the English teacher noted the hoped for change in students’ attitudes, i.e., knowledge *for* the environment.

ii) Assessment

According to Taylor (1998:210), assessment should address the broader aspects of EE such as the affective aspects (value and behaviour), as well as the higher order of thinking skills such as critical thinking, analysis and interpretation. This implies that assessment should address knowledge *through* the environment and *for* the environment besides knowledge *about* the environment.

The examples of questions asked in the exam/ tests given by the interviewees were as follows:

Geography exam:

- 1) Mention the types of natural vegetation found in your surrounding.
- 2) How many types of soils are there, and mention them?
- 3) Which type of soil is the best soil?

Science exam:

- 1) What is mixed farming?
- 2) Mention the main types of crops in Eritrea?
- 3) Describe the factors for air and water pollution?

English test:

- 1) The trees----- (water) by the students every day.
- 2) Animals----- (stop) from entering the compounds.

As also discussed in chapter four, the questions asked in the exam/test according to the examples given by the interviewees assessed mainly factual recall and recognition. From these types of questions students would get only knowledge *about* the environment, i.e., information about soil, vegetation, air and water pollution, mixed farming and the main crops in Eritrea. Exam/test question of this nature fail to address the affective aspects such as values and behaviour and as a result students are not assessed in their knowledge *for* the environment. These exam/test questions also fail to address the higher order thinking skills, such as critical thinking, analysis and interpretation; hence, students are not assessed in their knowledge *through* the environment.

1) **Instructional resource materials**

According to UNESCO (1980:82), adequate teaching aids and materials must be available for

teaching of EE and the content of instructional materials needs to reflect the diversity of problems presented and adopted to the varied interests of students. Instructional materials must be adequate in terms of content, quality and availability. Taylor (1998:213) suggests that financial support needs to be allocated for the design of instructional materials that reflect national policy. He argues that the progress of existing EE programmes and the implementation of innovative ones will be impeded if there is no adequate funding.

In this section I will look at the availability of textbooks to students, teachers' views on the relevance and quality of the EE section in the textbooks and on the type and availability of charts/posters/pictures for the teaching of EE themes.

a) Textbooks

There was a lack of textbooks in Debarwa junior secondary school. When the teachers were asked how students got access to textbooks, all three teachers said that “ there is a lack of textbooks in the school - three students share one textbook.”

What is the view of the teachers about the relevance of EE themes in the textbook? According to the Geography and Science teachers,

EE themes in the textbooks are relevant to the life of students. Since most of the students come from rural areas, the EE themes found in the textbooks, such as the soil and water conservation, are helpful for them so that they can apply what they have learned in class to their farming areas.

According to the English teacher,

EE themes in the textbook are relevant for the students in that they are directly involved in activities relating to the physical environment, like forests and tree planting where they have to care for their environment.

Therefore, according to these three teachers EE themes in the textbook are relevant to

students, because they are related to the life of students. It seems that the EE themes in the textbook could enable students to be equipped with knowledge and skills so as to develop a sense of personal responsibility towards, for example, the conservation of soil and water, as well as equip them with practical farming skills and information.

b) Wall charts/Posters/Pictures

Charts/posters/pictures can effectively support learning activities. If these teaching materials pick up on environmental issues in the students' actual life area, they may stimulate and contribute to developing students' concern for their own environment.

According to the English teacher:

There are a few official charts/posters/ pictures given from the Ministry of Education. There are wall charts in the Geography and Science classes made by the students concerning EE themes. However, there were no charts made by me and no wall charts in the class made by the students.

There were, however, some posters made by students in Geography and Science classes. However, in general, there was a lack of wall charts/pictures/posters in Debarwa junior secondary school. This means that these instructional materials are inadequate in terms of availability for the teaching of EE. Taylor (1998:212) suggests that the limited in-service teacher training that teachers receive could limit the potential for teachers to develop their own instructional materials. As a result the teachers are heavily dependent on core textbooks.

Examples of wall charts made by the students were:

Science: Soil conservation charts. Among these charts was a Terracing chart in Semenawi Bahri, Eritrea. (Terracing is the sloping of ground around a hill, which is steep-sided on one side. The levelled surface is planted with crops).

Geography : Wildlife wall charts. These charts are about wildlife found in Eritrea, such as Elephants, Leopards, Lions and Wolves, which are rare in Eritrea because of hunting and the destruction of forests.

Since these types of wall charts reflect the actual environmental conditions of Eritrea, they may stimulate and contribute to the developing of students' concern for their own environment; for example, concern for the conservation of soil through terracing and a concern for the preservation of wildlife by supporting Eritrea's national parks.

5) **Institutional and administration support**

Administration and institutional supports are very important in school, particularly to run field trips. For effective EE implementation, fieldwork, which places stress on local environments, can be stimulating. Fieldwork according to Hurry (1980:61) generates interest in the subject and students are stimulated by their activities in the "real world". He argues also that fieldwork provides the vehicle for activities through which the students learn more about their environments and helps them to develop a concerned interest in the environment. Through fieldwork students develop knowledge, skills and attitudes about the environment.

For effective fieldwork to take place in the school, there should be institutional and administrative support. In other words, there should be adequate funds to support fieldwork in the school. Among the Tbilisi Recommendations No 2(1978), EE should be enhanced and supported by the organization and structure of the learning situation and institution as a whole (Palmer and Neal 1994:22). However, according to the interviewees, and the school director, there were no available funds allocated for field trips, and there were no other means of getting funds in the school. Instead of using it for field trips, they said that if funds are available in the school, it is used to build new classrooms. These teachers have only taken their students to farms in the areas surrounding the school.

6) In-service Teacher Training

The UNESCO-UNEP statement, the IUCN (1977), the Belgrade workshops (1975) the Tbilisi Declaration (1977) and the Earth Summit (1992) highlighted the importance of teacher training in EE, by arguing that the future of the environment may depend upon the ability of teacher education to incorporate and practice an effective EE curriculum. Successes of EE would depend primarily on the teachers, since they are the central figures in the schools. A teacher is an important link between knowledge and the students in all educational systems. Effective teaching programmes rely on effective teachers. Specific teacher training for EE must exist if teachers are to be adequately equipped with both the knowledge and the associated pedagogical approach to teach EE.

The interviewees were asked whether or not they had ever had any in-service training in EE. The Geography teacher reported that he participated in a workshop regarding environmental concerns only in 1995 and it was too short (two weeks) to make any significant difference in his teaching-learning methods. But the Science and the English teachers never had training regarding environmental concerns.

The evident lack of teacher training could explain to a large extent the current de-emphasis of certain aspects of EE, such as skills to investigate the environment and developing positive attitudes to the environment (Spork 1992:152). According to UNESCO-UNEP (1985), the objectives of EE extend beyond the mere acquisition of cognitive information, to include those relating to attitudes, skills, awareness and participation. If teachers do not have knowledge and understanding of the goals, scope and expertise to facilitate its implementation, then “true” EE cannot be realistically operating in Debarwa junior secondary school.

B) Classroom observation

The second method I planned for data collection was classroom observation. First I will explain the plans I had for classroom observation and later I will analyze the plans with the findings in terms of education *about, through and for* the environment.

I had no plan to do classroom observation while still in South Africa, prior to my departure to Eritrea and this was due to time constraints. After I finished interviewing teachers and had collected enough data from documents, I thought that it might be fruitful to do classroom observation. I hoped that classroom observation would give me insight into how teachers actually do their work in class. What teachers say may not necessarily reflect what they do.

The areas I planned to observe were the following:

School environment observation

I planned to observe the presence or absence of plants in the school compound and I also wanted to see what the natural environment surrounding the school was like, because environment itself can be used as a fruitful resource for teaching of EE, especially in the absence or lack of other institutional learning materials such as textbooks.

Classroom observation

I planned furthermore to observe the following:

1) Teacher interaction with students

By observing the interaction of teacher with students, I wanted to know whether there was dialogue between the teacher and the students. Since environmental problems are complex,

there must be dialogue and interaction between the teacher and students, as opposed to mere transmission. Environmental education sees it as important to involve students actively in their own learning.

2) **The teacher's method of teaching and students' learning activities**

With this, I wanted to observe whether the teacher and students used a variety of teaching and learning methods and I wanted to compare these teaching and learning methods with the appropriate teaching and learning methods of EE, which is in general student-centred, collaborative and experiential.

3) **Time organization within one period**

With this, I wanted to observe the availability of time organization within one period. This is because the teaching-learning methods of EE often require long periods of time, because the activities are usually student-centred, such as the inquiry method, group discussion, experiment etc.

4) **Class size**

By knowing the number of students in one class, I wanted to observe its relation with assessment, feedback and group discussion in class.

Again I asked permission from the director of the Debarwa junior secondary school to do class observation. The director in turn asked permission from the concerned subject teacher. I informed the teacher also that I wanted to take photographs while I was doing class observation. This I assured the teacher, because I wouldn't be able to memorize the situation of the classroom later on. The director and the subject teacher were willing to allow me to do so.

First I looked at the lesson plan of the subject. This is because I wanted to get some information about the lesson ahead and I wanted to compare the stated goals of the teacher with the actual activity in the class. In the lesson plan the teacher stated that: “at the end of the lesson students will be able to distinguish among the three layers of soil.” (But whether it is done practically or theoretically it is not mentioned in the lesson plan).

Throughout the study I kept a research diary in which I recorded classroom observation, feelings, reactions, and interpretations which, according to Kemmis and Mc Taggart as cited by Klein (1997:33), is an important research tool.

Analysis of classroom observation

1) Teachers' interaction with students

Environmental problems are complex. There must be dialogue and interaction between teacher and student as opposed to mere transmission (Bak 1997b:191). There ought to be a move away from mere rote learning, towards incorporating in teaching practice the promotion of critical thinking, problem solving skills, care and commitment (EEPI 1994 as discussed in Bak 1997b:191). In the teaching-learning process, teachers should no longer be mere dispensers of factual knowledge and the only participants actively engaged in higher order thinking process (Stevenson in Robottom 1987:75). Since EE is often problem-oriented, a problem-solving approach is primarily recommended, i.e., the discussion projects techniques (Adara 1996:245). That is, the goal of EE requires students to be engaged in problematic inquiry: a critical and reflective analysis of environmental issues.

I observed a grade six Geography class. While the Geography teacher taught in class, I noted:

There is little interaction between the teacher and the students. The students are passive and the teacher transmits all the knowledge. The teacher is active and dominant while the students are only listeners. Students respond only when answering questions. (My field notes 1999)

Such type of teaching technique is teacher-centred which does not motivate students to learn or participate in the teaching and learning process. This implies that there was little dialogue between the teacher and students and students could not engage in problematic inquiry. This could lead to the possibility that when the students finish high school they won't be prepared for the world of work (MoE 1998:1). Through this form of education students would have knowledge primarily *about* the environment.

2) Teacher's method of teaching.

Since EE is often problem-oriented, according to Nam (1995:115) and Adara (1996:245) greater attention should be given to such teaching-learning processes, as field study, experiment, surveys, discussion, or participation in nature conservation activities rather than merely giving lectures. And according to the guiding principles of EE, effective EE should:

- ▶ emphasize the complexity of environmental problems to develop critical thinking and problem solving skills; and
- ▶ utilize ... a broad array of educational approaches to teaching-learning about the environment with due stress on practical activities and first-hand experience.

The Geography teacher during the lesson of "soil texture", did not use a wall chart or bring a sample of soil so as to make the teaching-learning process more experiential. (See appendix B).

The teacher uses chalk and talk method of teaching or lecture method... The teacher depends on textbooks and doesn't use supplementary instructional materials... No practical activities, no first-hand experience... mainly lecture method. (My field notes 1999)

This is a traditional method of teaching based mainly on the transmission of knowledge, information and ideas through verbal communication by the teacher. Hence the emphasis is centred on teaching *about* the environment and the method of teaching is teacher-centred.

The above finding might indicate that since the interviewed teachers lack substantial training in EE, they couldn't understand the complexity of EE so as to use a variety of teaching methods, such as practical activities, problem-solving approach, discussion, field study, etc. Moreover, the observation of a mainly fact transmission, teacher-centred approach differs from what this teacher said he does in his classroom when I interviewed him, where he claimed to place emphasis on learning activities and real samples of soil. Of course, I do not want to make any generalizations about general EE teaching approaches, based on merely one observation, but I did find it interesting that what he said in the interview and what he did in the classroom were quite different.

3) Class size

Activities that require students' active participation and involvement, such as field investigation, case study, project, group discussion and assignment should be suggested for the students. The class I observed consisted of about 75 students. Three students shared one desk and even in some desks there were four students. (See appendix B). In Eritrea, teachers have been working under severe difficulties where schools are over-crowded. Fieldwork, group discussion and active learning outside the classroom are considered by many teachers to be almost impossible to manage and control. As a result the teaching-learning process was mainly by lecturing of appropriate technical and intellectual skills. According to Fien (1993b:15), this form of education is education *about* the environment. Through this form of education students are provided with information, facts and ideas about environmental issues. However, the objectives of EE extend beyond the mere acquisition of knowledge, to those relating to attitudes, skills, awareness and participation (UNESCO-UNEP as quoted in Taylor 1998:203). Therefore, class size is another reason why teaching-learning seems to stress teacher-centredness.

4) Time management

Short periods often lead to rote learning in which teachers are dispensers of factual knowledge and the only participants actively engaged in higher order thinking process (Stevenson in Robottom 1987:75). Short periods mitigate against most of the more time-consuming and often enjoyable student-centred teaching methods such as inquiry method, group discussion, experiment, critical and reflective analysis of environmental issues. In Eritrean junior secondary schools one period is 40-minutes, which according to the interviewed teachers is too short. I did not observe group discussion, experiment in the class, and this might be due to the short time within a period. Therefore, another reason why the teaching-learning process focused on the transmission of knowledge or rote learning may be due to short periods. Hence, the teaching-learning process emphasized a teacher-centred approach. However, EE should prepare students for life not only through information development, but also through the provision of skills and attitudes. Environmental knowledge is needed to play a productive role towards improving life and protecting the environment (UNESCO 1980:24 and Ramsey et al 1992:36).

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CHAPTER SIX

ENVIRONMENTAL EDUCATION AND TEACHER TRAINING IN ERITREA

INTRODUCTION

In Eritrea after a meeting held in 1995, the Department of EE was established between the Agricultural trainers, Environmental trainers, Dean of Academic Affairs and the Director of the proposed Institute of Teacher Training. The Pre-service Teacher Training Institute was established in 1995 in Asmara. This implies that teachers trained before 1995 have had no exposure to EE training.

Institutions for Teacher Training

In Eritrea there are two institutions where teachers are trained. One is the Asmara University where secondary and junior secondary school teachers are trained. In this university a four-year degree programme and a two-year diploma programme are offered and educational subjects and discipline specific subjects are taught. However, EE as subject is not taught in this university.

The second one is the Teacher Training Institute (TTI) where the primary school teachers are trained. In this institute educational subjects are taught. One of the educational subjects is EE. Therefore, in the TTI, pre-service primary school teachers are trained in EE. Until the proposed teacher training college is opened (planned for 2001), those primary teachers trained at TTI can move to junior secondary schools. In the proposed teacher training college, junior secondary teachers will be trained and it is likely that the new curriculum will include EE.

In-service Teacher Training in Eritrea is very limited. From the three teachers I interviewed only the Geography teacher has had very limited in-service training. Seminars concerning environmental issues are held only once or twice a year and are only a day long.

Environmental Education in the Teacher Training Institute

Introduction

The course in EE has been written using ideas taken from other countries with experience of EE as well as from the United Nations Environment Programme (UNEP) and various NGOs such as Oxfam, the Peace Corp and VSO (Voluntary Service Overseas) (Gerezgher and Harris 1996b:5). However, the content and format of EE are specific to the Eritrean context.

According to the Environmental Education Course Trainer Guide (EECTG) (1996), the aims of the course in EE are the following:

- ▶ To acquire knowledge, skills and attitudes needed to protect and improve the environment;
- ▶ To examine and interpret the environment from a variety of perspectives; physical, geographical, biological, sociological, economical, aesthetic, ethical and spiritual;
- ▶ To arouse awareness and curiosity about the environment and encourage active participation by the individual and wider community in resolving environmental problems;
- ▶ To develop the teaching skills necessary to train primary school children in EE, thereby fulfilling the goal of EE.

Firstly, teacher training can contribute to the development of junior secondary students by educating trainees in knowledge *about* the environment in order to acquire knowledge and understanding needed to protect and improve the environment. Secondly, teacher training can contribute also by educating trainees in knowledge *through* the environment, i.e., knowledge

about how to teach their junior secondary students to go about protecting and improving the environment. The skills trainees develop would enable them to get their students to recognise the problem, to identify the cause, to develop solutions and to implement the solutions and thereby to improve and protect the environment. Moreover, teacher training can contribute in educating trainees in teaching their students knowledge *for* the environment in order to develop attitudes needed to protect and improve the environment. This type of knowledge seeks to empower trainees and their students with moral and political awareness. In short, based on the aims, the EE course at the TTI would seem to equip trainees and students with knowledge and commitment and skills to analyse environmental problems from social, political, economical, physical, geographical, biological, technical, historical, aesthetic, ethical and spiritual perspectives. In this case, the trainees aim to arouse awareness and curiosity about the environment, and hoped to offer the opportunity to use their acquired knowledge and skills in encouraging their students to take thoughtful, positive action individually and/or collectively towards solving and preventing environmental problems. Furthermore, it is hoped that trainees with their students will develop a democratic ethos in which the environmental problems are solved (Bak 1997b:43) and thereby fulfilling one of the goals of EE.

Content of Environmental Education as prescribed in the syllabus

First I will mention the contents with their sections included in each unit and I will summarize briefly what the unit is about and then I will analyse the unit in terms of education *about*, *through* and *for* the environment.

Unit-One Introduction

- ▶ Environmental Education
- ▶ Investigating an environmental problem
- ▶ Ultimate goal of Environmental Education

In this unit, EE is interpreted as: “ the vehicle to enable Eritrea’s students to develop a sound knowledge of the environment around them, develop an attitude of care and concern for the environment and develop skills which enable them to achieve sustainable development in the future.”(EECTG 1996:2). As is discussed in this unit, the ultimate goal of EE is: “ to develop citizens who are willing to work towards achieving sustainable development.”(EECTG 1996:4). One of the environmental problems addressed in this unit is litter, such as metal, plastic and glass. The causes and dangers of this litter are mentioned. For example, plastic causes suffocation, kills animals and does not decay.

Unit-Two Sustainable Development

- ▶ Natural Resources and Development
- ▶ Sustainable Development

Given the ultimate goals of sustainability, this unit considers how natural resources are often exploited and damaged. It also considers how the development of resources is influenced by nature, economics, society and politics. Sustainable development as a means of ensuring the sustainable use of resources in the future development of Eritrea is also investigated.

Sustainable development is seen as the goal we should all strive to achieve. It is developing the resources and environment so that the economic and social needs of all human beings are met now while ensuring their maintenance. The main implications of these are:

- concern about the relationship between resource use, population growth and technological development;
 - concern about production and distribution of resources of food, energy and industry among the more developed and less developed nations in the world;
 - concern about an even development, underdevelopment and the gross imbalances between rich and poor nations for equality;
 - concern about environmental degradation and potential ecological disasters
- (EECTG 1996:4).

Unit-Three Ecology foundation

- ▶ Species Ecology
- ▶ Ecosystem Ecology
- ▶ Ecosystem of Eritrea

In this unit the need for a sound knowledge of ecology (the study of organisms including man and their relationship with one another and their environment) and how to improve the trainees' understanding of ecology are considered. It also considers how ecological activities can be taught in schools. Some of the activities prescribed for the trainees are the following:

- ▶ Investigation of the invertebrate life around the TTI; collecting and identifying the species they find; drawing the different animals they collect; using a key to identify their catch; recording the names; writing down the habitat they have found in; and then predicting what the animals feeding niche is. Then trainees are divided into small groups, and have to evaluate the usefulness of the learning activity and consider how they could improve upon it.
- ▶ Trainees create food chains using cards to represent the animals they found in the previous lesson, as well as typical plants and large animals seen around the TTI.
- ▶ In groups, trainees present posters of each of Eritrea's ecosystems to the class. In turn each group explains the main components and relationships within that ecosystem(EECTG 1996:2-4).

Teaching about the food web (the lesson I observed during class observation) is also included in the learning activities. I will discuss it in the section dealing with classroom observation.

Unit-Four Environmental issues

- ▶ The problem-solving approach, recognising the problem: Deforestation is mentioned as an example.

- ▶ Identifying the causes of environmental problems: The causes of deforestation in Eritrea are noted as war, overgrazing, high demand for timber, fuel, wood and charcoal locally and conversion of forest to farm land (EECTG 1996:3).
- ▶ Developing solutions to environmental problems: “There are usually more than one solution to any problem. In order to achieve a sustainable development, the choice must be considered, and the most appropriate solution must be chosen”(EECTG 1996:3-4).

There is an activity prescribed in this unit which enables the trainees and their students a hands-on approach of experimentation to assess the alternative forms of energy available. I will mention the activity prescribed in this unit in the next section.

- ▶ Conflicts that arise during environmental problems: “Environmental problems can give rise to conflicts, for example, conflicts between groups of people and government to farm land, between people over forced resettlement and between international companies and local people.” (EECTG 1996:4).
- ▶ Role of government in decision-making: The following activity is prescribed:
 - trainees list the different forms of transport that are used in modern cities and assess in class which form is the most environmentally sound.
 - trainees discuss alternative transport systems used in other countries.
 - trainees then evaluate the current transport system in Eritrea, consider the government approach and then suggest which options the government might follow.
 - trainees draw conclusions about the role of the government (EECTG 1996:5).
- ▶ Roles of individuals: Individuals often believe that they have an insignificant role in making choices about the environment (EECTG 1996:5).

This activity stimulates trainees and their students into discussion about the role of the government in decision-making. This unit also considers that trainees and their students are able to tackle environmental problems themselves. Water conservation is taken as an example.

Unit-Five Environmental Education methods

- ▶ Goals of EE
- ▶ Context and content of EE
- ▶ Micro-Teaching-teaching/learning style one (lesson one)
- ▶ Micro-Teaching-teaching/learning style two (lesson two)
- ▶ Micro-Teaching-teaching/learning style three (lesson three)

This unit considers the goals of EE as mentioned in the introduction of this chapter. It also considers where the learning of EE can take place, what is taught in EE and how it should be taught.

Trainees' experience of EE is influenced by the quality of the environment in which they learn. The development of the positive attitude to other people and to their surroundings is related to what is being taught in the curriculum and how it is being taught. However, it also takes place beyond the formal curriculum, through observation and experiences outside the classroom and the Institute. The social and physical environment in which trainees learn also has an important influence on their experience of EE. The quality of the relationships between people in the classroom and Institute, as well as the quality of the surrounding inside and around the Institute, are key factors in creating a stimulating learning atmosphere for the trainees and lecturer (EECTG 1996:5).

Trainees use the outdoors as a classroom and learn from one another about various environmental topics. I will discuss the activities mentioned in this unit in the next section dealing with teaching methodologies.

Unit-Six Managing the school grounds

- ▶ Tree distribution
- ▶ Introduction to managing the ground

- ▶ Practical and cultivation
- ▶ Introduction to managing the ground
- ▶ Practical and weeding
- ▶ Practical and planting
- ▶ Tree assessment
- ▶ Practical and watering
- ▶ Practical and propagation

This unit investigates planning and managing the school ground for EE purposes. The EE purpose as mentioned in unit one is “to enable Eritrean trainees and students to develop a sound knowledge of the environment around them, develop an attitude of care and concern for the environment and develop skills which enable them to achieve sustainable development in the future.” (EECTG 1992:2). It also considers how trainees develop a variety of practical skills that can be used in schools.

In the EE syllabus of the TTI, the aim is to educate trainees in knowledge *about* the environment in order to address the environmental problems. For example in unit two, “Increasing industrialization...has put increased pressure on resources”. (EECTG 1996:1). This means that one cause of pressure on resources is more industries which use natural resources like water, minerals and air. Here, trainees would need knowledge *about* the environment in order to get information about various uses of resources, as well as the causes of exploitation of natural resources. In unit three, “A knowledge and understanding of ecological principles are needed if we are to understand environmental problems, develop solutions and strive to achieve sustainable development.” (EECTG 1996:2). Here, in order for the trainees to understand ecological principles, to understand environmental problems, and to develop solutions so as to achieve sustainable development, they would need information *about* the environment. That is, information about the distribution of natural resources in Eritrea, information about biological

cycles in Eritrea's natural environment, information about the governments' laws pertaining to environmental issues, and information about tree and soil types.

In unit four, "A problem solving approach is needed if solutions are to be found." (EECTG 1996:1). Here, trainees would need knowledge *through* the environment in order to develop skills needed to solve environmental problems, i.e., skills of problem-solving or a problem solving approach. Such skills could be skills of recognising the problem, skills of research, skills of identifying the causes of the problem, skills of developing ideas for solutions of the problem, and skills of implementing the solutions of the problem. In unit six, "the trainee will have the opportunity to care for young trees individually, as well as caring for a piece of land in a small group. Practical skills needed are experienced through participation." (EECTG 1996:1) In this case trainees are encouraged to develop participation skills, cooperative skills and decision-making skills.

Effective EE according to Tilbury (1994:14) encourages problem-solving by searching for solutions to real environmental issues. Since EE is problem-oriented, a problem-solving approach is primarily recommended, i.e., the discussion project techniques (Adara 1996:245). And according to the guiding principles of EE, "Effective EE should emphasise the complexity of environmental problems to develop critical thinking and problem-solving skills" (UNESCO 1980:72). This implies that since environmental problems are complex, an appropriate problem-solving approach is needed for the solutions of environmental problems. In this case trainees should develop different skills (problem-solving skills) such as critical thinking, synthesis and analyses, critical thinking and creative skills (Blignaut 1991:11). Therefore, through a problem-solving approach, effective EE seems to be developed in the TTI if this approach is really reflected in class by the lecturer.

Trainees in the TTI through practical experiences (such as the caring for trees and a plot of land) are encouraged to be fascinated by their surroundings and it is hoped would have tremendous

capacity to build up on natural learning experiences that take place within them. The “real world” experiences of a wide sample of educators show the vital importance of education *through* the environment as a prerequisite to a concern *for* it. The most valuable and readily available resource to all schools is the environment itself (Palmer and Neal 1994:33). Here, education can contribute in educating the trainees in knowledge *for* the environment in order to develop a sense of personal responsibility towards the care of the young trees individually as well as caring for the piece of land collectively. Trainees, through this actual experience, need to take their students through similar experiences so as to provide them with the base from which they will develop a concern for their environment too. This is likely to lead to the development of attitudes and values, including trainees’ understanding and behaviour necessary for the development of sustainable and caring use of the environment, which in turn they will hopefully live out for their students and so involve them too in education *for* the environment.

I have looked at what is taught in the prescribed EE syllabus of the TTI. In the EE syllabus of the TTI, trainees are supposed to learn knowledge *about* the environment, *through* the environment and *for* the environment in order to gain information, skills and develop attitudes and values about the environment. In the next section, I will elaborate on how EE is taught by looking at the activities in the teaching and learning activities prescribed in the syllabus.

Environmental Education methodology as prescribed in the syllabus

First, I will mention the activities or the teaching and learning methodologies prescribed in the EE syllabus, then I will analyse them in terms of the appropriate EE methodologies as mentioned in chapter four which, in summary, are student-centred, collaborative and experiential.

Unit One: The activities prescribed in this unit are:

- ▶ Trainees in groups investigate their knowledge about litter;

- ▶ Trainees sort through a collection of litter to identify the different types of litter;
- ▶ Trainees consider their attitudes toward the problems of litter in Eritrea.

Through these activities, trainees develop different skills, such as observing and questioning skills, raising ideas and hypothesizing, predicting and thinking skills, investigating and experimenting skills, communicating and recording skills and application skills. These activities are mainly trainee-centred, collaborative and experiential, because the trainees work in groups and all participate in collecting, identifying and investigating the different types of litter in Eritrea.

Unit-Three: The activities prescribed in this unit are already mentioned earlier in the section relating to the content of EE. In order to develop skills of identifying and collecting species, skills of experimentation and communicating with their colleagues, trainees need knowledge gained through interacting with the environment. For example, when the trainees demonstrated the model of a food web in class and when they presented the charts of ecosystems of Eritrea to the class, they were developing skills of presentation and communication. These activities are similar to the activities of teaching and learning methods suggested by Nam (1995:115). Since, he claims, EE is practice-centred, Nam suggests that “greater attention should be given to such teaching and learning process as experiment, survey, discussion, or participation in nature conservation activities rather than giving lectures.”(Nam 1995:115).

Unit-Four: The activities prescribed in this unit are:

- ▶ Trainees discuss the importance of forests and the causes of deforestation;
- ▶ Trainees investigate a variety of energy sources, decide where they originate from, how efficient they are, how safe they are and whether they are sustainable;
- ▶ Trainees report results to the class and discuss the advantages of the different alternatives;
- ▶ Trainees discuss what they can do to conserve water.

Trainees would need information about the environment in order to develop knowledge and understanding about the importance of forests and the causes of deforestation. They would also need information about the variety of energy sources, their origin, their efficiency, their safety and whether they are sustainable or not, before they can teach this to their students. The trainees themselves develop the skills of how to teach environmental knowledge to their students by going through the learning activity themselves. In other words the course promotes a trainee-centred experiential learning approach. This approach seems to be in line with the approach advocated by the Queensland Department of Education (1993:7-8) and Tilbury (1994:14-15), i.e., “Effective EE tries to be student-centred, allowing students to contribute to the planning of their own learning experience.”

Unit-Five: The following quote is mentioned in this unit.

Environmental Education is an approach to teaching and learning. The development of trainees’ ability to express their own views and listen to those of others, from reasoned opinions, work cooperatively, make decision and take action for the environment is related to the teaching and learning methods adopted for environmental work (EECTG 1996:7).

The syllabus lists the following methodologies appropriate for teaching EE:

A variety of teaching and learning approaches; participatory learning; cooperative learning; enquiry-based approach; problem solving; discussing views and beliefs; positive approach, i.e., emphasis on action not just on problems; first-hand experience; link with the community; use of real life issues; and use of a secondary source (EECTG 1996:7).

Trainees in groups have to prepare a lesson plan for teaching an environmental topic based on a practical experiment they establish outdoors. The activity is structured as follows:

- ▶ Each group delivers a 10-minute activity to the class;
- ▶ Trainees state objectives of their assigned activity;
- ▶ Trainees comment on the activities used and discuss how they could be improved;
- ▶ Trainees report on their activity.

Through this activity trainees develop participatory skills, cooperative skills, experimenting skills, presentation skills, communication skills and reporting skills. In other words this activity promotes a trainee-centred, experiential and collaborative learning approach. This activity seems to be in line with the approach advocated by Palmer and Neal (1994:135-136), i.e.,

Successful teaching involves trainees in learning through the environment using relevant first-hand resources and real life experiences as a basis for learning; working outside the classroom as a natural extension of the working environment; developing communication skills such as reporting the results of research; and developing self reliance and independence especially while exploring the school grounds.

Unit-six: By developing small gardens surrounding the Institute to represent model school grounds trainees are asked to:

- ▶ Water, weed, cultivate and tidy their plants in their own time;
- ▶ By dividing into groups, each group designs an experiment to prove that weeding is essential for healthy growth of grass;
- ▶ Students actively develop the garden plot during a series of practical lessons implementing instructions they were given.

Through group discussion, trainees develop interactive and cooperative learning skills, which means in group discussion there is active learning in which all the trainees are encouraged to participate by cooperating among themselves. These learning activities are aimed at developing practical skills such as: communication skills, weeding skills, watering skills, reporting skills,

cultivating skills, experimenting skills, pruning skills, planting skills and propagating skills. Therefore, this type of activity promotes a trainee-centred, experiential and collaborative approach to learning.

The learning activities also hope to instil a sense of pride and care for the natural environment as well as teaching practical plant care. In other words, trainees would need also knowledge *for* the environment.

In summary, there are many activities or teaching and learning methodologies in the EE syllabus which should be done by the trainees and should be guided by the lecturer. These activities lead to active learning by doing, which is trainee-centred. The lecturer's role would be to guide or lead the activities which are done by the trainees and to select the content material for each lesson. Within this method the trainees are encouraged to participate more in the acquisition of information, skills and awareness. Through the activities prescribed in the EE syllabus, trainees, it is hoped, will:

- ▶ acquire knowledge, skills and attitudes needed to protect and improve the environment;
- ▶ arouse awareness and curiosity about the environment and encourage active participation by the trainees and their students to protect and improve the environment.

It would seem from the above that the aims of EE as mentioned in the Environmental Education Course Trainers Guide, are reflected in the content and activities prescribed in the EE syllabus. If these prescribed activities are in fact reflected in class, then effective EE is likely to be developed at the TTI.

So far, I have discussed about what is taught (content), i.e., what trainees are supposed to learn as prescribed in the EE syllabus and how EE is taught (methodology), i.e., the teaching and learning activities that should be used in the EE syllabus. The next section deals with how

trainees are assessed. I will analyse the approach used to assess trainees by referring to the exam questions asked.

Assessment of Environmental Education

Assessment, as I have explained in chapter four, is a form of communication between teacher and students, communication which helps the students to demonstrate and appreciate what has been learned, and the teacher to plan tasks and first-hand experiences that will promote future learning or development of attitudes and concern (Palmer and Neal 1994:153).

Assessment should relate to the central teaching objectives of EE, i.e., knowledge and understanding (comprehension), skills, problem-solving, attitudes and application. In other words, in order to cover the three broad areas of knowledge *about, through and for* the environment, assessment should ask:

- ▶ questions that focus on environmental facts and information;
- ▶ trainees to demonstrate their skills of problem-solving, analysis, synthesis, interpretation, application;
- ▶ questions about appropriate forms of behaviour towards the environment.

The following are some of the questions asked in the first semester EE examination (1999).

- 1) Which of the following statements is correct about an ecosystem:
 - a) an ecosystem does not vary in size
 - b) an ecosystem refers to the study of living things in an environment
 - c) an ecosystem varies in size and location
 - d) an ecosystem is the study of living things in a nature place.

- e) none of the above
- 2) The natural place where an organism lives is called
- a) Natural resource
 - b) Niche
 - c) Habitat
 - d) Ecology
 - e) Species

These types of questions assess information about the environment, and there were 20 questions like these.

- 3) An ecosystem contains three main food relationship activities. By the help of a well-illustrated diagram for each activity, explain and discuss these relationships.

This type of question still focuses primarily on information (i.e., what are the three main food relationships; the way they link up with each other), but it also starts to move in to the area of analysis.

- 4) Suppose you are an EE teacher in an elementary school in Eritrea. The environment of the school you are assigned to is full of different types of wastes. Discuss and explain, how could you solve the waste problem so that your students and your community will not suffer from this environmental issue.

This question is much more focused on problem identification and solving skills as well as the skills to devise implementation strategies. Moreover, it also starts to touch on the assessment of appropriate behaviour (i.e., concern for the environment) which is needed to sustain the solution to the waste problem. It was the only question of this type in the exam.

It is clear from the examples given that the questions asked in the examination of EE at the TTI assess mainly factual recall and recognition. Thus, there is more emphasis on education *about* the environment, with less emphasis on education *through* and *for* the environment. The TTI assessment of thinking skills such as critical thinking, analysis and interpretation, as well as assessment of the affective aspects (value and behaviour), seems to be underemphasised.

In response to factual recall types of questions, the teaching of EE in class is likely to focus upon the provisions of cognitive information in order to maximize trainees' chances of success. This is because the content of EE in examinations according to Taylor (1998:203) provides an impression of the likely format of the classroom teaching of EE. Therefore, restructuring the exam questions to include a wider assessment of cognitive skills and affective aspects rather than simple recall of factual information is important to ensure that EE is taught in all its richness in the classroom.

What strikes me though is that despite the many and exciting learning activities that trainees experience (mainly skill development and consciousness raising), very few questions in the exam tested this learning. It seems as though the powerful traditional approach of information assessment still holds sway which is quite in contrast to the goals of EE as described in both chapter one as well as in the goals of the EE course itself in the TTI. I suspect that assessment of EE could be a fruitful area for further research.

So far I have discussed the content, methodology and assessment of EE as prescribed in the documents. In the next section, I will look at the lecturer's view about the content, methodology and assessment of EE.

Empirical Investigation: Lecturer's View

For my empirical investigation two methods were chosen. These were an interview and a classroom observation.

A) Interview with the lecturer

I planned to interview one EE lecturer at the TTI in order to determine his experience and perception about the status of EE in Eritrean junior secondary school in terms of how he included EE in the curriculum of training teachers for junior secondary schools. I thought that an interview would help me to obtain information on the views and experiences of the lecturer. I hoped that the interview would also enable me to gain insight of how and why the lecturer practises EE the way he does. In the TTI, there is only one EE lecturer and it is the only place in Eritrea where EE as a subject is taught.

I prepared questions while still in South Africa, prior to my departure to Eritrea. I followed pretty much the same procedure for formulating the interview questions as I did for the school teachers, i.e., changing the closed types of questions to open type of questions by doing a trial interview with the questions. I formulated 25 interview questions.

First, I will mention the types of questions formulated and then will analyse the findings of the interview with the findings of the classroom observation in terms of education *about, through* and *for* the environment.

The interview questions focused on five main areas similar to the school teacher interview questions. These are: general details from the lecturer, general interpretation of EE and subject content, curriculum, instructional materials and institutional and administrative support.

Again I followed similar procedure as I did for the school teacher interviews, i.e., asking the Director of the TTI for permission, having a preliminary briefing session with the lecturer about the purpose of my research and informing the lecturer of my need to use a tape recorder during the interview. As with the school teachers' interviews, the data collection method was semi-structured.

The interview was in English, because he told me that he would not have any problem with English language and that he could express his responses easily. The interview questions are shown in appendix A. I recorded half an hour of taped recorded data.

B) Classroom observation

The second method I planned for data collection was classroom observation. The procedure for classroom observation was pretty much the same as I did for classroom observation in the school, i.e., having no plan to do classroom observation while still in South Africa, prior to my departure to Eritrea because of time constraints; and later on planning to do classroom observation after the interview with the lecturer was finished and data was collected from the various documents

The plans for the classroom observation include the following:

1) Lecturer's interaction with trainees

By observing the interaction of the lecturer with trainees, I wanted to see whether there was dialogue between the lecturer and the trainees. This is because according to Bak (1997b:191), teaching and learning practice in a cooperative approach to EE calls for more active participation in learning, i.e., dialogues and interaction between the lecturer and trainees as opposed to mere transmission.

2) **The lecturer's method of teaching**

With this, I hoped to observe the lecturer's method of teaching and compare it with EE's view of appropriate teaching methods. Furthermore, I wanted to observe the trainees' learning activities and compare these with EE's view of appropriate learning methods which are trainee-centred, experiential and collaborative.

Analysis of lecturer's interview and classroom observation

1) **General details from the lecturer**

The EE lecturer; the first member of the new Department; has graduated from Agricultural College in Ethiopia. He received formal training in EE. Currently he is teaching EE at TTI. He has been teaching for about 27 years, out of which he has been teaching at TTI for about five years.

2) **General interpretation of Environmental Education and subject content**

According to the lecturer, EE is described as:

Education about, through and for the environment. It is an education which makes people knowledgeable, aware of and interested in the environment. Because of this, EE course is a successful course.

This shows that the lecturer has read about EE in order for him to name the very distinctions I am working with, and has a positive attitude to EE. Since the lecturer has a positive attitude towards EE, he is likely to implement it in class. His definition is similar to the definition of Stapp (1979:3). Environmental Education according to Stapp is:

a process aimed at developing a world population that is aware of and concerned about the environment and its associated problems and which has the knowledge, attitudes, motivation and solutions of current problems and the prevention of new ones.

In discussing the methodology and content of EE, I will look at whether the lecturer really implemented his stated view of EE or not.

3) Methodology of teaching-learning of EE

Environmental Education should not only be concerned with teaching trainees about the environment and how to conserve the environment. It should be a method of teaching and learning experiences, that is, stimulating and enriching (Opie in Leketi 1992:6). The central teaching objectives of EE extend beyond the mere acquisition of cognitive information to those relating to attitudes, skills, awareness and participation (UNESCO-UNEP as quoted in Taylor 1998:203).

According to the lecturer, he taught in class “by initiating trainees to be aware of and show concern for their environment through practical activities, such as the inquiry, discovery and the investigating teaching methods.” Here trainees, he hopes, will acquire information and understanding *about* the environment. They ought also to develop skills through the practical activities they learn in class. Moreover, trainees should use their acquired knowledge and skills in taking thoughtful measures towards and show concern for the environment. This type of teaching method is similar to Zoller’s interpretation of an EE approach in the school setting as “... exposing students to actual existing problems in the immediate environment, learning by self experience via the inquiry method; direct interaction between the students’ cognitive system which inturn entails a change in the lecturer’s role...”(Zoller in Leketi 1992:5).

According to the lecturer; “group discussion is one of the tasks given to the trainees in class. I organize this by dividing the class in into 5-8 groups.” Within this activity, it is hoped that trainees will participate actively. He hoped that the discussion would stimulate critical thinking of the trainees and that they would be ready to address environmental issues. According to Tilbury (1994:15), EE should emphasise the complexity of problems and stimulate critical thinking to address environmental and developmental issues in just and human ways. This approach supports participatory learning with the lecturer acting as catalyst and team member.

The lesson I observed was about Ecosystem Ecology. One of the activities prescribed in the syllabus of EE, i.e., model for a food web was demonstrated by the trainees in class. (See appendix B).

Trainees were presented with a selection of cards showing well-known Savanna species. They had to create a food web using string to demonstrate the complex relationships. They did so by standing in a circle, with each trainee, representing one species. One trainee represented the sun in the centre. The string was then used to join all the species together according to their feeding relationships. (My own field notes 1999)

This activity is trainee-centred, experiential and collaborative, since the trainees in groups participated in demonstrating the food web model.

The trainees seemed to acquire more knowledge and understanding and skills about the environment. This implies that in the classroom emphasis was given to education *about* and *through* the environment rather than emphasis on education *for* the environment.

In general, according to the lecturer, and the Environmental Education Training Report, the methods used in the teaching of EE are: Videos, role play, games, demonstration, group discussion, class activities, reading exercises, project work, practicals, competition, lecture, experiment and field work (Gerezgher and Harris 1996:9). The Report recommends that these

various teaching methods could be examples of practice to the trainees and other Departments at TTI.

4) **Interaction between the lecturer and the trainees**

In the lesson I observed, the trainees participated actively in the acquisition of knowledge. The lecturer was more of a facilitator and guide than a lecturer. There was dialogue and constant interaction between the lecturer and the trainees as opposed to mere transmission. Stevenson as cited by Robottom (1987:75) suggests that in this teaching and learning process, the lecturer is no longer merely a dispenser of factual knowledge and the only participant actively engaged in higher order thinking processes. In this case, the trainees participated actively in the development of higher order thinking skills such as critical thinking and analysis.

5) **Assessment**

As discussed earlier on, exam/test questions of EE should assess higher order skills such as critical thinking, analysis and interpretation and the broader aspects of EE such as the affective aspects of EE (value and behaviour) rather than simple recall of factual knowledge and recognition (Taylor 1998:203).

When the lecturer was asked to give an example of questions asked in the exam/test, his response was as follows: ‘Since EE is based on investigation or the discovery method, in order for the trainees to discover and investigate their surrounding; we prepared some questions which ask for some creativity.’ The example he gave was: “In our environment there is lots of waste. How do you think we can eliminate this waste from our environment?” In order to answer this question, trainees should use their higher order thinking skills such as critical thinking, analysis and interpretation they learned in class to eliminate the waste from the environment. The question also aims to assess appropriate value and behaviour of students towards solving the waste

problem. It is hoped that the trainees will develop a sense of personal responsibility towards eliminating the waste from their environment. He hoped that the trainees would use their acquired knowledge and skills they were taught in class to take thoughtful and wise measures towards solving this problem with their students.

However, most of the questions asked in the 1999 examination were not of this type. This means that most of the questions asked are fact recall and recognitions as I have seen from the exam paper.

6) **Instructional materials**

a) **Textbook**

In the TTI, the textbook for EE is not yet prepared. Instead of textbooks, handouts and booklets are used. According to the lecturer, trainees have access to handouts and booklets.

b) **Posters/Charts/Pictures and other teaching materials**

The charts, posters and pictures available at the TTI concerning EE are supplied by the Ministry of Agriculture, foreign supporters such as the British Council and the VSO teachers. There were also wall charts made by the trainees. The trainees are encouraged to make the wall charts by their lecturer, and grades are given for their work.

Some of the posters and wall charts are:

- ▶ Posters of ecosystems of Eritrea;
- ▶ Wall charts of invertebrate animals;
- ▶ Wall charts showing the relationship of organisms(both food web and food chain).

These posters and wall charts reflect the actual environmental conditions of Eritrea. The preparation of teaching materials reflecting the actual environmental conditions of the country, region or area is of fundamental importance (UNESCO 1980:53). As I observed and according to the lecturer, there were available wall charts and posters for the teaching of EE.

7) **Institutional and administration support**

Hurry (1980: 59-61) stresses the need for field trips in the local environment if EE is to be effective. It suggests that the inclusion of EE in out-of-school education (field trip) programmes will demand a special effort, in many cases. Institutions and persons responsible for it should be prepared to introduce materials and activities relating to the improvement of the environment.

According to the lecturer, the Peace Corps, VSO, Oxfam UK, the British Embassy and the British Council are actively promoting EE at the TTI through funding of seminars, workshops and other activities. Many institutions in Asmara, such as the Ministry of Energy, Marine Resources, Ministry of Education and Ministry of Agriculture, also help in various practical ways. Therefore, due to the support of these organizations, institutions, interested groups and agencies, the following field trips have taken place at the TTI.

- ▶ A field trip to the BetGiorgis Zoo and Escarpment
- ▶ A field trip to MaiHabar, Alla and Decemhare Agricultural centre.
- ▶ A visit to Alternative Energy Centre in Asmara.
- ▶ A field trip to Merara to see the forest centre.

These field trips according to the lecturer took place during week ends and vacation. The aim of these field trips was to develop the trainees' understanding and knowledge of the EE terms and concepts which they had heard in the classroom.

By obtaining information at first-hand in the field trips, trainees were able to record data and to hypothesise on the data collected. It provided the trainees with a vehicle for activities through which it was hoped they would learn more by doing things in the environment. Field trips should also aim at providing meaningful experiences for the trainees by enabling them to use all their skills in the environment, for example, skills of observation of animal behaviour and interaction. Thus, education can contribute by educating the trainees in knowledge *through* the environment. And of course, through these field trips trainees would hopefully develop a concerned attitude and interest in their environment, hence education can contribute also in educating trainees in knowledge *for* the environment.



SECTION C
CHAPTER SEVEN

STRENGTHS AND BARRIERS OF THE CURRENT SITUATION OF ENVIRONMENTAL EDUCATION IN ERITREAN JUNIOR SECONDARY SCHOOLS: SOME AREAS FOR FURTHER INVESTIGATION

Strengths of the current situation of EE in Eritrean junior secondary schools

Environmental Education and Education policy

- a) The government of Eritrea for the people of Eritrea has formulated a National Environmental Management Plan for Eritrea (NEMP-E) in 1995. The significant progress made by the government is the inclusion of EE in the education policy. The MoE within the NEMP-E focuses on three main areas: environmental issues, environmental concern and environmental awareness. According to my analysis, the policy does capture the three main thrusts, that is, knowledge *about*, *through* and *for* the environment. The policy encourages not only information about aspects and dynamics of various ecosystems; it also motivates students to develop skills in problem-solving, decision-making and application as well as fostering a kind of care for the environment.
- b) Another significant progress is the preparation of the pilot school afforestation programme on March 20, 1995. The main aim of this pilot project is to introduce the concept of sustainable development to rural communities through the participatory role of the students (MoE 1995:2). Through this project students are encouraged to develop knowledge *about* the environment, i.e., knowledge about how to plant trees properly, how to nourish their growth, how to weed; and also knowledge *through* the environment in

order to develop skills necessary, for them to sensitively manage the environment. Moreover, students are encouraged to develop knowledge *for* the environment, i.e., knowledge of caring about the state of the environment.

Environmental Education and curriculum in Eritrean junior secondary schools

- a) In Eritrean junior secondary schools environmental themes have been included in Science, Geography and English curricula. It is hoped that from the information and the activities prescribed in the textbooks of Geography and Science that students are able to gain information about the environmental issues prescribed in the textbooks, (for example, information about how to improve cattle production); that students are able to develop skills, (for example, skills of conserving water and soil); and that students will develop a positive attitude and interest towards their environment.
- b) The interviewed teachers had positive attitudes towards EE and had enthusiasm.

Pre-service teacher training

- a) The information and activities prescribed in the EE syllabus at the TTI seem to educate students in knowledge *about, through* and *for* the environment.
- b) The EE lecturer at TTI had positive attitude and enthusiasm towards EE.
- c) There is emphasis on skill development in the TTI classroom.
- d) Albeit limited, the contributions made by MoA, British Council, MoE, NGOs and other individual bodies in providing funds and resource materials, particularly for field trips could be considered significant progress in the development of EE at the TTI. Field trips

seem to provide trainees with a vehicle for activities through which they learn by doing and also seem to provide meaningful experience by enabling trainees to use all their skills in addressing environmental problems. Field trips can also help trainees to develop a concerned attitude and interest in their environment. Therefore, besides knowledge *about* the environment, field trips can also educate trainees in knowledge *through* and *for* the environment.

Barriers of the current situation of EE in Eritrean junior secondary schools

As in many countries of the world, the process of integrating and implementing EE in Eritrea encounters difficulties which in time have to be overcome. Fien (1993) and Smyth (1995) maintain that many of the problems facing environmental educators, particularly in relation to aspects of formal education, have developed around its nature and purpose (Martha 1997:187). It is also widely agreed that the current school curricula in many countries do not support EE (Oulton as quoted in Martha 1997:187). Robottom (in Bowen 1994:144) maintains that scientific subjects are offered in an exclusively theoretical manner to young people, instead of being taught in a personalised and more appealing manner. Some of the reasons why teachers do not infuse EE are lack of time and lack of background (Lane et al 1994:9). Very often there are conceptual barriers which stem from the lack of a consensus about the scope and content of EE. The two common misconceptions according to Roy (1997:9) are that EE is relevant to Science only and that EE should be a separate subject. In other words few teachers are aware of what EE is or how it can be implemented in their subject areas (Samuel 1993:27).

Barriers regarding education policy

- a) Teachers seem to be under-prepared for teaching EE.
- b) There seems to be a lack of a comprehensive plan or guidelines at a national level. Taylor

(1998:208) considers that an implementation strategy or framework needs to support policy provisions. He argues that for effective EE, there must be explicit guidelines to facilitate the implementation of the policy. It seems as though there is not always clarity, certainly not on the part of the teachers I interviewed, about how EE should be implemented and can be supported. Clear guidelines would assist greatly in the facilitation of EE in schools.

- c) There is a lack of a prepared budget for the implementation of the policy and action plan (Tesfamichael 1995:3). The overall problem in Eritrea has been the lack of funds to undertake any activities related to environmental protection, whether EE or environmental monitoring. Financial constraints limit the realisation of projects and case studies (Martha 1997:202). With regard to the implementation of the policy, one of the most crucial areas of support for EE, particularly in the formal system, is adequate budgetary allocation (Bynoe and Hale 1997:65). They suggest that without adequate funding the progress of existing EE programmes and even the implementation of innovative ones will be impeded. This finding suggests that there is a "gap" between policy on EE and the actual implementation of the policy.

Barriers regarding curriculum in junior secondary schools

a) Barriers regarding methodology

There seems to be a severe shortage of classroom teachers prepared to effectively integrate EE into the educational programme. The traditional approach to the teaching of environmental matters seems to have been for the teachers to become knowledgeable about some aspects of the environment and convey this information to the student through the lecture approach. This process according to Stapp (1979:53) is not highly effective in stimulating sustained interest in environmental affairs or helping students acquire beliefs, attitudes, values, or skills conducive

to the development of environmentally literate citizenry. The teacher's role is not to lecture about the environment, but to assist students in acquiring information, skills and attitudes relevant to their environmental concern. The teachers and lecturer I observed and interviewed appear to be moving away from this traditional mode to a more interactive, activity based, experiential mode. However, judging from the questions asked in the exam, I suspect that a lot of classroom teaching about EE is still firmly based on a traditional lecture approach.

It seems that among the structures and practices that often impede the successful implementation of EE are the following

i) Large class size

Once in the classroom, teachers must manage classes of 70-75 which mitigates against field work and active learning outside the classroom, against interactions with students with each other and group discussion. Hence the teaching-learning process is characterised mainly by lecturing. Through this form of teaching-learning students are provided mainly with information, facts and ideas about environmental issues. This is knowledge developed about the environment. However, the objectives of EE extend beyond the mere acquisition of information to those relating to attitudes, skills, awareness and participation (UNESCO-UNEP 1985 as quoted in Taylor 1998:203).

ii) Over-crowded curriculum

Many scholars and agencies according to Adedayo and Olawepo (1997:88) have contended that an already over-crowded curriculum will not allow the introduction of another subject with a strong bias towards EE although it may be all right at the beginning to incorporate it into existing subjects. Nonetheless, such a situation as detailed by Olawepo and Adedayo will not only cause EE to be regarded lightly by both teachers and students, but will also dilute and pollute it,

especially in a multidisciplinary and examination-oriented curriculum (1997:88). In most Eritrean junior secondary schools, the system of shifts operates, i.e., teachers teach two shifts of students. This implies that teachers have to fit a lot of curriculum work into one school day. Adding something to an already full curriculum might be an unrealistic move.

iii) Short periods

In Eritrean schools one period is 40 minutes which mitigates against most of the more time consuming and often enjoyable student-centred teaching methods which encourage an effective EE. As a result in most cases the teaching-learning focussed on a teacher centred approach with an emphasis on knowledge *about* the environment.

iv) Lack of awareness of EE

Teachers are not generally familiar with or trained to use EE methodologies, as EE has had a recent introduction in Eritrea. Teachers need to be adequately trained to ensure that they have the self confidence to embark on an EE programme and to feel capable of handling any 'awkward' questions which might arise. Specific teacher training for EE must exist if teachers are to be adequately equipped with both the knowledge and the associated pedagogical approach to teach EE effectively.

b) Barriers regarding assessment

Assessment seems to be strongly based on **factual recall and recognition**, hence students are assessed mainly on their knowledge *about* the environment. Exam/test questions of this nature fail to address the affective aspects such as value and behaviour and higher order of thinking skills, such as critical thinking, analysis, problem-solving and interpretation. As a result students are not assessed in their knowledge *through* and *for* the environment.

c) Barriers regarding instructional materials

If Debarwa is typical of most Eritrean junior secondary schools, then there seems to be a lack of instructional materials such as textbooks, wall charts, posters and pictures to support the teaching of EE.

d) Barriers regarding institutional and administration support

At Debarwa there was lack of institutional and administration support. In other words, there was a lack of funds to support field trips or any other activities related to environmental projects such as case studies. According to the Tbilisi Recommendations No 2 (1978), EE should be enhanced and supported by the organization and structure of the learning situation and institution as a whole (Palmer and Neal 1994:22).

All the above factors lead teachers to become transmitters of information rather than guides and catalysts and in turn mitigates against diverse teaching approaches and the recognition of diverse teaching skills.

e) Barriers regarding the pre-service teacher training

Currently the course of EE at the TTI is only targeted at Pre-service teachers. Training must be targeted at all groups within the education system if the government is to make progress towards developing environmentally caring citizens, i.e., other teachers, directors and administrators are in equal need of training (Gerezgher and Harris 1996:5).

Some areas for further investigation

My investigation had as its aim to give a broad overview of the present situation in Eritrean junior secondary schools with regards to EE. In the investigation a number of issues came to the fore which need further research. If the status of EE is to be improved, then the following forms a possible research agendas.

Education policy

Considering that there is lack of explicit guidelines to facilitate the implementation of the policy in junior secondary schools,

- ▶ Research is needed to guide all sectors of the education administration how to act cohesively in the development of a national programme of EE.
- ▶ Research is generally needed for teachers to be prepared for the teaching of EE and to develop clear guidelines for teachers on how EE can be implemented and supported institutionally.
- ▶ Research may be needed on the allocation prepared budget for the implementation of the policy and action plans.

Curriculum

Considering that large class size mitigates against fieldwork, active learning outside the classroom, group discussion and against interactions of students to each other,

- ▶ Research is needed on ways in which teachers can cope creatively with large class size.

Considering that assessment seems to be strongly based on factual recall and recognition,

- ▶ Research is needed on how to develop more adequate assessment approaches.

Considering that the incorporation of EE into existing curricula or teaching programmes is often slow in junior secondary school,

- ▶ More research is generally needed on effective integration of EE into the curriculum as opposed to EE as a separate subject.

Considering that an integrated approach cannot be effectively implemented without the simultaneous development of textbooks,

- ▶ Research is needed on a systematic rigorous assessment of the prescribed textbooks which include EE themes and are used by teachers of EE, as well as
- ▶ Research can show how re-worked textbooks can be developed.
- ▶ Research is needed on quality assessment of textbooks.

Considering that short periods mitigate against most of the time-consuming and often enjoyable student-centred teaching methods which encourage effective EE,

- ▶ More research is needed that will show how teachers can be assisted to manage their time more effectively.

Considering the importance of institutional and administration support in school particularly to run field trips,

- ▶ Research is needed on ways EE can be organized and supported institutionally.

Pre-service and in-service teacher training

Considering that the great majority of present day teachers in Eritrea graduated before 1995 from Teacher Training Institute have had no exposure to EE,

- ▶ Research is needed on how these teachers can be supported and developed in EE teaching.
- ▶ A system of in-service teacher training programmes should be developed that aims to maximise teacher access whilst being financially efficient. Teachers and instructors should be upgraded by constant training, especially in a field like EE with its rapidly developing body of content.
- ▶ Research on the design and provision of short in-service courses/workshops for practising teachers is needed.

Considering that the concepts, skills and teaching methodology required for EE should become a fundamental part of all teacher training programmes and considering that teachers should be encouraged to adopt a problem-centred approach to teaching starting with experience of students, introducing new innovations and knowledge to the students,

- ▶ Research on curriculum development that favours more problems-centred approach is needed.

Considering that EE coordinators facilitate interaction with non-formal EE organizations who are already geared to help teachers, particularly with respect to fieldwork techniques, assessment and the development of resources,

- ▶ Research is needed on how EE training can draw on non-government organisations involved in EE.

In summary, this minithesis has as its focus four main areas:

- ▶ The extent to which EE is included in the education policy of Eritrea;
- ▶ How EE is incorporated in the curriculum, including content, methodologies, assessment and the availability of instructional materials.
- ▶ The kind of in-service and pre-service training available for teachers; and
- ▶ Possible areas for further investigation.

In my investigation I found that the government of Eritrea for the people of Eritrea has formulated the National Environmental Management Plan (NEMP-E) in 1995. The significant progress made by the government is the inclusion of EE in education policy. However, there seems to be a lack of a comprehensive plan or clear guidelines at a national level for the implementation and support of EE at school level.

With regards to findings pertaining to the curriculum, in Eritrean junior secondary school, Environmental Education themes have been included in the Geography, Science and English curricula. This means that an integrated approach to EE has been adopted at this level of schooling. The textbooks for these subjects to some extent aim to educate students in knowledge *about, through and for* the environment. Despite the supportive attitudes teachers have to these three aspects of EE; in classroom teaching more emphasis was given to education *about* the environment. Similarly assessment seems to be strongly focused on factual recall and recognition, i.e., students are assessed mainly in their knowledge *about* the environment.

It seems that among the existing structures and practices that often impede the successful implementation of EE in the classroom are large class sizes, overcrowded curricula, short periods, lack of instructional materials and lack of institutional and administrative support.

Environmental Education was implemented as a subject at the Teacher Training Institute (TTI)

in 1995. The aim of the EE course is for the trainees to acquire knowledge and understanding *about* the environment, develop skills *through* the environment and have a positive attitude and interest *for* the environment. Despite the many and exciting learning activities that trainees experience in their TTI course (mainly skill development and consciousness raising), it seems that the powerful traditional approach of information assessment still holds sway. In other words trainees are assessed mainly in their knowledge *about* the environment.

Although, there is a certain amount of EE policy teaching and training in place, there is still much development work that needs to be done. Generally, to broaden and improve the status of EE in Eritrean junior secondary schools, more research is needed on the effective integration of EE into the curriculum; on quality assessment of textbooks; on ways EE can be enhanced and supported; and on how EE training can draw on non-government organizations involved in EE. The aim of this minithesis is to sketch the background to these possible further research projects on EE in Eritrean schools.

The logo of the University of the Western Cape, featuring a stylized classical building with columns and a pediment.

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APPENDIX A**Interview Questions to teachers and a lecturer**

Title- The status of Environmental Education (EE) in Eritrean junior secondary schools

Aim- To analyze the present status of EE in Eritrean junior secondary schools

Interview to teachers and lecturer**General details from the teacher and lecturer**

- 1) How many years have you been teaching?
- 2) What class do you teach?
- 3) How did you come to teach at this particular school?
- 4) What is the average class size in the sections you teach?

General interpretation of Environmental education and subject content

- 5) What do you think EE entails?
- 6) If you were to describe an EE theme in your subject, what it would be?
- 7) What do you think are some examples of an EE theme in your subject?

Curriculum

a) Methodology and content of teaching-learning of EE themes

- 8) Give an example of how you taught an EE theme in your classroom.
- 9) How would you go about making your students/trainees environmentally informed?
- 10) How do you think teaching about an EE theme of your subject (for example in Geography about conservation of soil) in an environmentally sensitive way would differ from teaching it in a way that is not linked to EE?
- 11) At the end of teaching EE theme in your subject what do you expect from your students/trainees?
- 12) Describe the kind of tasks you set your students/trainees? How do you organize them in order to engage with the task?

b) Assessment/ Examination of EE themes

- 13) Can you give an example of a test/exam question you set that was based on an EE theme?

Instructional resources/materials

a) Textbooks

- 14) How do students/trainees get access to textbook?
- 15) In what way are the EE themes in your textbook relevant for teaching?
- 16) In what ways do you think you could supplement the textbooks?

b) Charts/ posters/ pictures and other teaching materials

- 17) What available charts/ posters/ pictures are there officially from the Ministry of Education?
- 18) What type of teachers'/lecture's or students'/trainee's own pictures, posters, charts or other teaching materials have been made?
- 19) What type of Charts/ posters/ pictures do you share with other teachers?

Institutional support

- 20) Have you ever taken your students/trainees into field trips? If yes, when or how many times? Where? If not why not?
- 21) In what ways does the school/ Institute support Environmental projects?
- 22) Have you ever asked for funding?
- 23) What other sources of funding might be available?

Administrative support

- 24) How would you go about organising a field trip?
- 25) In what way does the time-table influence your decision to arrange field trips? Do you arrange it during your vacation or week ends?
- 26) How could the school/Institute administrative support you in arranging the field trips?

Teacher training

In-service teacher training

- 27) Have you ever participated in workshops or any other seminars regarding environment

concerns? If yes, When? Where? Would you like it?

28) What effect did these workshops or seminars have on your teaching afterwards?



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APPENDIX B

PHOTOGRAPHS



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Debarwa junior secondary school



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**Debarwa junior secondary school students during AIDS lesson by the Ministry of
Health.**

(Note the lack of trees in the school compound)



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Interview with Science teacher



**Grade six classroom, in which three students share one desk
(Note also the lack of pictures and posters on the wall)**



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Classroom observation during the Geography lesson, in which the teaching-learning method was mainly teacher-centred.



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Demonstration of food web by the trainees in the TTI classroom, in which trainees experiential learning activities took place.