

**CONTEXTUALISING CURRICULUM THROUGH ISSUES-
BASED APPROACHES: A CASE OF ECO-SCHOOLS IN KENYA**

THESIS

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by

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DECLARATION

I, the undersigned, hereby declare and certify that this thesis has not been submitted for a degree in any other university and that it is my original work.

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ABSTRACT

This study involved an issues-based approach to curriculum contextualisation in the context of the Eco-Schools programme in Kenya. It adopted a two-phase design using interpretivist and socially critical research orientations. In this study, research is represented as a *process* which is socially constructed within a particular theoretical, contextual, social and historical context by unfolding the thesis to illuminate how the phases are closely woven into each other.

The first phase used the survey method for a contextual review of existing approaches and views relating to environmental education in the formal education sector. The survey aimed to develop a deeper understanding of environmental education as currently practiced in Kenya and to unravel the complexities surrounding it. It involved about two hundred and six primary school teachers and a critical review of a set of resource materials used in Kenyan Primary Schools. It revealed that some aspects of environmental education practice and the prevailing technocratic view of curriculum in Kenyan primary schools potentially limit possibilities for issues-based approaches to curriculum contextualisation. The action research process in four case study schools in Nyanza province of Kenya represent an attempt to address issues in context through socially critical environmental education. Participant observations, workshops and document analysis revealed that, contextualised conceptions of the terms ‘environment’ and ‘environmental education’ that resulted from a process of deliberation of meaning by teachers in relation to their contexts and practices served to set perspective for the action research process. Further, the planning phase which involved environmental auditing to identify issues of concern, prioritization of actions, issues to address, and action planning to guide implementation was critical in setting the agenda of the action research process in each of the case study schools. Integration and infusion of local issues of concern into curriculum planning further enriched processes of curriculum contextualisation, making them relevant to local contexts by addressing real issues through appropriate pedagogical approaches in auditing, investigation and research, communicating and interpreting results, reflecting on investigations and taking action. The action research process further enhanced cooperation and partnership between the case study schools and surrounding communities with mutual benefits.

The research report demonstrates that despite the limitations posed by the technocratic orientation of the Kenyan curriculum, it is possible to address real environmental issues, risks and associated sustainable development challenges in context through issues-based approaches to curriculum contextualisation in the context of the Eco-Schools programme.

Some Key Words

Curriculum Contextualisation

Issue-based approaches

Environmental issues, risks and associated sustainable development challenges

Eco-schools

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LIST OF ACRONYMS

AIDS	Acquired Immune Deficiency Syndrome
HIV	Human Immuno-deficiency Virus
EE	Environmental Education
IGAD	Inter-Governmental Agency for Development
IMCE	Inter-Ministerial Committee on Environment
IUCN	International Union for the Conservation of Nature
KIE	Kenya Institute of Education
KOEE	Kenya Organisation for Environmental Education
KUC	Kenyatta University College
NEAP	National Environmental Action Plan
NEMA	National Environmental Management Authority
NES	National Environmental Secretariat
NGO	Non-Governmental Organisation
UNCED	United Nations Conference on Environment and Development
UNEP	United Nations Environmental Programme
UNESCO	United Nations Educational, Scientific and Cultural Organisation
WCED	World Commission on Environment and Development
WWF	World Wide Fund for Nature (formerly World Wildlife Fund)

CHAPTER 1

AN OVERVIEW OF THE STUDY

1.1 INTRODUCTION

Wenger (1998:3) questions some of the common norms in institutionalised learning on the basis of a social theory of learning, and poses several questions for deliberation.

Thus:

So, what if we adopted a different perspective, one that placed learning in the context of our lived experience of participation in the world? What if we assumed that learning is as much a part of our human nature as eating and sleeping, that it is both life-sustaining and inevitable, and that – given a chance – we are quite good at it? And what if, in addition, we assumed that learning is, in its essence a fundamentally social phenomenon, reflecting our own deeply social nature as human beings capable of knowing? What kind of understanding would such a perspective yield on how learning takes place and on what is required to support it? (Wenger, 1998:3)

The above questions posed by Wenger, coupled with the proliferation and growing complexity of environmental issues, risks and associated sustainable development challenges in Kenya, evoke a strong feeling for the need to rethink curriculum orientation and practice in Kenya. This study was inspired by the above questions posed by Wenger, and a range of contextual realities surrounding the orientation, purpose and design of the curriculum in Kenya today, vis-à-vis, the state of the environment, economy and society.

This research report documents the intent and process of curriculum contextualization using issues-based approaches in the context of the Eco-Schools programme in Kenya over a period of two years, and subsequent processes of data processing, analysis and reflections over a period of two years. This study was conducted alongside the Eco-Schools pilot programme in Kenya which offered a useful context for the study. Eco-Schools is an internationally accredited and recognised whole-school programme for environmental education, management and certification through the Green Flag (FEE, 2005a).

This Chapter introduces the study by illuminating Eco-Schools as context for contextualizing curricula, providing a brief mapping of the research setting, outlining the role of the researcher (myself) in Eco-Schools and in this study, outlining the research process, question and aims, and finally gives an overview of the whole study.

1.1.1 Eco-Schools as context for contextualizing curricula

The concept of Eco-Schools derives from the notion of putting the environment at the centre of learning in the school. This entails ensuring that environmental concerns (i.e. issues and risks) form part of the curriculum and the day-to-day running of the school. The three main themes for Eco-Schools are ‘waste, water and energy’ (FEE International 2004a), but due to the flexibility of the programme, and the broadening of sustainable development discourse, countries have since embraced other themes such as health, agriculture, biodiversity, disaster preparedness, as well as poverty and entrepreneurship as is the case with Eco-Schools in Kenya (KOEE, 2005).

In Kenya, the Eco-Schools strategy applies five key components of environmental action learning (EAL) namely: school environmental policy, cross-curriculum teaching and learning, micro-projects, school-community partnerships/cooperation and networking. At school level, the activities involve establishing of Eco-school committees, school environmental audits, developing of school action plans and eco-code, monitoring and evaluation of activities, teaching from the local environment, informing and involving the whole school and the wider community (KOEE, 2005). These five components can significantly support contextualizing curricula using issues-based approaches, and are all explored in this regard in this study.

Whole-school approaches to sustainability of which Eco-Schools is a part, incorporate all levels of school life such as: school governance, pedagogical approaches, curriculum, resource management, school operations and grounds. Additionally, whole-school approaches can imply links and/or partnerships with the local community (Henderson and Tilbury, 2004:9), which is likely to be a significant factor in processes of contextualizing curriculum.

The issue of *school governance* is key in the Eco-Schools programme. Further, action-oriented and problem solving *pedagogical approaches* are required in order to realize whole-school development. According to Fien (2001:24):

Important aspects of pedagogy in education for sustainability includes encouraging students to explore questions, issues and problems of sustainability, especially in contexts relevant to them and their communities; this involves student-centred and interactive enquiry based approaches to teaching and learning.

In the Kenyan Eco-Schools programme, income-generating micro-projects are set up to address local environmental issues hence promoting *resource management*. They are also used for out-of-classroom curricula teaching and cooperation with local community. *School-community partnerships/cooperation* promote collaborative efforts in solving common problems through local environmental projects. This also builds the capacity of communities to implement Agenda 21- the environmental programme of action developed at the United Nations Conference on Environment and Development (UNCED, 1992). Local environmental awards are given to best practices so as to encourage replication of the projects. To enhance *networking*, school networks and exchange programmes are developed to promote dissemination and exchange of information. This is usually through visits, the local press, newsletters, television, radio and the Internet. This combination of processes promoted in the Eco-Schools programme potentially provides a rich context for exploration of contextualization of curriculum through issue-based approaches.

For the purpose of this research report, reference to the Eco-Schools programme in Kenya represents only those activities that directly related to the focus of this study since 2004.

1.1.2 Brief mapping of the research setting

This study took place in Kenya, a country in eastern Africa facing numerous environmental issues, risks and sustainable development challenges that have begun to take on crisis proportions due to rapid increase in human population, increase in consumption, industrialization as well as technological developments, which are fuelled by the global spread of market-based economies. Additionally, this study took place at a time when the Kenyan curriculum could be described as decontextualized both conceptually and operationally (Cornbleth, 1990:13) as well

as issues-wise (see section 2.5). This can majorly be attributed to its *Technocratic* orientation (Cornbleth 1990:13-23). The conceptual decontextualization is evident in two related ways. One being that curriculum as a product and its construction are arbitrarily separated from curriculum policy making and use. This is because the curriculum is developed by ‘curriculum development experts’ at the Kenya Institute of Education, curriculum related policies are developed at the Ministry of Education headquarters, and the curriculum is used or implemented by the teachers in schools. Secondly, the curriculum and its construction are seen as apolitical or neutral, apart from or above competing social values and interests. This culminates in a situation where curriculum developers are not responsible for the education made available to learners, and attention being directed to the curriculum document rather than to classroom practice.

Operational decontextualization of the Kenyan curriculum manifests itself in the form of structural (i.e., systemic) and socio-cultural (i.e., extrasystemic, societal) isolation. This isolation of curriculum and curriculum construction from their structural and socio-cultural contexts is due to the assumption that the curriculum produced is appropriate for students and teachers, schools, and school systems across the country. The *actual* contemporary features of the Kenyan education system and local variations are often largely ignored by curriculum developers while socio-cultural influences on the shape and substance of the curriculum remain unexamined. This situation has also been described by Cornbleth (1990:17)

The second and most critical phase of the study took place in Nyanza province. Nyanza province of Kenya has been at the centre of attention due to the complexity of the environmental issues, risks and associated sustainable development challenges most of which have their roots in unsustainable agriculture, food insecurity and poverty, poor waste management, unmet energy needs and water scarcity, poor water management and conservation, and land degradation due to erosion (see 2.2.3).



Figure 1.1: The map of Kenya showing the location of Nyanza province

1.2 MY ROLE IN ECO-SCHOOLS AND THIS RESEARCH

Since I started this study in 2004, the complexity of environmental issues, risks and associated sustainable development challenges, and their effects on life and livelihoods has had a dynamic and constant influence on my practice and perspectives on education and curricula's relevance to contexts. These environmental issues, risks and challenges (see 2.2) threaten the earth's capacity to sustain life, including human life. They also threaten the quality of human life. This situation has led me to develop an interest in contextualization of curricula using issues-based approaches for problem solving.

My present concern for the environment and interest in environmental education is a result of a process of gradually becoming aware over time of the environmental issues, risks and the associated sustainable development challenges around me. My Bachelors Degree in Education and Extension laid a good foundation for conceptualizing sustainable development challenges in perspective and the drive to address them in context. My career experience as a high school teacher of Biology (teaching the British curriculum) further presented me with a wide variety of readings that helped me develop a global perspective on issues. My participation as a co-researcher in an environmental education action research project that reviewed and developed environmental interpretation resources to foster environmental learning in two Kenyan schools (Atiti, 2003) further influenced and deepened my concern for the environment and interest in environmental education. Most important was my work as the education officer in the Eco-Schools programme in Kenya that provided me with a broad framework within which to engage and reflect critically on issues and curricula in the context of action enquiry strategies (Allison & Kielly, 2000).

Reflecting on all the significant moments that shaped my study, I am guided by a statement by Gough (1998:67) who indicates:

We need to examine the stories in which we participate very carefully – to recognize the myths and meanings in their sequences and structures..., and to have a self-critical awareness of how our interpretations of these stories influence our thoughts and action.

In this regard, I would say that my story in this study is one of an educator searching for alternative approaches to making teaching and learning processes relevant to contexts by addressing real issues in context with teachers.

I believe that my deep interest in, and understanding of many environmental issues, risks and challenges is firmly rooted in the context of my upbringing, experiences and encounters in life. My early school life in western Kenya and the later enrolment into an education and extension course in university further shaped my perspectives on issues, their manifestations and likely causes. The courses of study and personal encounters in my own rural home and later through field visits soon captivated and influenced my thinking with regard to sustainable living. This fascination with and

understanding of environmental issues, risks and associated sustainable development challenges deepened through my teaching practices where I experimented with strategies to relate my teaching to real contexts by integrating theory and practice through laboratory investigations and fieldwork. I established a botanic garden for cross-curricula teaching and learning in the school.

Joining the Eco-Schools programme as the Education officer in 2004 allowed me to take this work further, which led to the focus of this study: Contextualizing curricula using issues-based approaches; a case of Eco-Schools in Kenya. My main roles in the Eco-Schools programme (as stipulated in the contract) were; facilitating capacity building of teachers and community groups; designing and promoting solutions to environmental and sustainable development concerns through development education; designing and implementing action learning programmes with stakeholders; developing school policy on Environmental education (EE)/Education for Sustainable Development(ESD) with stakeholders; implementing school curriculum processes in environmental and sustainable development related disciplines with relevant stakeholders; enhancing environmental education processes/Education for Sustainable Development (ESD) for primary and secondary schools; demonstrating concepts and themes related to Education for Sustainable Development through micro-projects; designing and implementing training programmes/workshops for teachers and community groups; developing and disseminating environmental education(EE)/Education for Sustainable Development(ESD) materials/resources to support EE/ESD processes; promoting action competence in learning through a wide range of interactive learner centred strategies aimed at re-orienting education towards sustainable development; promoting use of ICT and multimedia in action learning and professional development in schools; enriching and demonstrating concepts and themes related to education for sustainability and how they can be integrated in all subjects across the curriculum.

1.3 RESEARCH PROCESS, QUESTION AND AIMS

Confronted with the complexity of environmental issues, risks and associated sustainable development challenges in Kenya and the rest of Africa (see 2.2), there is an urgent need to critically rethink education. Odora (1994:96) clearly stated:

For education activists in Africa and elsewhere, there is a growing challenge and an urgent need for reconceptualising education as a whole, and articulating alternative scenarios and frames of reference ... the foundations of education systems [in Africa] require a comprehensive overhaul if [they] are to begin to respond to the contexts within which [they] are located.

Guided by Odora's position as stated above, and in the light of a perspective which views environmental education as a process of social transformation (Janse Van Rensburg, 1995; Lotz-Sisitka, 2004) and against a backdrop of international developments following the 1992 Earth Summit, I opted to explore the social transformation role ascribed to environmental education processes within the institutional frameworks of school curricula and formal curriculum development processes.

Against the above, I focused this research to establish the potential of contextualised approaches to curriculum development for guiding environmental education curriculum processes in Kenya in the United Nations Decade of Education for Sustainable Development (UNESCO, 2005) in response to environmental issues, risks and associated sustainable development challenges. Education for Sustainable Development (ESD) has its roots in the history of two distinct areas of the United Nations – education and sustainable development. The declaration of the decade of ESD was informed by the realization that education and learning lie at the heart of approaches to sustainable development. ESD focuses largely on the major social, economic and environmental issues that threaten the sustainability of the planet (UNESCO, 2005). Many of these key issues were identified at the Earth Summit and are found in *Agenda 21*. Understanding and addressing these issues are the heart of ESD and locally relevant issues should be included in any programme related to educating for sustainability (*ibid*).

This study aimed to find out whether issue-based approaches serve to strengthen the contextualizing and relevance of the curriculum and what might be done to orientate the curriculum to better achieve this. Hence, the study sought to explore the following research question: *Can issue-based approaches be used in Eco-school contexts to contextualise the Kenyan curriculum?*

In order to address the above mentioned question, I defined two research goals, which were related to each other. The first goal provided a more in-depth analysis of the existing curriculum processes, and the second goal examined innovation towards contextualization of curriculum through issues-based approaches. The two goals were:

- To probe the existing understandings and approaches to environmental education (EE) in the Kenyan curriculum.
- To try out issues-based approaches in an action research process with some educators working in Eco-Schools within a wider purpose of Education for Sustainable Development (ESD) work in Kenyan schools.

1.4 OVERVIEW OF THE WHOLE STUDY

1.4.1 The research process

This study (see CR 1.1 for the research proposal) was conducted in two phases. Phase 1 of the study was guided by the interpretivist research paradigm and phase 2 was guided by the socially critical research paradigm. The two phases are closely related to each other in the sense that phase 1 served to prepare the ground for phase 2 by generally illuminating environmental education practice in Kenya with the view to enhancing socially critical environmental education in the context of the Eco-Schools programme.

1.4.1.1 Phase 1 - Contextual review

Phase 1 of the study involved a contextual review/mapping of existing approaches and views relating to environmental education in the Kenyan curriculum. Throughout this phase, I was driven by the urge to develop a deeper understanding of environmental education as currently practiced in Kenya. My main pre-occupation was to unravel the complexities surrounding environmental education practice in Kenya. This phase of the research is described in detail in Chapter 5 of this thesis

with a view to providing grounding and a frame of reference for phase 2. This phase followed the survey method, which reviewed teachers' understandings of environmental education in Kenya. It was complemented by a policy review, resource materials review, and curriculum practice and processes review.

The policy review was done in order to understand the legal/policy provisions for environmental education in Kenya. The review of teachers' understandings of environmental education in Kenya was done so as to understand the prevailing view and approach to environmental education in Kenya. This helped to surface apparent tensions and ambiguities contained in the various international guiding principles, policies and action frameworks in relation to existing practices. As observed by O'Donoghue (1991), neither the scope of the environmental crisis nor the diverse nature of environmental education processes are clear-cut issues in relation to the guiding principles defined for environmental education (see 2.3) in / through international institutions. The review was also necessitated by the fact that working with conceptual tensions must be seen as a necessary part of the process of curriculum change in any environmental education project (O'Donoghue, 1991).

Materials review was done to ascertain the presence of environmental education concepts, and how they are dealt with in relation to curriculum requirements. The materials were also reviewed to establish the depth of coverage of environmental education concepts, emphasis on skill building and action orientation. Curriculum review involved review of key curriculum documents i.e. current syllabi and a selection of past exam papers so as to better understand the concept of environmental education in the Kenyan curriculum.

1.4.1.2 Phase 2 – Action research case studies

Phase 2 of the study aimed to help bring about transformation through the research process itself hence the socially critical orientation. As Lather (1986a) described critical research as a form of praxis, the lines between research/education/development were blurred in this phase of the study.

This phase of the study was conducted in Nyanza province using the action research method. The action research process involved the usual four-phase cyclical process of formulating plans, acting on the plans, observing outcomes and critically

reflecting to understand the processes, strengths and weaknesses of the plans (Hillcoat, 1996:151).

This phase of the study explored how the Eco-Schools programme can support localising/contextualising curricula using an issues-based focus within an action research framework and with action learning embedded therein. A case study approach (MacDonald and Walker, 1975) was adopted due to the fact that it recognises the particular contexts in which innovations are embedded and aspires to describe and analyse the processes by which and the conditions in which innovations are implemented. The case studies also allowed judgments to be made in relation to particular circumstances. Four case studies were conducted in four primary day schools in Nyanza province of Kenya. Each school attempted to contextualize the curriculum using an issues-based focus. The issues of focus were chosen by the schools on the basis of the prevalence rates and the findings of a baseline survey conducted earlier by the Eco-Schools programme in Nyanza province of Kenya (KOE, 2003; Chapter 6.)

This research phase involved *planning with teachers and integrating the issues in context into the curriculum*, whole-school development work, materials development as well as theoretical work on localising/contextualising curriculum.

1.4.2 Overview of the thesis

In this thesis, I represent research as a *process* which is socially constructed within a particular theoretical, contextual, social and historical context (see Chapters 2, 3, 5 and 6 for insights into the theoretical, contextual and socio-historical location of the research). To present the research as a process, I unfold the thesis to illuminate how the phases are closely woven into each other.

In an attempt to achieve a reflexive text, I have chosen to structure this text in a manner that maintains the visibility of literature through reflections from a theoretical perspective as the research processes and events are reported. The use of literature is also harnessed to highlight, illuminate and develop better understandings of the research process in an ongoing way. This style is in line with Lofland's (1974) suggestion that a successful text should weave together the local and the generic and

should achieve a satisfactory mixture of data and discussion, example and generalization (cited in Lotz, 1996).

This introductory chapter provides a general overview of the study by briefly looking at contextualising/localising curricula as a component of the Eco-Schools programme in Kenya and by giving a brief mapping of the research setting. It further gives relevant and key shaping biographical notes of the researcher (myself) and my role in the Eco-Schools programme and in the research. The chapter also defines the research question and aims and briefly outlines the research process. It also gives an overview of the whole study.

Chapter 2 of this thesis provides the contextual, theoretical and policy background of the study. This is presented through an exploration of the environmental issues, risks and sustainable development challenges in Kenya as well as an overview of environmental policy and environmental education responses in Kenya. It further examines environmental education and the Kenyan curriculum against a background of relevant literature, theories and perspectives of curricula and learning.

Chapter 3 provides the theoretical vantage point of this study by illuminating curriculum theory, social learning and situated learning theory, issues-based approaches, the theory of communities of practice and Eco-Schools practices.

Chapter 4 presents the research methodology used in the study. It starts by defining an enabling research orientation for the two phases of the study and discusses the methods used in the data gathering process in phase 1 and the action research process in phase 2. It also describes the processes of data analysis and interpretation, validity of the study and the ethical practice followed during the study.

Chapter 5 presents the findings of the first phase of the study i.e. the contextual review of the teachers' understandings/conceptions of environment and environmental education, importance accorded to environmental education by Kenyan teachers, environmental education practice in the Kenyan curriculum, environmental education, issues and teaching and learning resource materials as well as negative influences on environmental education practice in Kenya.

Chapter 6 presents the action research case studies of the four primary schools (Kosawo Primary School, St. Josephs Ombo Primary School, Kandiego Primary School and Muhoroni Township Primary School) that were involved in the research process. It starts by first giving the overview of the process and later gives an account of the planning process with teachers and integration and infusion of local issues in context into the curriculum. This chapter also presents an account of the whole-school development work in the four schools by discussing the innovations and approaches undertaken by each school to effectively address the issues in context. I present the account of whole-school development work in relation to the issues with a focus on school governance, pedagogical approaches, resource management, actual issue-based interventions, school operations and support as well as links and/or partnerships with the local community. I end this chapter by reflecting on the action research process.

Chapter 7 provides the key findings of the study which are grounded in a critical discussion of the key issues emerging in relation to the research question and drawing on literature. The discussion is based on the analytical statements used in the data analysis process.

Chapter 8 gives a synthesis and recommendations from the study. The main recommendations are presented in reference to the key findings of the study as possibilities and options for consideration. This chapter also gives recommendations for further research. It ends with reflections on the research process and concluding comments.

1.4.3 Style of presentation

Stanley and Wise (1983, cited in Blaxter *et al.*, 1996:220) argued, “Research is a process which occurs through the medium of a person, the researcher is always and inevitably *in* the research”. To avoid trying to convey an impression of distanced objectivity, I have written in the first person. The recognition of subjective involvement is also reflected in the narrative form of the thesis. Narrative is a form aimed at providing a rich context in which to examine and report on the many issues that have been encountered.

Owing to the vast amounts of data gathered, the text generated, the data analysis tools, photographs, and other core as well as peripheral products of the research

process which could not all be included in the appendix, a selection thereof was included in a case record (Stenhouse, 1978:25) which comprises volume two of this thesis. References to items in the case record (CR) are contained throughout the thesis.

This thesis is structured according to a sequence that starts with a comprehensive contextual, policy, and theoretical situation of the study followed with a methodological chapter, presentation of the results and a critical discussion of the findings of the research grounded in literature. It should be noted that some theoretical insights illuminated in Chapters 2 and 3 are research findings in their own right. Further, although a comprehensive literature review has been included in Chapters 2 and 3 more literature is identified as findings are discussed in the later chapters. In this respect, literature review was an ongoing process.

My concluding chapter is not aimed at making concrete recommendations to the reader, but to only make tentative proposals for consideration and those that may open up new possibilities for research and enhance the relevance and links of curriculum to contexts through curriculum contextualisation using issues-based and other alternative approaches.

1.5 CONCLUSION

By way of introduction to this thesis, this chapter provides the reader with a quick walk-through the research context, purpose and structure of the report. In the next chapter, I present the contextual, socio-historical and policy situation of the study.

CHAPTER 2:

CONTEXT OF THE STUDY; ENVIRONMENTAL EDUCATION, ISSUES, POLICY AND CURRICULUM IN KENYA

2.1 INTRODUCTION

In this chapter I situate the contextual policy and theoretical framework of this research which investigated contextualization of curricula in the context of the Eco-Schools programme in Kenya, through issues-based approaches. This chapter provides background for a critical analysis of the findings of the study (see Chapter 7). By exploring the environmental issues, risks and associated sustainable development challenges in Kenya (see section 2.2), reviewing the relevant environmental policies and environmental education responses in Kenya in the context of the international declarations/agreements (section 2.3) and critically reviewing environmental education in the Kenyan curriculum (section 2.4), I explore possibilities of enhancing socially critical environmental education processes through issues-based approaches.

Guided by the concepts of curriculum as a ‘contextualized social process’ (Cornbleth, 1990), and ‘Curriculum as praxis’ (Grundy, 1987), I consider potential influences on contextualization of curricula using issues-based approaches.

Further, by drawing on the views of curriculum, as ‘technocratic’ and/or ‘critical’ as presented by Cornbleth (1990), I explore how they can influence contextualization of curricula vis-à-vis the decontextualized nature of the Kenyan curriculum (section 2.5). Through a critical discussion of the curriculum theories of Cornbleth (1990) and Grundy (1987) and how they can influence contextualization of curricula, I further deepen my understanding as I seek to gain a guiding orientation and context in this chapter. I tend towards the critical view of curriculum that seems to support contextualization of curricula with a problem solving orientation, owing to its apparent resonance with the intentions of environmental education (EE).

2.2 ENVIRONMENTAL ISSUES, RISKS AND SUSTAINABLE DEVELOPMENT CHALLENGES IN KENYA

Environmental issues, risks and associated sustainable development challenges in Kenya are a function of many complex and interlinked factors related to issues of poverty, population pressure, industrialisation, development priorities and trends, policy developments and influences as well as other natural factors.

2.2.1 National context

Kenya's economy and the livelihoods of her people are dependent on natural resources, which are increasingly under pressure from unsustainable use resulting in environmental degradation. The challenge is to utilise the natural resources to develop the economy while at the same time saving the environment from adverse impacts of pollution, soil erosion, deforestation and general degradation.

Since independence, the Kenyan government has been advocating for improved environmental management. This has been articulated in various government policy statements, directives and pronouncements, sessional papers and development plans. The Environmental Management and Co-ordination Act (EMCA), No 8 of 1999 underscores the right of every person in Kenya to a clean and healthy environment and commits all Kenyans to safeguard and enhance it. The Kenyan environmental law consists of legislation, standards, regulation institutions and administration adopted to control activities on environmental management. EMCA No. 8 of 1999 gives a specific mandate to the National Environmental Management Authority (NEMA) to be involved in EE in Kenya. The Act in section 9(2m) states that NEMA should:

...undertake, in co-operation with lead agencies, programmes intended to enhance environmental education and public awareness about the need for sound environmental management as well as for enlisting public support and encouraging the effort made by other entities in that regard.

The population of Kenya was 28.7 million in 1999 and is projected to be 36.5 million in 2010 (Abagi, 1999). The high population growth has had adverse effects on the environment, which includes encroachment of marginal lands, over consumption of wood fuel resources as well as generation of waste products. The proportion of total urban population rose from 10% in 1969 to 27% in 1999 (Abagi, 1999). The impacts are falling living standards, polluted air and water, unsanitary living conditions,

increasing informal settlements and slums, wood fuel depletion, increased soil erosion and land degradation.

2.2.2 Environmental issues, risks and associated sustainable development challenges

Environmental issues and risks and sustainable development challenges in Kenya have complex characteristics, which can be illuminated through a consideration of the interrelations between ‘four dimensions’ of environment: biophysical, economic, socio-cultural and political (O’Donoghue, 1993). These issues, risks and challenges can also be illuminated through a consideration of the interrelated dimensions of society, economy and environment (UNESCO, 2005). Much as environmental issues and risks, and sustainable development challenges have always been with us, some of them have now begun to take on crisis proportions due to rapid increase in human populations, increase in consumption, industrialization as well as technological developments, which are fuelled by the global spread of market-based economies.

The World Summit on Sustainable Development (WSSD) held in Johannesburg in 2002, prioritized five issues for action within the broader framework of poverty reduction that needed to be addressed if people are to create a better place to live for current and future generations, and to alleviate the current levels of poverty and inequality. The issues prioritised were under the thematic areas of water, energy, health, agriculture and biodiversity (UNEP 2006a), also known as the WEHAB agenda.

The Africa Environment Outlook 2 Report entitled; *Our Environment, Our Wealth* (UNEP, 2006b) focuses on the theme *Environment for Development*, and rallies its departure point as two landmark reports of the United Nations (UN) – the Brundtland Commission’s report (WCED, 1987) ‘Our Common Future’ (WCED, 1987), and Agenda 21 (UN & country working groups, 1992), and Africa’s own vision of renaissance (NEPAD, 1998). This is in response to the persistence of poverty and its links with environment and development as well as the fundamental connections between environmental goods and services and human well-being. The profiling of Africa’s environmental resources as an asset for the region’s development (UNEP, 2006b) may be misleading if due consideration and emphasis is not given to sustainability. The advice given by the Brundtland Commission (1987) that: The downward spiral of poverty and environmental degradation is a waste of opportunities and of resources. What is needed now is a new era of economic growth

– growth that is forceful and at the same time socially and environmentally sustainable (WCED, 1987).

The advice, as stated above, attempts to give direction and due consideration to development trends with sustainability in mind. However, such considerations are not attended to in most development models. This has led to complex environmental issues, risks and associated sustainable development challenges with poverty at the centre.

Echoing the approach proposed in the Brundtland commission, the United Nations Conference on Environment and Development (UNCED), in its environmental programme of action, Agenda 21 reaffirmed the links between environment and development by drawing attention to the fundamental connection between environmental goods and services and human well-being (UNEP 2006b). In the Agenda 21, it is clearly stated that:

Integration of environment and development concerns and greater attention to them will lead to the fulfilment of basic needs, improved living standards for all, better protected and managed ecosystems and a safer, more prosperous future (UNCED, 1992).

This study draws inspiration from the above statement hence the attempt to address related issues in context through contextualising curricula using issues-based approaches.

There is increased recognition that environmental issues and risks and sustainable development challenges require special educational approaches to effectively address them (UNESCO, 2005; Wals, 1994; O'Donoghue, 2001; Jensen & Schnack, 1997). There appears to be an emerging recognition that problem solving, action-oriented and contextualized approaches to education are required to address the complex nature of environmental issues and risks, and associated sustainable development challenges (see section 2.6).

Four decades after independence, almost all of Kenya's eight provinces are characterized by numerous socio-ecological issues that are linked to poverty, population pressure and inappropriate models of development (NEMA, 2003). These include (amongst others): uncontrolled exploitation of resources e.g. forest, marine

and coastal resources, desertification, land degradation due to overcrowding, bad land management, industrialization, inappropriate intensive agriculture, overstocking/overgrazing and soil erosion which reduces the productivity of land for grazing and food production. Other ecological issues and risks arise due to poor implementation of legislation for environmental protection; inadequate management of pollution and waste, climate change and natural disasters such as floods and droughts. These issues and risks present threats to habitats, leading to loss of biodiversity, and a reduction to the quality of life options for many Kenyans, particularly those that are directly dependant on natural resources to sustain their livelihoods (*ibid*). Others include: poor health and sanitation issues leading to health risks, unmet energy needs due to limited alternative energy sources and technologies, loss of indigenous knowledge, diminishing water resources and inequitable access to land and natural resources (NEMA, 2003; NEMA, 2004). This study is an attempt to explore appropriate educational approaches that can contribute to addressing these issues.

Kenya's economy and the livelihoods of her people are dependent on natural resources, which are increasingly under pressure from unsustainable use resulting in environmental degradation (GOK, 2003). It has been observed that Kenya's 41 years of independence have been marked by a decline in economic growth from an average of 6.6 % in the 1970s to 4.2 % in the 1980s to an average of 2.1 % in the 1990s (Abagi, 1999). As a response, a long-term national policy is contained in the Poverty Eradication Plan/Poverty Reduction Strategy 2000-2015 (GOK, 2000) that provides the necessary institutional framework for action against poverty. The government further released the Economic Recovery Strategy Paper 2003-2007 (GOK, 2003), which aims at implementing mechanisms that promote economic recovery through the creation of wealth and employment opportunities for the Kenyan people. However, the anticipated results from these initiatives are yet to be realized, and have been severely retarded by recent political conflict in the country.

Across Africa, poverty is more prevalent in rural than in urban areas (UNEP, 2006b:13) and the link between environmental resources and the livelihoods of rural people is widely acknowledged. Further to this, it is reported that pervasive poverty, governance issues and social inequities remain major constraints to sustainable development. The equitable, efficient, and productive use of natural resources offers important opportunities for sustainable livelihoods which can contribute to reducing

poverty (UNEP 2006b: 12). Since the Brundtland commission, there has been growing recognition of the close relationship between poverty and environmental problems, as both cause and effect. This could partly explain the futility of approaches that do not take a broad perspective and address the factors underlying world poverty which include environmental degradation (UNEP 2006b: 27).

Poverty is a major challenge facing Kenya today with 57-75% of the Kenyan population living below the poverty line. Poverty has led to overuse of, and destruction of natural resources where short-term development goals are pursued at the expense of longterm environmental sustainability, presenting a complex sustainable development challenge. Manifestations of poverty include household food insecurity, poor health and low educational attainment due to limited or no access to health care and education, sanitation, water or proper waste disposal. It has also been noted that large inequalities exist in Kenya, with the gap between the rich and poor growing larger with no discernible improvement in income distribution (Social Watch, 2005). Further, cases of unemployment have been on the increase in the last decade (GOK, 2002c; Abagi, 1999). The poverty situation in Kenya is further exacerbated by lack of commitment to corporate responsibility and accountability, a poor market economy, and recent political turmoil.

HIV/AIDS also remains a major issue in Kenya. Research indicates that the main impact of HIV/AIDS on poorer families (both rural and urban) includes loss of income; productive labour, food reserves and savings diverted to care for the sick, or for funeral costs, as well as reduced educational opportunities and reduced levels of nutrition and disruption of community structure and function (NACC,2003). Additionally malaria, tuberculosis and other pollution-related illnesses contribute to a limited quality of life, as does substance abuse such as alcoholism. Crimes such as rape, murder, child abuse, violence and a range of socio-economic issues such as unemployment rates are extremely high, leading to high levels of insecurity. Additionally, cases of unemployment, social strife, tension and gender related violence have been on the increase in the last decade (GOK, 2002; Abagi, 1999).

Poor governance is still a major issue in Kenya today; the government has constantly come under criticism from civil society organisations and the international community for its poor governance record that has constantly infringed on human rights. Recently, disputes centred on the legitimacy of the current political leadership

have severely affected stability in Kenya. Corruption is still rampant which has led to Kenya being ranked as one of the most corrupt countries in the world (TI, 2005). Gender inequality is also an issue in many sectors of the Kenyan society. Erosion of cultural values and a lack of intercultural understanding are also issues that need to be addressed urgently.

2.2.3 Environmental issues, risks and sustainable development challenges in Nyanza province

Nyanza is a province in the western region of Kenya with a total area of 15979 km² and covers most of the Lake Victoria shores (see Figure 1.1- map of Kenya in Chapter 1). Lake Victoria is the second largest fresh water lake in the world. It is shared by three riparian states: Kenya, Uganda and Tanzania. Statistics indicate that the lake has a total catchment area of 193 000 km² and Kenya shares 22% (42460 km²) of this.

The main annual rainfall ranges from 1000 mm near the shores of Lake Victoria to 1800 mm away from the lake shore. More than half the areas in Nyanza receive unpredictable rainfall during the first season March-June, and some areas receive short rains between September and December. Temperatures are warm in most areas where they range from 15-24 degrees centigrade. Due to the low rainfall, most vegetation cover is scanty grass and shrubs with a few tree species especially in areas near the shores of the Lake. However, most vegetation in the highlands has disappeared because of intensive agriculture.

The lake's potential lies in the opportunities for investments in fisheries and tourism, transport and communications, water and energy, agriculture, trade and environmental research. People's culture in the province is highly diversified. The predominant tribes in the area include the Luo, Kisii, Kuria and the Luhya. Approximately more than 2 million people are indirectly involved in fishery; other people are supported mainly through agriculture.

Nyanza province is faced with many intertwined environmental issues, risks and associated sustainable development challenges. The attainment of socio-economic growth and ecological sustainability is largely dependent on addressing the issues in context. Contextualizing curricula through issues-based approaches could be one

way through which such issues, risks and associated challenges could be effectively addressed (see Chapter 6).

Poverty levels in Nyanza province are among the highest in the country (KOEE, 2004). This is brought about largely by high unemployment, low income levels and lack of diversified sources. All these have been reported to have negative impacts on all aspects of people's livelihoods including education. The poverty situation in Nyanza is further aggravated by environmental disasters such as flooding and drought in some regions coupled with lack of appropriate skills in entrepreneurship and capacity to deal with environmental disasters.

The environmental issues, risks and associated sustainable development challenges in Nyanza threaten not only the sustainability of her natural resource base, but also the livelihoods of the residents. Recent survey studies conducted in the province by different agencies (Government, civil society and private sector) have revealed disturbing proportions of environmental issues, risks and associated sustainable development challenges. The issues were identified across the themes of water, energy, health, agriculture, biodiversity, waste, entrepreneurship and income generation, and environmental disasters among others (KOEE 2004).

An analysis of the findings from a variety of sources such as the National Environment Management Authority (NEMA) Provincial Implementation plans (NEMA PIPs, 2005, 2006) and District Implementation plans (NEMA DIPs, 2005, 2006), District Development plans for the years 2005 and 2006, the Yala Swamp Dominion Rice Development Scheme reports (cited in NEMA, 2006), and the Eco-Schools Baseline Survey reports (KOEE, 2004), have revealed that agricultural related issues top the list. This could be attributed to the fact that agriculture is the mainstay of the Nyanza province economy and that most people engage in agricultural activities for food and money. Most of the health related issues reported are HIV/AIDS related. The many problems that limit entrepreneurship and income generation are seen to be the same as those that limit agriculture. Even though waste problems are also cited, it is evident that waste management problems are localized to specific urban set ups and schools. This is a typical case of contextual influences on the culture, economy as well as ecology, further justifying the focus of this study. An analysis of the issues of concern from various sources indicate that agriculture related problems were leading followed by water, health, energy, environmental

disasters, waste and lastly biodiversity. Entrepreneurship and income generation were also mentioned as critical concerns that require urgent attention. With regard to the themes of focus, agricultural problems touch on issues of soil degradation, poor marketing of produce and low prices, crop pests and animal diseases, inadequate rainfall and poor farming methods. Small land sizes and flooding as well as lack of some appropriate farm inputs, are also identified as concerns.

With regard to the water theme, inadequate and impure water supply is the major issue affecting both schools and communities. Availability of clean, safe and adequate water at a convenient distance was an issue cited by most respondents in the various studies that have been conducted in Nyanza province (KOEE, 2004; NEMA DIPs, 2005; 2006). Most schools and communities in Nyanza rely on natural water sources such as rivers, streams and open wells for their daily water needs. Sunken boreholes have been developed in some regions through support from development partners. There are, however, very few efforts to harvest rainwater. Most of the rain water often goes to waste because rain water harvesting technologies have not been fully embraced in Nyanza province. The issue of access to water is also a critical factor for schools and communities living far away from the natural water sources. This forces people, especially women, to walk very long distances (an average of 3 kilometers) in search of water. This is tedious and time consuming.

Water-related diseases are common in Nyanza province. Statistics from district hospitals as obtained in the NEMA DIPs (NEMA 2006) indicate that water-borne diseases such as diarrhoea, amoebiasis, and other helminth infections are very common. This can directly be attributed to the contaminated water sources that most people depend on.

Poor waste management is a common problem for both schools and communities in Nyanza province. This issue manifests itself more in the form of uncollected garbage and other solid waste as well as other sanitation concerns. The Eco-Schools baseline survey (KOEE, 2004) revealed that most waste management concerns were due to lack of management facilities followed by inadequate pit latrines, and lastly polythene menace - in that order.

Unmet energy needs and inadequate renewable energy options are a serious problem affecting most residents of Nyanza province. The rural population is heavily dependent on wood fuel to meet their energy needs as was revealed by the studies mentioned above (KOE, 2004). Shortage of wood fuel is often cited as the main problem. This is followed by high costs of alternative energy sources and energy wastage. The shortage of wood fuel is cited in all the districts but is more critical in Migori and Nyando districts where vast pieces of land have been cleared for sugar cane plantations and few trees are left on farms. Communities, especially in Migori district, have to depend on wood supplied from neighbouring forested hills, which are far away. Most schools also need a lot of wood to supply their energy needs. Buying of wood fuel is a major cost component to most boarding schools in the province. Alternative sources of energy such as solar, electricity and gas are still inaccessible and relatively expensive and unaffordable for many residents.

Health issues in Nyanza include a wide variety of tropical health problems. Most schools and communities identify HIV/AIDS, other communicable diseases, and malnutrition related disorders to be of major concern. Various data sources indicate that HIV/AIDS related health problems are most critical, followed by other communicable diseases and lastly malnutrition related disorders (KOE, 2004). HIV/AIDS is seen to be aggravating poverty due to the actual and opportunity costs associated with it. It is also reported that HIV/AIDS has seriously affected education. Most schools report that HIV/AIDS impacts negatively on learning in various ways including deprivation of parental care to the orphaned learners, high levels of absenteeism amongst the infected and affected as well as high stress levels.

Four districts in Nyanza province were selected to be the focus of this study due to the diversity and gravity of environmental issues, risks and associated sustainable development challenges in them. Of the four districts, three of them (Nyando, Siaya and Migori districts) are predominantly rural settled districts and one (Kisumu district) is a partly urban settled district.

Kisumu District is located in the central part of Nyanza province where the provincial administration headquarters is located. Poverty is rated at 53%, and school enrolment is rated at 36%. The issues of concern include inadequate rainfall, persistent flooding, contamination of water, and poor waste management in the urban setting. Nyando District is located at the central part of Nyanza region. Poverty is

rated at 54%. The major issues of concern include persistent flooding, poorly drained soils, invasive alien species such as the water hyacinth and prevalence of HIV/AIDS. The major development challenges are attributed to insufficient basic services such as education and health care. The district, however, is scenically beautiful and attracts tourists due to its flood plains and the associated flora and fauna, especially the wide variety of bird species.

Siaya District is located in the northern part of Nyanza province. Poverty is rated at 58%. The major challenges relate to the high prevalence of HIV/AIDS, inadequate rainfall and low income returns from agricultural investments. The ecological conditions are, however, quite suitable for most socio-economic activities. Migori District is located in the southern part of Nyanza province. Poverty is rated at 58%. There exists great disparity in terms of agricultural potential within the district. The challenges to agricultural investments are related to high level of land degradation, soil infertility, low and unreliable rainfall as well as low levels of entrepreneurship.

The environmental issues, risks and associated sustainable development challenges in Kenya and Nyanza province specifically call for responses that can bring about positive socio-economic transformation whilst ensuring environmental sustainability. Appropriate environmental educational responses have an important contribution to make in this endeavour. Such responses and approaches need to be guided and inspired by socially critical and issues-based approaches to environmental education if the desired transformation is to be realized.

2.3 POLICY DEVELOPMENTS AND INFLUENCES

Environmental education has the potential to assist Kenyans to respond to many of the issues outlined above in direct and indirect ways. Such responses are already underway, as reflected by the diversity of organizations involved in environmental education in Kenya today, mostly drawn from both government and civil society sectors (NEMA, 2005: 45-49) as well as the proliferation of supportive policies at both the global and national levels. The environmental education responses have, however, been constrained by factors related to resources and poor interpretation, implementation and enforcement of policies.

2.3.1 Global policy shaping influences

This study draws inspiration from some landmark events and associated documents in the environmental movement. They include among others those tabulated below;

Table 2.1: Some landmark events in the environmental movement that inspired this study

Event	Main features and outcomes of interest to this study	Year	Place	By whom
United Nations Conference on the Human Environment	A recommendation that United Nations Educational, Scientific and Cultural Organisation (UNESCO) and United Nations Environment Programme (UNEP) establish an international programme in Environmental Education (EE) that is interdisciplinary and encompassing all levels of education. This study tends to advocate for interdisciplinary EE processes as a strategy for addressing issues in context.	1972	Stockholm, Sweden	The United Nations
Tbilisi International Environmental Education Programme (IIEP) conference	Developed and endorsed the concept of 'education for the environment' and came up with the Tbilisi declaration that listed 5 objectives and 12 principles of EE which this study recognises and is anchored on.	1977	Tbilisi, Russia	UNESCO and UNEP
Publication of the <i>World Conservation Strategy</i>	The document stresses interdependence of conservation and development and introduces the concept of sustainable development - which drives this study via issues-based approaches. This is despite the fact that it is based on a narrow vision of ecology without acknowledgement of people, politics, and economics.	1980	Gland, Switzerland	International Union for the Conservation of Nature (IUCN), UNEP and World Wide Fund for Nature (WWF)

Publication of Our Common Future	Sustainable development is central to this document which links poverty and environmental concerns. Economic growth was promoted as the solution to both concerns. This study borrows from this approach but advocates for entrepreneurship for poverty alleviation and a sustainable development model in which economic development does not take priority over social justice, peace and equity as well as ecological sustainability.	1987	Gland, Switzerland	World Commission on Environment and Development (WCED)
<i>Caring for the Earth</i>	Broadened the concept of conservation as described by the <i>World Conservation Strategy</i> by acknowledging the role of economics, culture and tradition in practices affecting ecology. Challenged the idea of sustainable development with its emphasis on economic growth and proposed sustainable living as more appropriate for improving environments and human well-being. This study considers context in its totality with due consideration of economic, societal and ecological influences on sustainable development and livelihoods.	1991	Gland, Switzerland	IUCN, UNEP, and WWF
The Earth Summit United Nations Conference on Environment and Development (UNCED)	Most important contributions to EE - (apart from the five major documents produced)- were to introduce the idea of Environment and Development Education (EDE) or Education for Sustainable Living. This study borrows some basic principles from the above.	1992	Rio de Janeiro, Brazil	United Nations and country working groups
Non-Governmental Organisation (NGO) gathering	A set of Principles of Equitable and Sustainable Societies for EE was developed and a	1992	Rio de Janeiro, Brazil	The International Forum of NGOs and

at the Earth Summit	view of value-based EE as an ‘act for social transformation’ developed. These have had a profound influence on the design and intent of this study.			Social Movements
UNEP Report	Address by Elizabeth Dowdsell, director of UNEP. Dealt with population growth, soil erosion, overfishing of oceans, species loss and pollution. These outlined issues and others were the same as those identified to be of major concern and that became the issues of focus during this study.	1997	Nairobi, Kenya	UNEP
UNEP’s Africa Environment Outlook (AEO 2) report	Focuses on the theme <i>Environment for Development</i> . Reaffirms the links between environment and development by drawing attention to the fundamental connection between environmental goods and services and human well-being as in Agenda 21. This study is inspired by the current and projected state of the environment in Africa, and hence attempts to explore possibilities of addressing related issues in context through contextualising curricula using issues-based approaches.	2006	Nairobi, Kenya	UNEP
Ahmedabad Declaration and Recommendations	Maps changes in the field of EE from 1977 to 2007. Most significant to this study are: the changes in thinking about education and learning, changes in conceptualizing environment-development relationship, changes in emphasis on issues as well as aspects of the changes in sites of learning and participation in learning.	2007	Ahmedabad, India	UNESCO, UNEP and the Government of India (GOI)

The above landmark events and associated documents and their main features and outcomes of significance to this study, provide a powerful discourse that helps to motivate for, and justify this study's interest in issues-based approaches to curriculum contextualisation.

The study is guided by the earlier goals, objectives and guiding principles of environmental education as stated in both the Tbilisi Inter-Governmental Conference on environmental education held in Tbilisi, Russia in 1977 (UNESCO-UNEP, 1978) and the Principles of Environmental Education for Equitable and Sustainable Societies (International Council for Adult Education, UNCED, 1992), and the more recent Ahmedabad Declaration and Recommendations (2007) which maintain that:

Environmental education processes support and champion Education for Sustainable Development. Such education processes must be relevant, responsive and accountable. Research is encouraged to provide additional rigour and credibility and to identify increasingly effective methods of learning and sharing knowledge.

Stevenson's (1987) concern about the prevailing gap between the rhetoric and philosophy of environmental education and the reality of practices in schools, which regrettably persists to date, provides further inspiration to this study. Specifically the observed pronounced discrepancy between the problem solving and action-oriented goals associated with the contemporary philosophy of environmental education and an emphasis on the acquisition of environmental knowledge and awareness in school programmes (Childress, 1978; Greenall, 1981; Maher, 1982; Robottom, 1982; Volk. *et al.*, 1984) requires that new approaches are adopted. Issues-based approaches to curriculum contextualisation could be a positive step towards narrowing the rhetoric-reality gap (see Chapter 6).

2.3.2 National environmental and educational policy developments

In the period before independence, the worldwide promotion of nature and outdoor study greatly influenced environmental management practices. This was aimed at developing in individuals an understanding and appreciation of the biophysical environment (Stevenson, 1987). Later, the conservation movement introduced a concern for the protection and management of wildlife through national parks and

game reserves. This led to the creation of the Nairobi National Park in 1946 (NMK & KWS, 2002) and the formation of the Wildlife Clubs of Kenya in 1968 (WCK, 2002). Due to the need to preserve biodiversity, other national parks and game reserves were later created.

During the same period, environmental education processes tended to focus on the management and control of the environment with the emphasis on providing knowledge about the environment (Huckle, 1993; Wals *et al.*, 1999). However, following the United Nations Conference on the Human Environment held in Stockholm in 1972, and the subsequent establishment of the United Nations Environment Programme (UNEP) in Nairobi, a number of significant events have taken place at the national level (KUC, 1980; IGAD, 1999). These developments have influenced and shaped the formulation of strategies and programmes on the provision of environmental education processes in the country. Further, Atiti (2003: 22) comments that the recommendations of the Stockholm Conference, together with those from other meetings such as Belgrade in 1975, Brazzaville in 1976, Tbilisi in 1977, the All African Universities Workshop in Nairobi in 1978 and the Kenya National Symposium in 1979, helped Kenya to identify her position on the enhancement of environmental education processes within a global framework (KUC, 1980; Government of Kenya, 1999).

The establishment of the National Environmental Secretariat (NES) in 1974 and the subsequent formation of an Inter-Ministerial Committee on Environment (IMCE) was a major development with regard to the development of environmental education in Kenya. Of particular significance was the production of the National Environmental Action Plan (NEAP) Report in 1994 by the NES. This provided a strategy for achieving sustainable development in Kenya and also formed a basis for translating and operationalizing Agenda 21 in the country (Government of Kenya, 1994; IGAD, 1999; Karembu, 2002).

The year 1987 is significant for the reason that the first ever report on the state of the environment was prepared by NES in collaboration with the United Nations Environment Programme (UNEP, 1987). This report aimed to increase the awareness of the decision makers at all levels and the Kenyan public at large about the interrelationships between their activities and aspirations for better living and the environment. However, the report reflected a technical interest that focused on the

control and management of the environment (Huckle, 1993) by viewing the environment as economic capital to be drawn on and exploited (Atiti, 2003: 23). This technical interest position has been challenged in a study by Atiti (2003) through a socially critical orientation to education processes (Atiti, 2003:29-35; see also section 2.3.4)

Many of the formative activities associated with developments in environmental education processes in the country (KUC,1980; Lindhe *et al.*, 1993) have their foundations in the Environmental Education Committee that was formed in 1997 at the then Kenyatta University College and the guidelines for incorporation of environmental education processes into the curriculum prepared by the Ministry of Education in consultation with the Kenya Institute of Education (KIE). According to Atiti (2003:23), the subsequent creation of an Environmental Science panel to provide guidelines and approaches for incorporation of environmental education processes into the various teaching topics led to environmental education being associated with science disciplines. This discipline-centred approach has implied a fragmentation of knowledge that is consistent with the specialized nature of technological processes in the wider society (Robottom, 1987; Fien, 1993; Huckle, 1993). This has promoted a dominant technocratic scientific worldview in schools and the association of environmental education processes with the science curriculum (Atiti, 2003:25-28).

The need for a curriculum with a practical orientation led to the introduction of the current 8-4-4 system of education in 1981. This new system did not, however, bring about the desired results (Atiti, 2003: 23-24). Atiti further observes that although the need to make environmental education processes an integral part of both the formal and non-formal curricula was made explicit in *Sessional Paper No. 6 of 1988* (GOK, 1988), little has been done at classroom level, beyond a discipline-based approach to the teaching of environmental education processes. Further, Karembu (2002) maintains that the current education system has turned out to be more exam-oriented and content based with an increased workload for both learners and teachers leaving little room for socially critical approaches to environmental education processes. In view of the above observations, it is valid to claim that the school curriculum appears not to have been sufficiently effectively implemented to be able to take account of the complex interdisciplinary character of environmental education processes (Huckle, 1993; Fien, 1993; Fien & Tilbury, 2002, Atiti, 2003). As a result, the

education process has become part of the dilemma confronting the teaching of environmental education processes in Kenya as is the case elsewhere (Sterling, 1996; Hopkins & Mckeown, 2002; Stevenson, 2007). This calls for the need to re-appraise curriculum development strategies, a challenge that this study aims to address by trying out the option of contextualizing curricula using issues-based approaches in four case studies (see Chapter 6).

Nationally Sessional Paper No.6 of 1999 on Environment and Development (GOK, 1999: 92) explicitly stated the importance of environmental education processes, thus:

Environmental education, both formal and non-formal, is vital to changing people's attitude to appreciate environmental concerns. A long-term education programme focusing on all levels of environmental education and society is desirable.

This paper was developed to set up comprehensive policy guidelines for achieving sustainable development and also in response to the increasing concerns regarding the effects of development on the environment. This led to the enactment of the Environmental Management and Coordination Act of 1999 which provided for the establishment of an appropriate legal and institutional framework for the management of the environment (GOK, 2000). The National Environmental Management Authority (NEMA) came into being in 2002 as a result of this act. Prior to the establishment of NEMA, implementation of environmental policies was disjointed, as no comprehensive environmental legislation existed. The establishment of NEMA further committed the government to developing a national strategy for environmental education processes.

For a long time there was no comprehensive environmental legislation in Kenya (IGAD, 1999). However, in recent years, the government of Kenya, in line with global trends, has pursued policies that ensured that environmental education is included into the school curriculum, even if this has only been to a limited extent. For example, the government of Kenya under sessional paper No. 6 of 1988 (GOK, 1988: 23) on "Education and Manpower Training for the Next Decade and Beyond" stated that:

- a) Environmental studies (ES) be made part and parcel of education and training curricula and be taught at all levels of education systems.

- b) Concerted efforts be made to educate members of the public on methods of, and their specific role in conservation and enhancement of environment.

Further, the National Environment Action Plan (NEAP) report of 1994 included a section dwelling on public participation and environmental education (GOK, 1994:137-145). The role of education and public awareness to enable society to achieve sustainability was further underlined in the Sessional paper No.6 of 1999 on Environment and Development Policy (GOK, 1999).

A major outcome of the NEAP, was the Environmental Management and Coordination Act (EMCA) enacted in 1999 (ROK, 2000), which strongly recommends environmental education as a major strategy towards promoting sound environmental management and sustainable development in Kenya. Environmental education in Kenya can be practiced in three broad settings i.e. formal, non-formal and informal. Environmental education in the formal sector has basically focused on the biophysical dimension of the environment (GOK / MOEST, 2002a; GOK / MOEST, 2002b) while non-formal environmental education, which is usually conducted by non-governmental organizations (NGO's) has tended to focus on specific interventions as per the organizational priorities (IGAD, 1999).

The government of Kenya has also been advocating for sound environmental management practices and environmental education. This is clearly reflected in various other policy statements, government directives, sessional papers and development plans key among them: Sessional Paper No. 2 of 1997 on Industrial Transformation to the year 2020 (GOK, 1997); Poverty Reduction Strategy Papers (PRSP) for the period 2001-2004 (GOK, 2001); Economic Recovery Strategy for Wealth and Employment Creation for the period 2003-2007 (GOK, 2003a); Anti-corruption and Economic Crimes Act (GOK, 2003b); Sessional Paper No. 1 of 2005- A Policy Framework for Education, Training and Research (GOK, 2005a); Sessional Paper No.2 of 2005 on Development of Micro and Small Enterprises for Wealth and Employment Creation for Poverty Reduction (GOK, 2005c); Kenya Education Sector Support Programme (KESSP) (GOK, 2005b); Forest Act (GOK, 2006a) and the Vision 2030 (GOK, 2006b).

The above policy documents all have sections that directly and indirectly propose the enhancement of sound environmental management for sustainable economic

development and social justice; however, they lack cohesion in the necessary emphasis on implementation. Further, the organs and departments charged with the role of implementation have not satisfactorily brought about the desired results. Environmental education particularly has not been given the due attention at both formal and non-formal levels.

To fully grasp the nature of this challenge, further insight into the Kenyan education system is needed, which I discuss next.

2.3.3 Education, training and research in Kenya

The government and the larger population perceive education, training and research as factors that influence national development. These factors are seen as tools to address local challenges and provide possible practical solutions and options. An efficient and effective education system provides the necessary modalities and infrastructure to facilitate learning, training and research that take cognizance of local issues. It is on this basis that appropriate policies have been developed to guide education, training and research in the country.

Kenya is signatory to international commitments and conventions related to education such as the Education for All (EFA) Dakar Framework of Action, Millennium Development Goals (MDGs), United Nations Literacy Decade (UNLD), the Decade of Education for Sustainable Development (DESD), and the Convention on the Rights of the Child (CRC). The Sessional Paper No. 10 of 1965, Board of Adult Education Act (1966), Education Act (1968) and the Sessional Paper No. 6 of 1988, “Education and Manpower Training for the Next Decade and Beyond” are amongst others, the laws and policies that have guided the philosophy and provision of education in the country since independence. The Children’s Act (2001) highlights the right of every child to free compulsory basic education.

The most recent policy step is the passing of the Sessional Paper No. 1 of 2005, ‘A Policy Framework for Education, Training and Research’. This policy paper recognizes the integral role of education and training in promoting national development and re-affirms the government’s commitment in the provision of quality education and training for national development. To operationalize Sessional Paper No. 1 of 2005, the government developed the Kenya Education Sector Support Programme (KESSP) to provide a comprehensive understanding of the issues and

reform priorities in education, training and research. The paper among others embraces Education For All (EFA) goals and the MDGs.

The policy framework is based on the philosophy of ‘education and training for social cohesion, human and economic development’. It is further guided by nine (9) national goals of education (Sessional Paper No. 10 of 1965) based on the principles of national unity, social responsibility, unity of purpose, moral and ethical values, lifelong learning, science and technology, equity, quality of education as well as environmental conservation and management. The paper upholds the need to address global issues such as environmental concerns, technology, gender disparities, etc. through education. It also recognizes the need to offer Kenyans education and training that promotes sustainable development, peace and social justice.

The existing policy on education, training and research aims at national development and recognizes the role of education in sustainable development. Ideally, if fully and properly implemented, the policy would ensure education that contributes to sustainable development by addressing the environmental issues, risks and associated sustainable development challenges. As mentioned above, the education system has infused aspects of environmental education (EE) in most subjects taught in the curriculum as a response to teaching about environmental sustainability, but the existing education curricula both formal and non-formal have not embraced appropriate modalities to fully implement the national goals of education for sustainable development.

Whereas, education delivery through the Kenya Education Sector Support Programme (KESSP, 2005-2010) is pegged on policies as provided for in the Sessional Paper No.1 of 2005, there is a gap in that not all concerns in the Sessional Paper of 2005 are addressed by KESSP. The reason for this may be due to the fact that for implementation purposes the focus in KESSP is on 23 specific investment programmes. It is worth noting here that KESSP is reviewed annually by the Ministry of Education and development partners. Therefore, it is possible that emerging priorities such as the need to strengthen and or ESD may find accommodation in all 23 programmes including Information, Communication and Information (ICT) in education, teacher training, school infrastructure, adult and continuing education, monitoring and evaluation, capacity-building and training, expanding educational opportunities in the Arid and Semi-arid Lands (ASALs), etc.

through sustained advocacy. This could bring about new dimensions in the delivery and outcomes of education and hence realize the national goals of education. It is possible therefore that insights gained from this study could feed into such review processes.

2.3.4 Environmental Education as a global response to environmental issues, risks and associated sustainable development challenges

It is well acknowledged that the challenges associated with responding appropriately to the current social, economic, political and biophysical dimensions of the environmental crisis are fundamental, complex and enormous and that environmental education has been globally defined as an educational response to the environmental crisis (Lotz-Sisitka, 2001: 3). Chapter 36 of Agenda 21, the Biodiversity Convention, the Earth Summit +5 are some of the international conventions that have emphasized and acknowledged the role environmental education and capacity building as a response to the environmental crisis.

A critical look at the emergence of environmental education processes and the emergent definitions reveal a variety of potential ways in which educational responses may be able to respond to environmental issues, risks and associated sustainable development challenges. The first internationally adopted ‘definition’ for environmental education developed by IUCN in 1971 reflected a rational, linear, developmental view of education characteristic of major scientific institutions which associated environment and environmental problems with biophysical problems. Additionally, assumptions about education at the time were often linked to linear models of awareness raising and behaviour change (Lotz-Sisitka, 2001: 3). However, later definitions of environmental education (Huckle, 1991; UNCED, 1992, Bruntland report 1987), reflected a stronger focus on social critique and social change. These later definitions introduced a *socially critical* orientation to the education process.

The fact that environmentalists and environmental educators recognize that environmental education processes are processes of social transformation and change is evident in (amongst others) the view of environmental education processes that involve teachers and learners in “...promoting sustainable development and improving the capacity of people to address environment and development issues” (UNCED, 1992). Fien (1998) observes, however, that mainstream education has not

responded well to the environmental crisis and he highlights the paradox that while mainstream educationalists ignore the environmental crisis, education plays a key role in perpetuating unsustainable environmental practices by uncritically accepting and often replicating the association of progress and the unfettered growth economy, global injustice and poverty.

Numerous attempts have been made to mainstream environmental education, education for sustainability, and education for sustainable development as a way of setting the agenda for social transformation and change in formal education (Lotz-Sisitka, 2001). This began with the Tbilisi conference in 1977 (UNESCO-UNEP, 1978), Chapter 36 of Agenda 21, Publication of the document titled “*Education for a Sustainable Future: A Transdisciplinary Vision for Concerted Action*” by UNESCO in 1997 at the third international conference on environmental education in 1997. Development of an ‘*Education for Sustainability*’ discourse influenced the prominence of sustainable development in international politics which led to declaration of a United Nations Decade of Education for Sustainable Development (2005-2014) (UNESCO, 2005). Additionally, there have been various definitions of Education for Sustainability and a wide range of strategies and orientations prescribed to guide educators practice examples of which include Tilbury (1995); UNESCO (1996); UNESCO (2005); Huckle and Stirling (1996). These initiatives have changed with changing societal dynamics, as indicated in the Ahmedabad Recommendations from 4th International Environmental Education Conference of 2007 (UNESCO/UNEP/GOI, 2007).

In view of the above developments and the prevailing conditions with regard to environmental issues, risks and associated sustainable development challenges, it is vital to seek lessons from some of the above trends in environmental education, embrace a balance of environmental education processes *in, about* and *for* the environment and look into possibilities of collaboratively developing capabilities (tools, resources, action competencies) to deal with, and encourage change in local contexts. Additionally, provision of a range of learning experiences for encounter, dialogue and reflection in a context of action taking in diverse settings that respond to a wide range of environmental issues, risks and associated sustainable development challenges through education can help to achieve positive socio-economic transformation and change as well as ecological sustainability (Lotz-

Sisitka, 2001). As mentioned above, one apparently viable option is contextualizing curricula using issue-based approaches, which is the focus of this study.

The major impediments to effective environmental education practice in Kenya have been identified to include; lack of appropriately trained professionals (Atiti, 2001), lack of adequate and appropriate teaching and learning resource materials, limited exchange of information and experiences, limited research, lack of monitoring and evaluation of activities - especially environmental education activities in the curriculum, and limited donor support (IGAD, 1999; Atiti, 2001). The other problems facing environmental education in Kenya revolve around what Stevenson (1987) described as the rhetoric – reality gap which seem to have influenced the prevailing conceptions of the terms ‘environment’ and ‘environmental education’ as well as shaped the practice of environmental education in terms of scope, focus, general orientation, guiding principles and pedagogy (see also Chapter 5).

The above described policy context and the resultant influences on environmental education practice, coupled with the persistence and worsening of environmental issues, risks and associated sustainable development challenges in Kenya call for a review of environmental education curriculum practice in Kenya. The review needs to take into consideration the need for broader engagement with environmental issues, contextualising learning, active approaches modelled around the action enquiry strategies (Ellis & Kiely, 2000) of action learning, action research, participatory action research as well as action science. An issues-based approach to curriculum contextualisation which this study explores could be one potential possibility for this endeavour, although the scope of this study does not allow for a nation-wide review of this nature.

2.4 ENVIRONMENTAL EDUCATION IN THE KENYAN CURRICULUM

Educational responses to the above mentioned issues and risks in Kenya can be seen in the attempts to integrate some of the emerging environmental and sustainable development issues into the curriculum. In the 2002 curriculum review HIV/AIDS, environment, gender, human rights, female genital mutilation, and drug and substance abuse were integrated into the curriculum (GOK / MOEST, 2002a; GOK / MOEST, 2002b). Despite inclusion of these contextually relevant issues, the Kenyan curriculum can be said to be decontextualized both conceptually and operationally

(Cornbleth, 1990:13) as well as issues-wise (see section 2.5). Additionally, the rhetoric-reality gap as described by Stevenson (1987) is strongly manifest in the environmental education curriculum practice given the traditional purpose and structure of schooling (see Chapter 5).

2.4.1 History

Environmental education is practiced in both the formal and non-formal education sectors in Kenya. However, the environmental education practiced is as variable as are the conceptions and interpretations of environment and environmental education (see Chapter 5). The variability in conception and practice of environmental education in Kenya can be traced to the perspectives and interpretations of the landmark events in environmental education that led to the emergence of different approaches to environmental education. As a result, there has arisen dispute and contestation on approaches to environmental education (Greenall, Gough, 1993b; Lucas, 1979; O'Donoghue, 1993a; Robottom, 1987a).

The Ahmedabad conference recommendations (UNESCO/UNEP/GOI, 2007) maps changes in the field from 1977 to 2007, in regard to: changes in thinking about education and learning, leadership and partnerships, conceptualizing the environment-development relationship, communications and access to knowledge, emphasis on issues, as well as changes in sites of learning and participation in learning (UNESCO/UNEP/GOI, 2007:2-3). Most significant to this study are: the changes in thinking about education and learning, changes in conceptualizing environment-development relationship, changes in emphasis on issues as well as aspects of the changes in sites of learning and participation in learning.

With regard to 'thinking about education and learning', the Ahmedabad recommendations (UNESCO/UNEP/GOI, 2007:2) state that emphasis today is on "... experimentation and broader social and cultural situated learning processes that take account of context". This is in line with not only the focus and key question of this study (see Chapter 4) but also aspects of collaborative learning which were noted in the 1997 International Environmental Education Conference Recommendations.

The Recommendations state further that: "Environmental educators today are considering the inter-relationships between environment, society, culture and economics, in conceptualizing the environment-development relationship. However,

many are concerned that economics dominates the others raising issues of equity and social justice”. This is a marked change from 1997 and 1987 where ‘poverty reduction for sustainability’ and ‘environment in the context of social and economic issues’ were the focus respectively (UNESCO/UNEP/GOI, 2007:2).

There have also been changes in emphasis on issues whereby ‘global climate change’ tops the international political agenda today as compared to pollution and population growth in 1987 and poverty and sustainable development in 1997 (*ibid.*). However, it should be noted that poverty and sustainable development are still critical issues of concern in Kenya and the rest of Africa today, and are implicated in issues of ‘climate change’. The Recommendations state further that there is “... recognition that environmental issues such as global climate change are interconnected with a range of related issues such as health, human rights, the right to education, poverty, pollution, business responsibility, consumption and production, biodiversity loss, water quality and quantity, energy, gender, and environmental ethics among others” (UNESCO/UNEP/GOI, 2007:2-3). These provide a range of issues for considering in issues-based approaches to curriculum contextualization. The fact that environmental justice and social justice have become closely linked provides a further vantage point for dealing with such issues in education.

The ‘changes in sites of learning and participation in learning’ could also work in favour of issues-based approaches to curriculum contextualization. Specifically, “the widening of learning sites, accompanied by new media and methodologies that allow for border crossings and multi-site learning, and broadening of participation in the learning process” (UNESCO/UNEP/GOI, 2007:3) is a recommendation that resonates with issues-based approaches to curriculum contextualization.

2.4.2 Environmental education practice in Kenya

The prominent trends in environmental education visible in Kenya include:

- Communication approaches which are aimed at ‘targeting messages’ at target groups;
- Nature experience and values education approaches which provide experiential learning approaches *in* the environment (O’Donoghue, 1993a, 1994a, 1994b).

These trends have resulted in two main dominant forms of environmental education in Kenya namely: conservation education and biophysical education which are mainly associated with the science disciplines (Atiti, 2003; Ndaruga, 2003). O'Donoghue (1993a), fifteen years ago already criticized these attempts at defining environmental education for being linked to perceptions which view the environmental crisis as resource destruction, pollution and conservation issues, to the exclusion of *social, political* and *economic* concerns.

The conservation education and biophysical education forms of environmental education are often oriented towards nature studies and outdoor field studies. These are often carried out within the framework of education *about* the environment (Fien, 1993). The confinement of environmental education practice to education *about* the environment has limited environmental education practice to the level of only knowing about living things and life support systems. This calls for a reorientation of environmental education towards socially critical environmental education that is guided more by the concept of education *for* the environment (Fein, 1993). Education *for* the environment needs to be supported by both education *about* and *in* the environment for meaningful socio-economic transformation and ecological sustainability.

A close examination of environmental education practice in Kenya against the principles of environmental education as formulated at both the Tbilisi Inter-Governmental Conference on EE held in Tbilisi, Russia in 1977 (UNESCO-UNEP, 1978) and the Principles of Environmental Education for Equitable and Sustainable Societies (UNCED, 1992) reveal worrying gaps at practice level. These gaps stem from the very definition of environment. Environment was broadly defined at both the Tbilisi and the Rio de Janeiro conferences to embrace its totality. One of the Tbilisi principles of environmental education clearly spells out that the environment should be considered in its totality i.e. natural and built, technological and social (economic, political, technological, cultural-historical, moral, aesthetic).

This study draws inspiration from one of the Principles of Environmental Education for Equitable and Sustainable Societies which recommends that: Environmental education should treat critical global issues, their causes and inter-relationship in a systematic approach and within their social and historical contexts. Fundamental issues in relation to development and the environment, such as population, health,

peace, human rights, democracy, hunger, degradation of flora and fauna, should be perceived in this manner (UNCED, 1992).

Critical reflection on the above stated principle calls for the need to contextualise curricula through issues-based approaches, which is the focus of this study. This is also reflected in the more recent Ahmedabad recommendations, which state:

Base environmental education on an understanding of the inter-related dynamics of environment, society, culture and economics, and an understanding of the nature and causes of risks and issues that impact on socio-ecological relations, systems and structures at local, national and global levels.

Recognise the multi-faceted nature of environmental issues, and mainstream them across all disciplines and sectors as a priority.
(Ahmedabad Declaration and Recommendations, UNESCO, UNEP and Government of India (GOI), 2007:8)

According to Atiti (2003) schools and non-formal education organizations in Kenya, as elsewhere, are regarded as reproductive sites for the provision of the "... knowledge, skills and social relations necessary for the functioning of the capitalist economy and dominant society" (Giroux cited in Freire, 1985: xi). These skills, knowledge and social relations are what Bourdieu (1998) termed symbolic capital (Atiti, 2003:3-4). Contextualizing curricula through issue-based approaches can lead to locally relevant cultural capital being mobilised in schools and socio-historical contexts to provide new forms of symbolic capital in schools that cross boundaries of the distinctions made between everyday knowledge and school knowledge in the formal school system (Atiti, 2003:3). The interpretive capital that exists in non-formal education organizations (such as Eco-Schools) in Kenya (and elsewhere) can be used to provide "... tools for critical thinking and transformation action" (Giroux cited in Freire, 1985: xi) through working with teachers to contextualize environmental education processes in schools.

Normally, the responsibility of the Ministry of Education is to ensure that cultural capital of society is reproduced in schools in ways that are organized to suit the aims of formal education. To date this seems not to have been geared towards enhancing sustainable development in society. This study could provide some insight that can inform curriculum review efforts to achieve this.

The Ministry of Education, through the Kenya Institute of Education (KIE), reviewed the Kenyan curriculum in 2002 and produced curriculum guidelines in the form of syllabi (for example, GOK / MOEST, 2002a; GOK / MOEST, 2002b). In these syllabi, attempts were made to integrate some of the emerging environmental and sustainable development issues into the curriculum. Some of the issues integrated include: concerns from the biophysical/ecological dimension of the environment, HIV/AIDS, gender, human rights, female genital mutilation, and drug and substance abuse (GOK / MOEST, 2002a; GOK / MOEST, 2002b). It is, however, worth noting that only the biophysical/ecological concerns were regarded as components of environmental education in this review. Further, the teachers to date have not yet received adequate orientation and training on how to effectively integrate and infuse these issues into the curriculum. Additionally, the prevailing technocratic view of curriculum (Cornbleth, 1990) in Kenya has constrained efforts to address these issues through education. The conception of curriculum as a “contextualized social process” (Cornbleth, 1990) and “curriculum as praxis” (Grundy, 1987) are worth considering if issues in context are to be effectively addressed through learning processes.

It has been observed that curriculum is unlikely to change in the absence of supportive structural changes, which are unlikely to be initiated in the absence of external pressures or support (NEEP-GET, 2005). This line of reasoning indicates the futility of trying to bring about substantive curriculum or other reform simply by substituting one curriculum document for another (Cornbleth, 1990). Further, Popkewitz (1984) and Papagiannis et al. (1982) note that ‘develop and implement’ approaches to curriculum change have unfortunately proved to be surprisingly weak.

Teachers’ workshops on environmental education and a review report from the Inter-Governmental Authority on Development (IGAD, 1999) have confirmed that there is ineffective pre-service and in-service training for Kenyan teachers in environmental education processes despite the emphasis of the importance of teacher education programmes as the basis for effective implementation of environmental education methods and processes (UNESCO, 1980; KUC, 1980; Stevenson, 1987; Huckle, 1996; Hopkins & Mckeown, 2002). It is, however, worth noting that some public universities offer modules on environmental education (IGAD, 1999; Karembu, 2002) although with more emphasis on environmental studies at a postgraduate level.

Atiti (2003:27) reported that in-service training in environmental education is usually offered in terms of seminars, workshops and field courses for teachers and non-formal educators. These are used to increase awareness, improve extension services, sensitise the participants on environmental issues and strengthen institutional capabilities in the provision of environmental education processes. However, such in-service training is often implemented through technocratic approaches that fail to take into account the educational and environmental problems that arise in particular settings (Robottom, 1987; Huckle, 1996). Therefore, institutional and conceptual constraints that shape educational practices remain unresolved.

According to Wanaswa (1993), environmental issues in the Kenyan curriculum are implicitly integrated into some 'carrier subjects'. However, it is worth noting that the notion of 'carrier subjects' has ramifications of relegating environmental education processes to a 'thing' that can only be moved around by certain subjects in terms of content (Atiti, 2003:26).

A process-based approach to environmental education is desirable if the well intended goals of environmental education are to be realized in Kenya. However, it is unfortunate that process-based approaches are yet to take root (Greenall Gough 1997). Additionally, the Ministry of Education has not yet developed a comprehensive policy on the provision of environmental education processes in both formal and non-formal education (Wanaswa *et al.*, 1993; IGAD, 1999). This is despite the fact that several government statements have been made, in line with international environmental education policy (for example, Government of Kenya 1999) (see 2.3.2). The implication of this situation is that environmental education is yet to be adopted as an integral part of the school curriculum. In addition, teachers appear not to understand the nature and scope of environmental education processes, which many view as an additional burden in the already overloaded curriculum and as only relevant in the science curriculum (Atiti, 2003:24). Ketlhoilwe's (2007) study undertaken in Botswana, shows that a similar situation exists in other countries, and that while policies are made to guide environmental education in schools, poor support for their implementation radically changes their intent and efficacy (Ketlhoilwe, 2007: 171-184).

This, coupled with a lack of adequate materials to support these processes in schools, has continued to contribute to the prevailing low levels of environmental literacy amongst learners (Karembu, 2002). Consequently, organizations and institutions dealing with environmental education processes are not coordinated to share information and facilities (IGAD, 1999).

The United Nations Decade for Education for Sustainable Development (2005-2014) presents an excellent opportunity for further development of environmental education in Kenya, particularly if environmental issues and risks are to be addressed in relation to associated sustainable development challenges involving consideration of the interrelations between environment, society and economy. The Eco-Schools programme (FEE International, 2004b) presents a unique opportunity and curriculum development context for exploring processes of contextualizing curriculum in this way.

With the aforementioned theoretical vantage points available to curriculum theorizing and practice, it is lamentable to note that the contextual nature of many environmental issues are not explored in the Kenyan curriculum. It would seem that strategies need to be devised to explore contextual understandings of environmental issues and risks, and their associated sustainable development challenges. In this endeavour an action learning framework (Ellis & Kiely, 2000) can be applied to address real problems in context. Such an education could also be guided by the themes of Water, Energy, Health, Agriculture, Biodiversity (WEHAB) that have been identified to be of major concern in achieving sustainable development in local and global contexts, as specified in the draft International Implementation Scheme for the United Nations Decade of Education for Sustainable Development (DESD) (UNESCO, 2005).

As a contribution, this study aims to strengthen socially critical environmental education through case studies of action research for problem solving by enhancing contextualization of curricula through issues-based approaches in four primary schools in Nyanza province of Kenya (see case studies in Chapter 6). This presents a challenge to the prevailing technocratic practice in curriculum processes in Kenya and hopes to address some of the conceptual weaknesses in existing approaches to, and understandings of environmental education as identified above (see also Chapter 5).

2.4.3 Environmental education and teaching and learning resource materials in Kenya

Relevant and appropriate teaching and learning resource material are critical for enhancing environmental education in the curricula and for strengthening issues-based approaches to learning (Lotz-Sisitka, 1996:62). Of interest to this study was relevance and appropriateness of teaching and learning resource materials towards enhancing contextualised socially critical environmental education in schools using issues-based approaches.

Relevance and appropriateness of resource materials in the context of this study was looked at against criteria (see CR(Case Record) 2.1) which includes an assessment of presence of environmental education concepts and environmental and sustainability issues in the content; the depth of coverage of environmental education related concepts and contemporary environmental and sustainability issues; emphasis on skills building; action orientation of the materials; as well as recognition of and working with different ways of knowing (particularly indigenous and local knowledge). The criteria for reviewing resource materials (see CR 2.1) provides a synopsis of the criteria, sub-criterion factors and attributes that can be taken into consideration in judging the suitability of materials for enhancing socially critical environmental education with particular emphasis on issues-based approaches focusing on contemporary environmental issues, risks and associated sustainable development challenges in Kenya.

2.5 DECONTEXTUALISED NATURE OF THE KENYAN CURRICULUM

Cornbleth (1990) holds the view that curriculum is an ongoing contextualised social process that includes aspects which directly or indirectly influence the learning process. She further argues that context both situates and shapes curriculum, but observes that the complexity and elusiveness of context make it difficult to ‘pin down’ and link empirically to a particular curriculum hence the need to view curriculum as a contextualised social process (Cornbleth, 1990:27). Cornbleth first chose to classify context into nominal context; events within and outside the schools; and each organizational layer within the education system. However, to make context more manageable, she considered it important to distinguish between

structural or systemic and socio-cultural or societal contexts (Cornbleth, 1990:27-32).

Cornbleth (1990:28) further observes that an important feature of curriculum context is its variability or fluidity thus there is no generic curriculum context, no fixed set of parameters or invariant grid that can be imposed on any curriculum. Instead, she suggests that potential aspects of curriculum context can be identified and their relevance to a particular curriculum can be illustrated. A possible way of doing this would be to contextualize curricula using issues-based approaches, which this action research study explored (see Chapter 6).

The Kenyan education system serves societal, political, economic and stratification functions as well as the more often recognized individual demands for enlightenment, practical skills, and/or status (GOK- National goals of education, 2003). In so doing, the education system exerts controls on curriculum knowledge, through curriculum policy making and by shaping the conditions of curriculum practice with little regard to contextual influences. This has contributed to the 'decontextualization' of the curriculum.

The Kenyan curriculum can be said to be decontextualised both conceptually and operationally. This can be attributed to its *technocratic* orientation (Cornbleth, 1990:13-23, see also section 2.5.1 below). Cornbleth (1990:17-18) further observes that, given the widespread decontextualisation of curriculum both conceptually and operationally, we ought not to be surprised by continuing discrepancies between curriculum documents and curriculum practice or by repeated disappointment with the effects of technocratic curriculum change efforts. She further comments that neither the promised efficiency nor beneficence have been obtained through such orientations.

2.5.1 Conceptual and operational decontextualisation of curriculum

The conceptual decontextualisation of the Kenyan curriculum as informed by the technocratic model is evident in at least two related ways (Cornbleth, 1990:17). The first one being that curriculum as a product, (and its construction) is arbitrarily separated from curriculum policy making and use. Secondly, the curriculum and its construction are seen as apolitical or neutral, apart from or above competing social values and interests. This ironically culminates in a situation where curriculum

developers are not responsible for the education made available to learners, and attention being directed to the curriculum document rather than to classroom practice.

Operational decontextualisation of the Kenyan curriculum manifests itself in the form of structural (i.e., systemic) and socio-cultural (i.e., extrasystemic, societal) isolation. This isolation of curriculum and curriculum construction from their structural and socio-cultural contexts as evident in the Kenyan curriculum - which is produced at the Kenya Institute of Education (KIE) - is due to the assumption that the curriculum produced is appropriate for students and teachers, schools, and school systems across the country. This can potentially lead to situations where the actual features of the education system and local variations get ignored by curriculum developers while socio-cultural influences on the shape and substance of the curriculum remain unexamined (Cornbleth, 1990:17). The specific dimension which this study sought to explore was the '*issues-wise*' decontextualisation of curriculum.

2.5.2 Issues-wise decontextualisation

Despite recent efforts to integrate societal issues into the curriculum, the Kenyan curriculum can be largely described as decontextualised issues-wise. i.e. environmentally/ecologically, economically, socio-culturally, socio-politically as well as structurally. Going by Cornbleth's (1990) ideas, it would be probable that a decontextualised curriculum could potentially reduce the effectiveness of curriculum processes in addressing the issues that affect communities in context. It may also foster continuing discrepancies between curriculum documents and curriculum practice which could result in repeated disappointment with the effects of technocratic curriculum change efforts (Cornbleth, 1990). As a result, neither the promised efficiency nor beneficence would be obtained.

2.5.3 The need for curriculum contextualisation

From an EE/ESD perspective, there is need to consider alternatives that would contextualise curriculum using issues-based approaches, and thereby redefine curriculum, making it relevant and appropriate to local contexts (biophysical/ecological, economic, socio-cultural and socio-political), given the ascribed purpose and intent of environmental education and ESD (UNESCO 2005, Ahmedabad Declaration, 2007). In such alternative approaches, opportunities for

addressing real issues in context could be created, a focus which this study explores in more depth.

In arguing for curriculum contextualization, I am also guided by the work of Grundy (1987) in which she advanced the concept of 'curriculum as praxis'. Some of the important implications of Grundy's work are that: curriculum is constructed within actual learning situations with actual students; learning is a social process; and curriculum knowledge is socially constructed and subject to critique and reconstruction (or interpretation and meaning making).

Further, in presenting action research as a means of fostering critical or emancipatory curriculum praxis, Grundy (1987:142) observes that;

Social interaction (e.g., curriculum practice) takes place within a context which impinges upon the situation and often constraints it in unrecognized ways. If a particular set of social interactions is to be improved, then it is often the case that the social and material contexts within which those interactions occur need also to be improved and it is always the case that these contexts need to be understood.

However, Grundy does not examine more specific questions of what contextual understanding and improvement might be pursued. Issues-based approaches to curriculum contextualization provide one such approach in pursuance and operationalisation of Grundy's ideas.

Cornbleth (1990) argues that curriculum emerges from the dynamic interaction of action, reflection and setting, not action and reflection alone as put forth by Grundy (1987). However, reflection could of course be directed toward context as well as action. Grundy (1987) acknowledges this possibility, but in contrast, does not pursue contextual influences.

In pursuing a conception of curriculum as a contextualized social process, I question the current conception of curriculum in the Kenyan education system guided by Cornbleth's criticism of the dominantly prevailing technocratic conception of curriculum as a product e.g., plan, course of study (Cornbleth, 1990:7).

Additionally, a contextualised social process view of curriculum and its construction reflects a critical rather than a technical rationality (Cornbleth, 1990:24). Further, curriculum as a contextualised social process encompasses both subject matter and social organisation and their interrelations. This is because social organisation, including teacher and student roles (and their attendant rights and obligations) and patterns of interaction, provides a setting for academic activities that can extend or constrain students' learning opportunities (Cornbleth, 1990:24).

It is also worth considering the fact that, curriculum and how it might be changed requires understanding the culture of the education system - which may involve several subcultures associated with occupational groups, subsystems, and regions as well as racial-ethnic, religious, socio-economic and gender groups. The relevant socio-cultural context of curriculum consists of those extra systemic demographic, social, political, and economic conditions, traditions and ideologies, and events that influence curriculum and curriculum change. The socio-cultural context often provides the impetus for curriculum change. At times, education systems seem more responsive to socio-cultural expectations and demands than to those of their clients or participants (e.g., students, teachers). This may be a function of 'the external legitimisation, definition, and control of their internal processes' (Cornbleth, 1990:31).

Issues-based approaches to curriculum contextualisation may constitute an important contribution and step forward to Cornbleth's (1990) suggestion that putting curriculum in context necessitates reformulation of curriculum conceptions and reconstruction of curriculum practice, including the practice of curriculum theorizing, research, design and change.

It is, however, worth noting that, while voiding the reductionism and impotence of technocratic approaches to curriculum and its construction, contextualisation is not without problems such as complexity, situational contingency and risk (of unfamiliar phenomena and retaliation by vested interests in the *status quo*.) These human, socio-cultural problems are not amenable to technical solutions but to process-based and issues-based contextualised approaches to curriculum development (Cornbleth, 1990:32).

- **The contextualised curriculum**

With reference to the decontextualised nature of the Kenyan curriculum as discussed above, a contextualised curriculum is one which offers opportunities to address the issues that affect communities in context through the curriculum processes. Further, such a curriculum should try to link the school, home and the wider community environments so that experiences gained in each environment are drawn together and integrated in the learning process by maximizing the interfaces between the three learning environments (Taylor & Mulhall, 2001). This they propose will contribute to making the learning process more effective especially with regard to addressing the issues of concern in the community. Additionally, contextualisation of learning occurs when the content of the curriculum, and the methods and materials associated with it, are related directly to the experience and environment of the learner.

Stevenson (1987:75-78; 2007:146-150) identified four behavioural and programmematic regularities that have inhibited the implementation of environmental education as envisioned by the framers of the Belgrade Charter and Tbilisi Declaration. These included: the presentation of standardised knowledge associated with established disciplines; reliance on teachers as primary information sources; assessment procedures based on ease of marking and justification; and control of students (Smith, 2007:189). Additionally, Stevenson's (1987/2007) identification of fundamental disconnection between the structure and purposes of public schools and the aims of environmental education provides a useful explanation for why environmental education has largely remained peripheral to school reform agenda to date, although UNESCO (2005) identifies it as one of the fastest growing curriculum areas. Similarly, over a century ago, Dewey (1915) recognised that a failure to alter these regularities would prevent widespread adoption of *progressive educational practices* aimed at integrating schools and their communities and inducting students into patterns of civic engagement essential to the maintenance of democratic institutions. An issues-based approach to curriculum contextualisation has the potential to challenge these regularities (see Chapters 6 and 7).

As argued by Cornbleth (1990) and Grundy (1987), a contextualised curriculum provides room for educators to take responsibility for the teaching and learning processes thus providing opportunities that offer options to improve the relevance of education while contributing to the development of skills and competencies for

addressing the issues of concern in community as a progression towards sustainable development. Useful skills in these areas include problem solving, planning, management, social, negotiation, facilitation, as well as creative and critical thinking skills. Contextualisation is particularly useful in this case because, indeed, qualitative skills reflect more than just formal schooling, including family input, cultural norms, health and other factors (Hanushek, 2005).

Through action research case studies, this study tried out issues-based approaches to curriculum contextualisation in the context of the Eco-Schools programme in Kenya (see Chapter 6).

2.6 ORIENTATIONS TO CURRICULUM

The changing trends in education and environmental policy developments in Kenya (see section 2.3) as discussed above point to possibilities of reconsidering the purpose of the curriculum. The orientation of curriculum has a significant influence on the purpose and design of the curriculum. Da Costa *et al.* (1994:31) emphasise that curriculum intention or purpose as well as process is an important dimension of curriculum work.

The arguments in sections 2.2-2.4 above present a case for a curriculum orientation that supports transformation. To understand different approaches to curriculum, Grundy (1987) draws on Habermas's (1972) theory of knowledge interests to explain different kinds of curriculum. Habermas's theory of knowledge interests explains how people think about knowledge, and how knowledge is organised in society.

Habermas proposed three different knowledge interests in society, which Grundy (1987: 12-18) interprets as different approaches to curriculum. She refers to them as; *a technical knowledge interest* – which informs objectives based approaches to curriculum; *a practical knowledge interest* – which regards curriculum design as a process through which pupils and teachers interact in order to make meaning of the world and is also primarily focussed on understanding the environment through interpretive approaches; and *an emancipatory knowledge interest* – which is primarily focused on emancipation involving independence from external structural forces and is often linked to notions of justice and equality.

On the *practical knowledge interest*, Grundy (1987: 15) notes that Stenhouse's process model of curriculum has a practical knowledge interest and quotes Stenhouse as saying that 'A process model of curriculum development rests on teacher judgement, rather than teacher directions' (Stenhouse, 1975:96).

Cornbleth (1990) draws from the *emancipatory knowledge interest* and describes curriculum as an ongoing social process, which comprises interactions between learners, educators and other stakeholders. This translates to advocating for wider participation in curriculum processes which this study explores through issues-based approaches to curriculum contextualization in the context of the Eco-Schools framework - that embraces participation of various stakeholders and holds issues as central to programme activities.

With cognisance of Grundy's (1987) interpretation of Habermas's (1972) three knowledge interests, Cornbleth (1990) takes this further and discusses two views of curriculum, the *technocratic* and *critical*.

- **A critical perspective of the *technocratic* and *critical* views of curriculum**

Cornbleth (1990) criticises the *technocratic* view of curriculum and advocates for a *critical* view of curriculum citing several limitations that come with the former. Most conspicuous of these limitations and of interest to this study is the apparent decontextualisation of the curriculum (see 2.5) as influenced by a technocratic orientation. This decontextualisation often makes curriculum less relevant to contexts and communities contrary to the expectations of a functional curriculum.

Additionally, Cornbleth (1990:34) laments that there are problems in planning for thinking or inquiry that technocratic approaches simply cannot accommodate. These include provision for student generated questions as well as student hypotheses and interpretations, and conclusions not anticipated or condoned by the curriculum developers. In addition, national curriculum documents cannot provide opportunities for experiences beyond the classroom to generate questions, test hypotheses, or act on conclusions. Further, she notes that a packaged curriculum cannot anticipate local possibilities. Given the above limitations of the technocratic curriculum as brought out by Cornbleth, it can be speculated that a technocratic view of curriculum cannot adequately support issues-based approaches to curriculum contextualization.

Related to these differing postures toward control and conflict are different attitudes towards curriculum and social change. A technocratic approach tends towards the perpetuation of the *status quo* within and outside the schools (Cornbleth, 1990:34). According to Cornbleth (1990), key features of a critical perspective then are its normative stance against forms of domination and its context sensitivity. In order for curriculum to further critical purposes, it must be seen and treated as value laden and contextualized (Cornbleth, 1990).

In the critical curriculum view, curriculum knowledge or subject matter of interest is primarily but not solely academic, it also includes the personal, social, and world knowledge that is communicated or otherwise made available to students (Cornbleth, 1990:25-26). The critical conception of curriculum and its construction posits dynamic interaction among policy, planning, enactment and their structural and socio-cultural contexts (unlike the technocratic approach) i.e. curriculum is constructed and reconstructed in situated practice. Additionally, whereas a technocratic view puts curriculum as instrumental to classroom practice, a critical view sees curriculum as existing in practice, not independent of it. Further, a technocratic view tends to be prescriptive of practice while a critical view is interpretive and questioning (Cornbleth, 1990:26). From a critical perspective, curriculum construction and reconstruction both reflect and respond to their immediate and more distant contexts.

In view of the limitations of a technocratic view of curricula, Cornbleth (1990) finds a *critical* view of curricula ideal arguing that a critical approach is not so limited. She further comments that a critical orientation has normative aspects that support system, and social change consistent with human dignity and possibilities for social justice. Additionally, she observes that, such change is seen as interrelated, and that if curriculum is viewed critically as a contextualised social process, then curriculum change is a function of contextualised change. In this study, I draw on Cornbleth's (1990) thinking, given its synergy with transformative and contextually located interests of environmental education, as described in 2.3.4 above.

In Africa participatory, contextualised approaches to curriculum development have received attention notably in Southern African environmental education processes, where approaches that enable communities to participate in their learning in ways that allow critical contextual dialogue and action at local level have been sought

(Lotz, 1999). Participatory, deliberative approaches to curriculum development work in the Southern African region was synthesised by Lotz (1999) who describes and characterises a participatory process of curriculum deliberation. According to Lotz (1999), deliberative curricula in environmental education are characterised by five interacting key curriculum features namely: responsiveness, flexible course structure, participation, praxis and assessment as learning. I find these features quite relevant and informative to this study.

Environmental education processes have the potential to successfully address the prevailing environmental issues, risks and associated sustainable development challenges in context if appropriate curriculum and pedagogical approaches are adopted (Lotz, 1999; Atiti, 2003; Lupele, 2003). This study seeks to explore the potential of an issues-based approach to curriculum contextualisation in addressing local environmental issues, risks and associated sustainable development challenges of concern. Related approaches that are currently attracting attention include place-based education (Smith, 2007: 189-207). Knapp (2007) also identifies a number of similar approaches that have sought to ground at least part of student learning in the local as problem-based learning, contextual teaching and learning, expeditionary learning as well as cultural journalism.

Smith (2007:192) specifically argues for place-based learning on the grounds that the opportunity to participate in learning activities that focus on real-world problem-solving can impart to children a sense of their own agency and collective capacity to alter their neighbourhoods or communities for the better. Additionally, he asserts that the educational experiences are aimed at developing in young people a sense of affiliation with the places where they live.

2.7 CONCLUSION

This chapter has provided the context of the study by illuminating the environmental issues, risks and associated sustainable development challenges in Kenya and in Nyanza province specifically, where the action research case studies were conducted. It has also outlined the policy developments and influences both globally and nationally as well as described the state of environmental education curriculum practice in Kenya while underscoring the importance of relevant and appropriate teaching and learning resource materials. Additionally, the chapter described the

decontextualised nature of the Kenyan curriculum and provided perspectives for a contextualised curriculum, which is argued has the potential to contribute towards addressing real issues in context through issues-based approaches. Further, orientations to curriculum and potential influences on issues-based approaches to curriculum contextualisation have been critically discussed.

The next chapter provides the theoretical vantage point of this study by exploring relevant curriculum and learning theories. It also discusses Eco-Schools practices as the study was located in the Eco-Schools programme.

CHAPTER 3

THEORETICAL SITUATION OF THE STUDY: CURRICULUM, LEARNING AND ECO-SCHOOLS PRACTICES

3.1 INTRODUCTION

The persistence of environmental issues, risks and associated sustainable development challenges in Kenya call for concerted and multi-sectoral efforts to address this looming challenge. Education in general and environmental education particularly, has the potential to contribute towards addressing environmental and sustainability issues in context. This is inspired by the fact that most of the current trends and debates in environmental education for change are inclined towards socially critical environmental education, which seeks to bring about real societal transformation through curriculum processes.

Guided by critical curriculum theory as basis for issues-based approaches (see 3.2), issues-based enquiry approaches to curriculum contextualisation (see 3.3), social learning and situated learning theories (see 3.4.1), the theory of communities of practice (see 3.4.2), the concept of schooling as a cultural process (see 3.4.3) and the related perspectives of learning, I seek insights from contemporary learning theory and Eco-Schools practices to provide theoretical orientation for this study.

By combining “... the language of critique with the language of possibility” (Giroux cited in Freire 1985: xii) I propose a re-orientation of environmental education processes in schools. I do this by providing an overview of a socially critical orientation to environmental education processes, guided by the relevant theoretical positions and also critically reflect on environmental education in the Kenyan curriculum so as to gain some insights into how issues-based approaches to curriculum contextualisation can be enhanced within the context of Eco- schools.

3.2 CRITICAL CURRICULUM THEORY AS BASIS FOR ISSUES-BASED APPROACHES TO CURRICULUM

The critical curriculum theory of education *for* the environment is considered suitable as a guiding orientation to issues-based approaches in this study. This is

because it is potentially counterhegemonic (Fien, 1993:11). Further, socially critical environmental education recognizes a reciprocal relationship between teachers, schools and society in which “...formal education is both shaped by, and responsive to the needs of society and, in turn, helps to shape the society of which schools are part” (Lotz-Sisitka, 1996:38).

Fien (1993:4) states that there is wide agreement that education has an important role to play in transforming values and empowering people to participate in environmental improvement and protection. However, there is contestation over the relative importance of different knowledge, skill and affective objectives and the social and political interests served by different approaches to environmental education (Robottom, 1987a, 1987b cited in Fien, 1993:5). Robottom argues the case for a socially critical approach to environmental education – or a critical curriculum theory – known as ‘education *for* the environment’ as brought forth by Fien (1993).

Fien (1993:15-16), discusses three approaches to environmental education namely; education *about* the environment, education *through* the environment, and education *for* the environment and their ideological bases. He argues that education *for* the environment has an overt agenda of values education and social change. It aims to engage students in the exploration and resolution of environmental issues in order to foster the values of the new environmental paradigm and to promote lifestyles that are compatible with the sustainable and equitable use of resources. In so doing, Fien (1993:15-16) explains that it builds on education *about* and *through* the environment to help develop an informed concern for the environment, a sensitive environmental ethic, and the skills for participating in environmental protection and improvement.

According to Stevenson (1987), education for the environment involves engaging students in:

... the intellectual tasks of critical appraisal of environment (and political) situations and the formulation of a moral code concerning such issues, as well as the development of a commitment to act on one’s values by providing opportunities to participate actively in environmental improvement.(1987:73)

Fay (1977) argued out that critical (curriculum) theorizing is ‘clearly rooted in concrete social experience’ and arises from as well as seeks to address, the life

problems of individuals and groups. He further explains that it uncovers the social processes that create and maintain social problems and provides strategies by which they may be challenged (Fay (1977 cited in Fien, 1993: 6). Fay (1977:109) summarized these features of critical theorizing when he wrote that it ‘arises out of the problems of everyday life and is constructed with an eye towards solving them’.

3.3 ISSUES-BASED ENQUIRY APPROACHES TO CURRICULUM CONTEXTUALIZATION

Issues-based enquiry, as a participatory learner centred approach, offers possibilities for learners to develop an awareness and understanding of environmental issues, and possible ways of addressing them (Gough, 1992; Chambers, 1995). This approach represents a radical departure from traditional approaches of teaching and learning where teacher-centred styles are the most common methods of teaching, and knowledge is often viewed as factual recall at the expense of conceptual understanding or skills development. Additionally, in the traditional approaches, little, if any, link is made to the real world of the learners (Van Harmelen & Irwin, 1995 cited by Wilmot, 2005:126). Further, issues-based approaches, as a characteristic of socially critical environmental education offer that education is purposeful when it is centred on issues that are topical and relevant to students’ lives (Barry, 2006:4).

It is well acknowledged that education needs to play a role in developing knowledge, skills and values necessary for creating just, democratic and sustainable societies. However, for these to be realized, there is need to find ways of translating this rhetoric into practice (Wilmot, 2000). Provision of experiential and participatory learning opportunities in context can contribute significantly to the realization of just, democratic and sustainable societies (Fien, 1993) characterized by ecological sustainability, economic stability, social cohesion and justice as well as political stability. A similar orientation to education is promulgated by environmental educators (Gough, Robottom & Spork, cited in Fien 1993) with emphasis on development of skills and capacities in learners, problem solving and decision-making and promotion of values and attitudes necessary for sustaining life on this planet (Wilmot, 2000). Further, Van Harmelen and Irwin (1995, as cited in Wilmot, 2000:128) criticize traditional school classroom practices and instead advocate for conceptual understanding and skills development.

As a means by which “...to empower communities to act on environmental issues and to promote environmental ethics’ in a South African context” the Environmental Education Curriculum Initiative (EECI) advocated a cross-curricular and integrated approach to environmental education within all levels and programmes of the curriculum, as well as the adoption of an action competency orientation. It also supported programmes that reflect the principles of *Agenda 21* and international trends of education for sustainable living (Janse Van Rensburg & Lotz-Sisitka, 1998: 4-5).

Despite the opportunities for issues-based approaches presented by the new curriculum initiatives, there are still constraints that need to be addressed. Simon (1992) suggests the need to move beyond the identification of constraints to change, and to actively encourage the search for possibilities for change in spite of the apparent flaws in the education system. This inspires the need for reconstructing educational practices that engender pedagogy of possibility, so that transformation is possible (Wilmot 2000:129). An issues-based approach to curriculum contextualization is an attempt in that direction.

Following the model of enquiry suggested by Gough (1992) and Chambers (1995), issues-based enquiry approaches often consist of the following phases: planning; investigating and researching aspects of the theme; communicating and interpreting the results of the investigations; reflecting on the investigation, and taking action.

Further insight and guidance is gained from the ‘*Education in Action: A Community Problem Solving Programme for Schools*’ work of Wals, Beringer and Stapp (1990). Wals, Beringer and Stapp (1990) discuss Action Research and Community Problem-Solving (ARCPS) model as an approach to environmental education. They define environmental education as the process that enables students and teachers to participate more fully in the planning, implementation and evaluation of educational activities aimed at resolving an environmental issue that the learners have identified. What an ‘environmental issue’ is, depends on the perceptions and the experiences of the learner as well as on the context in which education takes place.

Wals, Beringer and Stapp (1990), further explain that, given that the educational activities in this approach are aimed at resolving an environmental issue, students

and teachers act and seek to improve the (local) biophysical and/or social environment while engaged in an interdisciplinary learning process (DiChiro & Stapp, 1985).

Additionally, Mabunda's (1999) work on '*Educating for Socio-Ecological Change; Case Studies of Changing Practice in South African Tertiary Institutions*' provides interesting perspectives relevant to this study. Mabunda confesses choosing an issue-based approach to teaching environmental issues due to the numerous advantages it has over the traditional approaches, *inter alia*, its appropriateness to all levels of education and for use in local contexts. Additionally, teaching issues close to home is advantageous because both students and teachers become aware that they also contribute towards the deterioration of the environment and that this helps them realize that they can contribute towards their solution (Mabunda, 1999 cited in Le Roux, 2000: 321-322).

Current curriculum initiatives around the world reveal feasible opportunities for curriculum contextualisation. However, ways of translating the rhetoric into practice need to be identified, and appropriate approaches and strategies designed for this purpose. In pursuit of this, this study explored issues-based approaches to curriculum contextualization in the context of the Eco-Schools programme through case studies in four primary schools in Kenya (see Chapter 6).

3.4 CONTEMPORARY LEARNING THEORY (SITUATED LEARNING)

Given the widespread decontextualisation of the Kenyan curriculum both conceptually and operationally (see 2.5.1) as well as issue-wise (see 2.5.2), there is need to consider alternative perspectives of learning that would contextualise and thereby redefine curriculum, making it relevant and appropriate to local contexts (biophysical/ecological, economic, socio-cultural and socio-political) by way of addressing real issues in context. The alternatives would further treat curriculum critically rather than technically, as a contextualised social process (see 2.5.3, 2.6). In this endeavour, various concepts with supportive philosophical orientations need to be embraced and inculcated into curriculum practice. Some of the relevant concepts that will guide this study and provide inspiration include: the theory of situated learning advanced by Lave and Wenger (1991). Further guidance will be sought from the concepts of communities of practice and the social theory of learning

advanced by Wenger (1998a, b), and the concept of schooling as a cultural process advanced by Rogoff (1998).

3.4.1 Social Learning Theory and Situated Learning

Daniels (2001), views social learning as a theory which places knowledge as something which is socially constructed and this is achieved through collaborative efforts to accomplish shared objectives. The shared objectives in the context of this study refers to addressing the common environmental issues, risks and associated sustainable development challenges in context. Smith (1999) is of the view that social learning theory states that people learn as they observe each other in a social setting.

Wals and Heyman (2004) define social learning as a process that should allow people to explore and reflect on their common ground and differences at the same time. They believe that through such a learning process, people are able to live more sustainably in their context. For instance Craps *et al.* (2004) were able to show that professional experts and local people in the rural areas of Ecuador were able to put aside their differences and work together because they wanted to achieve the same goal of ‘sustainable drinking water management’ (*ibid*:378). Similarly, specific issues of concern in communities are often identified through environmental auditing and these become the themes of focus in Eco-Schools (see Chapter 6).

- **Situated learning as a model of the social learning theory**

Situated learning is one of the models of social learning theory. This model suggests that learning is always contextualised. Benzie *et al.* (2005:180) argue that ‘the context and the activities through which learning takes place are an integral part of what is learned and the environment in which the learner engages in learning is an integral part of the learning experiences and shapes that which is learned’.

Several arguments have been put forth in various settings in support of the need to contextualise or localise curricula; Autman Tembo (1996 cited in Lotz-Sisitka, 1999:1) reflecting on research done to inform the development of an environmental education curricula for industries in Malawi stated that; “...To draw out a curriculum framework at this stage may be rather difficult as much more needs to be discovered about the needs, attitudes and context of the industries...” Going by Tembo’s assertion, it is obvious that a curriculum needs to take needs, attitudes and contexts

into account. This is a key consideration if curricula are to be relevant and to contribute in addressing real issues affecting society.

This is further reinforced by Lave and Wenger in their concept of situated learning (Lave & Wenger, 1991). The main characteristics of their concept of situated learning as per Altrichter's (2005) view are;

- Learning means engaging in the social world (Wenger 1998a:7; Hanks, 1991:24)
- Learning is situated (Clases *et al.*, 1996:233; Lave, 1991:67)
- Learning occurs in and through communities of practice (Lave & Wenger, 1991:98; Hanks, 1991:15f; Hanks, 1991:16)
- Learning occurs in socially structured situations (Lave, 1991:74; Lave & Wenger, 1991:33)
- Learning involves formation of identity in communities of practice (Lave, 1991: 64-65, 74)
- Learning occurs through a process of 'legitimate peripheral participation' (Lave & Wenger, 1991; Hanks, 1991:14, 23; Clases *et al.*, 1996:239).

3.4.2 'Communities of practice' as context for situated learning

Wenger (1998) defined the 'concept of community of practice' as a group of people who have a common interest in achieving something and they share ideas on the best way of achieving their common goal. He further observed that a community of practice is a unique combination of three fundamental elements:

- 1) **Domain:** A sense of joint enterprise (that which matters to people) that brings members together. This sense of joint enterprise creates identity and a shared domain of interest and a commitment to this domain.
- 2) **Community:** Members engage in joint activities, they help each other and share information with each other in the pursuit of their joint enterprise. It has been found that joint enterprise belongs to the participants in the community of practice because they are the ones who negotiate a response to the situation they will be facing (Rock, 2005). A community is only a community of practice if members interact on regular basis and learn from each other on the best way to achieve their enterprise.
- 3) **Practice:** Members of a community develop a shared repertoire. Wenger (1998: 79) summarised repertoire as "routines, tools, ways of doing things, stories, words,

gestures, symbols, genres, action or concepts that the community has produced or adopted in the course of its existence, and which have become part of its practice”.

In order to give a social account of learning, Wenger’s theory explores in a systematic way the intersection of issues of community, social practice, meaning and identity (Austin, 2002).

The concept of ‘*practice*’ as shaped up by the concepts of ‘*participation*’ and ‘*reification*’ in negotiating meaning are explored in this research owing to the focus of the study (see Chapter 3). Additionally, the concept of ‘*legitimate peripheral participation*’ is probed, challenged and reconsidered against mutual engagement, so as to gain credence in this study.

- **The Concept of ‘Practice’**

Practice is one of the central ideas of Wenger’s understanding of learning (Tusting, 2005). According to Wenger (1998:47), “practice connotes doing, but not just doing in and of itself. It is doing in a historical/ social context that gives structure and meaning to what we do”. Wenger maintains that in this sense, practice is always social practice. Wenger further argues that the process of engaging in practice always involves the whole person, both acting and knowing at once (Wenger, 1998: 47-48). Additionally, Wenger (1998:48) maintains that practice is not immune to influence of theory, but neither is it a mere realisation of theory or an incomplete approximation of it.

In this view, the study sought to explore practice and participation in Eco-Schools with due consideration for context. The Eco-Schools framework provided an ideal structure for this endeavour. Eco-school activities related to aspects of school governance, curriculum work, pedagogical approaches, and resource management – particularly through micro-projects, as well as school operations and support offer useful opportunities for enhancing communities of practice.

Wenger (1998:4) defines a *community* as a group of people who have a common interest in achieving something. In this study, a *community* is comprised of the school community and surrounding community. They share ideas on the best way of achieving their common goal and thus a community is characterised by:

- *Mutual engagement*: defined as “people who are engaged in actions whose meanings they negotiate with one another” (Wenger, 1998:73-74). Further, Wenger (1998:74) observes that: “being included in what matters is a requirement for being engaged in a community’s practice, just as engagement is what defines belonging”. This study explored the common activities that members of the community engage in for economic well-being as well as for environmental/ecological sustainability and social justice (see Chapter 6). Due to the issues-based focus of this study, it was necessary to look into ways through which the learners in schools could mutually engage with the community to address the environmental issues, risks and associated sustainable development challenges facing the community through a learning process.
- *Joint enterprise*: (Wenger, 1998:77-82) refers to joint enterprise as a goal that is shared by members of a community of practice as they respond to their situation irrespective of all the factors that might be beyond their control. Wenger considers *negotiation of joint enterprise* as the second characteristic of practice as a source of community coherence. He specifically states 3 points about the enterprise that keeps a community of practice together. Thus:
 - It is the result of a collective process of negotiation that reflects the full complexity of mutual engagement.
 - It is defined by the participants in the very process of pursuing it. It is their negotiated response to their situation and thus belongs to them in a profound sense, in spite of all the forces and influences that are beyond their control.
 - It is not just a stated goal, but creates among participants relations of mutual accountability that become an integral part of the practice (Wenger, 1998:77-78)

In the case of this study, *negotiation of a joint enterprise* was done around and out of concern for the environmental issues, risks and associated sustainable development challenges in the schools (see Chapter 6).

- *Shared repertoire*: (Wenger, 1998:83) summarised repertoire as “routines, tools, ways of doing things, stories, words, gestures, symbols, genres, action or concepts that the community has produced or adopted in the course of its existence, and which have become part of its practice”. He identified development of a shared

repertoire as the 3rd characteristic of practice as a source of community coherence (Wenger, 1998:82). In the case of this study, which is situated within the Eco-Schools framework, the process and criteria of becoming an Eco-school requires that schools develop environmental policies, eco-codes and action plans as per critical issues of concern affecting the community. These environmental issues, risks and associated sustainable development challenges are often revealed from the environmental audits. Additionally, Wenger (1998:83) calls a community's set of shared resources a *repertoire* to emphasise both its rehearsed character and its availability for further engagement in practice.

- **‘Participation’ and ‘reification’ as key concepts to negotiating meaning in practice**

Wenger (1998:52), defines meaning as “an experience that is located in the process of negotiation of meaning... and negotiation of meaning involves interaction of two constituent processes called participation and reification and these are fundamental to the human experience of meaning and thus to the nature of practice”.

Participation: Participation emanates from the interaction amongst people as they take part in a practice within a community of practice (Wenger, 1998:55-57). Additionally, Wenger (1998:56) maintains that participation in social communities shapes our experience, and it also shapes those communities; the transformative potential goes both ways. This attribute of participation is particularly important with regard to learner participation in resolving environmental issues in the community.

Wenger (1998:7-8), states that placing the focus on *participation* means that learning is an issue of engaging in and contributing to the practices of their communities for *individuals*, refining their practice and ensuring new generations of members for *communities*, and sustaining the interconnected communities of practice through which an organization knows what it knows and thus becomes effective and valuable as an organization for *organizations*.

Reification: Wenger (1998:58), refers to the concept of ‘reification’ very generally as the process of giving form to our experience by producing objects that congeal this experience into ‘thingness’. He maintains that in so doing, we create points of focus around which negotiation of meaning becomes organized. The issues of concern in a community as in the case of this study could be treated as the focus. Wenger

(1998:58-59), further gives another example quite relevant to this study. He states that: “Writing down a law, creating a procedure, or producing a tool is a similar process”. He explains that a certain understanding is given form and that this form then becomes a focus for the negotiation of meaning, as people use the law to argue a point, use the procedure to know what to, or use the tool to perform an action. He concludes by claiming that the process of *reification* so construed is central to every practice. In the context of this study, school environmental policy formulation, action planning, development of eco-codes, micro-project design targeting the critical issues of concern in society as well as resource books used by Eco-Schools can be considered in terms of the concept of *reification*.

Against this background, this study focused on exploring participation and reification as they constitute practice in the context of the Eco-Schools framework and whole-school development work in schools (see Chapter 6) and in relation to issues-based approaches to curriculum contextualisation.

With regard to networking learning community, Wenger (1998), explains that communities of practice are connected to the rest of the world and those that belong to a community of practice relate to this world and learn from it. In this study, I sought to explore these linkages through networking the case study schools with other schools, local experts, community groups, other organizations doing work related to their themes and issues of focus as well as other Eco-Schools around the world (specifically Denmark) for purposes of sharing knowledge and experiences so as to enhance efficiency and effectiveness in practice.

- **The concept and process of ‘legitimate peripheral participation’ and situated learning**

The concept of *legitimate peripheral participation* as used by Wenger (1998) to characterise learning, broadens the traditional connotations of the concept of apprenticeship from a master/student or mentor/mentee relationship to one of changing participation and identity transformation in a community of practice. This approach is in line with the philosophical basis of this study which tends more towards theories of *situated experience* that give primacy to the dynamics of everyday existence, improvisation, coordination, and interactional choreography as well as emphasize agency and intentions (Wenger, 1998:13).

Lave and Wenger (1991) understood social learning as a 'situated activity' through the notion of *legitimate peripheral participation*. They explain legitimate peripheral participation in the sense that "...learners inevitably participate in communities of practitioners and the mastery of knowledge requires newcomers to move toward full participation in the socio-cultural practice of a community" (Lave and Wenger, 1991:29). This implies that people learn new things not from the community but as part of being a community of practice (Smith, 2003). Additionally, Lave and Wenger (1991:55), state that "legitimate peripheral participation refers both to the development of knowledgeably skilled identities in practice and to the reproduction of and transformation of communities of practice".

It is also, however, possible that learning can start from mutual engagement between the newcomers and the old timers. This is often the case in the context of the Eco-Schools programme in Kenya, where both learners and community members jointly participate and mutually engage in the activities of the programme through the Eco-Schools committee. This approach is evident for instance in the case of non-drinking alcoholics given by Lave and Wenger (1991:79-84), in which learning apparently took place without necessarily starting at the periphery but by people sharing stories of failure and success.

In environmental education, Lupele (2007), in his study on learning as it happens amongst the members of the course development network (CDN) in environmental education established that sharing of the lived experience of the members acted as a learning curriculum to members. However, an ethnographic study of 14 high school students' experiences who worked for an environmental management organisation which was run by the Institute of Ecosystem Studies in America indicated that the power dynamics between the novice and the experienced hindered the learning of the new comers (Hogan, 2002). Another study carried out in the UK on the experience of doctors that were training to become general practitioners also indicated that being on the periphery was not necessarily conducive to learning (Cornford & Carrington, 2006). This suggests the need for participatory and mutual engagement throughout the learning process as opposed to just legitimate peripheral participation. This study was an attempt to try out participatory and mutual engagement of learners in schools and community members, through issues-based approaches to curriculum contextualization in the context of the Eco-Schools programme. These processes were important to the contextualisation process and are therefore highlighted here.

3.4.3 Schooling as a cultural process

Rogoff (1998) seeks to widen the discussion of shared problem solving practices to a socio-cultural view that emphasizes that individuals become proficient in the practices that are common and valued in the institutions and interactions of their daily lives, again emphasizing the primacy of practice as focus for curriculum thinking.

In proposing contextualizing curricula, I am guided by the idea that schooling involves cultural practices—“ways of doing things” that are rooted in participants’ beliefs, expectations, traditions, and relations (Argyris & Schon, 1978; Goodnow, Miller, & Kessel, 1995; Rogoff et al., 1993). Thus, to increase relevance to local contexts, schooling processes ought to be contextualized.

In a contextualized curriculum the use of directive guidance in which teachers ask children to produce actions and practices without explaining their meaning or providing a rationale for the requests could be phased out. This could potentially add value to the learning process (Cuban, 1984; Heath, 1983; Lemke, 1990; Mehan, 1979; Mercer, Edwards, & Maybin, 1988; Minick, 1993; Newman, Griffin, & Cole, 1989; Wells, 1992; Wertsch & Minick, 1990; Woods, 1980). Contextualised curricula could also ensure that experiences in the schooling process are applied in solving real problems in the environment. This is because there is suggestive evidence that schooled people use communication patterns of the school outside immediate classroom contexts and constraints (Chavajay & Rogoff, 2001).

In contextualized curricula, “transactional dialogue” can ensure efficient and effective problem solving approaches in context. This is because children together examine the problem and possible solutions, building a new understanding collectively. Each child/learner can concentrate on the other’s ideas as offered and the solutions come directly from the process of dialogue, with the partners directly addressing ideas to each other, as in Bearison’s (1991) “transactional discussion”, (the dialogic turns could be accomplished by words or by actions directed to the partner for consideration)- centred on practices.

In a study conducted by Matusov, Bell, and Rogoff (1998), which combined qualitative and quantitative analyses of the videotape data from the two dyads i.e. from the traditional school and from the collaborative school revealed that

transactional dialogue, specialized working together, and instruction embedded in collaboration approaches to guidance was the most ideal in finding solutions to the problems presented. The results support the idea that children learn more than curriculum content in their involvement in teaching and learning practices of their school, this is consistent with the view of schooling as a cultural process. Matusov, Bell, and Rogoff (1998), further argue that children's learning and collaboration needs to be considered in the ecological niches in which they both learn to participate and in which judgments of value are nested.

An action learning framework can be applied to address real environmental issues, risks and associated sustainable development challenges in context. This will require starting with practices such as environmental audits, policy formulation, drawing up action plans and then taking action to solve real problems in context (see Chapter 6).

Wenger's assumptions as to what matters about learning and the nature of knowledge, knowing, and knowers (Wenger, 1998a:4-5) are worth considering in designing education programmes. According to Wenger, a social theory of learning must integrate the components necessary to characterize social participation as a process of learning and of knowing. These deeply interconnected and mutually defining components include meaning, practice, community, and identity (Wenger, 1998:5).

Wenger (1998:3) questions some of the common norms in institutionalised learning on the basis of a social theory of learning, and poses several questions for deliberation.

Thus:

So, what if we adopted a different perspective, one that placed learning in the context of our lived experience of participation in the world? What if we assumed that learning is as much a part of our human nature as eating and sleeping, that it is both life-sustaining and inevitable, and that – given a chance – we are quite good at it? And what if, in addition, we assumed that learning is, in its essence a fundamentally social phenomenon, reflecting our own deeply social nature as human beings capable of knowing? What kind of understanding would such a perspective yield on how learning takes place and on what is required to support it? (Wenger, 1998:3)

The above questions posed by Wenger, evoke a strong feeling for the need to rethink learning. Wenger ably leads in this direction by recommending ‘rethinking learning’(Wenger, 1998:7-8) and advocating for ‘placing the focus on participation’, arguing that this has broad implications for what it takes to understand and support learning (Wenger, 1998:7). Wenger further details these implications with regard to individuals, communities and organizations.

In the process of ‘rethinking learning’ (Wenger, 1998:7-8), an important step would be to shift the conception of curriculum from a technocratic to a critical one. This is because the critical conception to curriculum shifts attention from intention to realization, from plan to practice. The focus is on what knowledge and learning opportunities are actually made to learners, how they are created, and what values they reflect and sustain (Cornbleth, 1990:24-25). Wenger’s focus on practice and participation adds a stronger situated learning dimension to the socially critical work of Cornbleth as discussed in 2.6.

In the critical curriculum view, curriculum knowledge or subject matter of interest is primarily but not solely academic, it also includes the personal, social, and world knowledge that is communicated or otherwise made available to students (Cornbleth, 1990:25-26). The critical conception of curriculum and its construction posits dynamic interaction among policy, planning, enactment and their structural and socio-cultural contexts (unlike the technocratic approach) i.e. curriculum is constructed and reconstructed in situated practice. Additionally, whereas a technocratic view puts curriculum as instrumental to classroom practice, a critical view sees curriculum as existing in practice, not independent of it. Further, a technocratic view tends to be prescriptive of practice while a critical view is interpretive and questioning (Cornbleth, 1990:26). From a critical perspective, curriculum construction and reconstruction both reflect and respond to their immediate and more distant contexts.

In view of the theoretical positions as discussed above, this study tends towards a critical view of curriculum by exploring issues-based approaches to curriculum contextualization guided by the concept of ‘communities of practice’ and situated learning theory as one of the models of the social learning theory.

3.5 ECO-SCHOOLS PRACTICES AND POTENTIAL FOR ISSUES-BASED APPROACHES

The concept of Eco-Schools derives from the notion of putting environment and sustainability at the centre of learning in the school (see Chapter 1). Eco-Schools practices and processes are significantly oriented towards issues-based approaches thus making Eco-Schools a suitable context for issues-based approaches to curriculum contextualisation.

Eco-Schools as a strategy for sustainable development promotes an action learning programme tailored to address the needs, environmental issues, risks and associated sustainable development challenges of the schools and the community. This enables the learners and the community members to develop a shared vision by addressing the inherent environmental and sustainability problems in society.

3.5.1 Environmental and sustainability issues as the primary focus in Eco-Schools

Eco-Schools aims at ensuring that environmental and sustainability concerns (i.e. issues, risks and associated sustainable development challenges) form part of the curriculum and the day-to-day running of the school. Additionally, Eco-Schools seeks to use schools as entry points and springboards into the surrounding communities to address the environmental and sustainability issues of concern. Originally, there were three main themes for Eco-Schools. These included: waste, water and energy (FEE International, 2004a). But due to the flexibility of the programme, and the broadening of sustainable development discourse, countries have since embraced other themes such as health, agriculture, biodiversity, disaster preparedness, as well as poverty and entrepreneurship as is the case with Eco-Schools in Kenya (KOEE, 2005). Gender issues are also considered as important and crosscutting in Eco-Schools.

School environmental audits/reviews are carried out to establish the environmental and sustainability issues of concern in the school and community. These issues then form the basis of the school environmental policies – (which are key school governance documents in Eco-Schools) - with a view to developing appropriate strategies and designing actions aimed to address the issues in context.

In addition to the school environmental policies, ‘eco-codes’ – (which are a set of rules in the form of dos and don’ts) - are jointly and consultatively developed by learners, teachers, parents and other members of the community. The eco-codes serve to help develop and internalize appropriate attitudes and values that contribute to addressing the environmental and sustainability issues on concern in context.

Income-generating micro-projects are also initiated to address local environmental and sustainability issues and also earn the school and community some extra income. Micro-projects also help to enhance best practices in *resource management*. They are also used as teaching and learning resources and for demonstration to both the school and community at large. These form centres for cooperation with and involving the whole school and local communities to address the environmental and sustainability issues of concern. Networking and information dissemination around issues of concern is also enhanced in the process (KOE, 2005)

Integration and infusion of local issues of concern into the teaching and learning processes is also promoted through the ‘curriculum work’ component of the Eco-Schools programme. This also creates an opportunity to use the local school, home and community environments as teaching and learning resources thus making the curriculum processes, content and methods relevant, effective and directly linked to the local contexts, experiences and daily lives of the learners and other members of the community (Taylor & Mulhall, 2001). Important aspects of pedagogy include encouraging learners to explore questions, issues and problems of environment and sustainability, especially in contexts relevant to them and their communities; this involves learner centred and interactive enquiry based approaches to teaching and learning.

Given that the Eco-Schools programme is strongly oriented towards issues-based approaches, it can serve as a useful context for curriculum contextualization using issues-based approaches.

3.5.2 Eco-Schools practices and potential for issues-based approaches to curriculum contextualization

The challenges of Education for Sustainable Development today require innovative approaches to effectively address them (UNESCO, 2005). Consequently, whole-school approaches to school development have been developed in response to global

calls for the need to reorient the management and practice of formal education, in order to contribute to addressing inequalities and to building a better world (UNCED 1992; UNESCO, 2002). The FEE Eco-Schools programme is one of the whole-school approaches that has a strong focus on addressing environmental and sustainability issues and is rapidly spreading across the globe (see 1.1.1).

According to Henderson and Tilbury (2004:7), whole-school sustainability initiatives operating across the globe highlight the possibilities for schools to innovate and showcase changes in practice for a better future. They report that some programmes are documenting deep levels of change resulting in cultural shifts within schools and the wider community. Active *participation* and partnerships for sustainability are not only occurring within the school (involving teachers, pupils and management/administration) but between the school and the community (organizations, business/industry and governments) (Mardon, 2004; Sweden National Agency for Education, 2001; FEE International, 2004). In the next subsection, I describe some of the Eco-Schools practices in more detail.

3.5.2.1 *Environmental auditing as the foundation of Eco-Schools practices*

An environmental audit acts as a starting point for the school in the process of becoming an Eco-school. Undertaking an environmental audit or review provides schools with a snapshot of their current situation and assists in identifying issues and potential action areas (Henderson & Tilbury 2004:36). This enables schools to set practical and realistic measurable goals and objectives towards solving the environmental issues, risks and associated challenges in the school and community.

The audit entails a review of the state of the environment in the school and surrounding community. It involves an assessment of the environmental issues, risks and associated sustainable development challenges; efficiency in resource utilization; environmental education performance in the school as well as checking infrastructure for inefficiencies.

The Eco-Schools programme encourages whole-school participation in environmental auditing. This is particularly important in capturing all issues in the school and community that need attention.

Environmental audits help to catalyse action to address the problems as they can generate a series of ideas and possible solutions to the environmental problems. These are used to develop a school environmental policy, eco-codes and suggestions of activities to be implemented through a plan of action. The findings from the environmental audits also inform the development of a framework which provides a checklist for monitoring and review of achievements (Henderson & Tilbury, 2004:36).

3.5.2.2 School governance

The issue of *school governance* is critical in the Eco-Schools programme. This is basically through the active involvement of the school's management and governing body in all aspects of the programme planning and operations, whilst also ensuring that decision-making is distributed more equitably across the school body, including the learners (Henderson & Tilbury, 2004: 35). Further to this, democratic decision-making and meaningful participation of all stakeholders are at the heart of whole-school sustainability programmes. School governance is thus an essential component of this process. The elements of school governance in Eco-Schools include the Eco-Schools committee; the school environmental policy; action plans; and eco-codes. All these elements have potential to support issues-based approaches to curriculum contextualisation.

- **The Eco-Schools committee**

The Eco-Schools committee is the main decision making organ of the Eco-Schools programme, hence its formation is usually the first step in the process. The Eco-Schools committee in the case of the Eco-Schools in Kenya consists of representatives of learners, teaching and non-teaching staff, board of governors/management, parents, local community notables, as well as the head teacher or school administrators (Odeke, 2004a: 6). Wales Eco-Schools notes that their Eco-committee is the driving force of the project and consists of pupils, staff, governors and parents (FEE International Secretariat, 2004)

An Eco-Schools coordinator and an assistant are chosen from among the teachers on the basis of interest, enthusiasm and commitment. The coordinator and the assistant are charged with the responsibility of daily management of Eco-Schools activities, but under the overall guidance of the head teacher.

The Eco-Schools committee has the responsibility of planning, implementing and evaluating the Eco-Schools action learning activities and ensuring their continuity. The committee also keeps records of all important decisions made and minutes of the meetings in Eco-school files for future reference by the committee, other interested parties as well as the national Eco-Schools coordination team. The Eco-Schools committee minutes can be shared in school management meetings, staff meetings or in relevant class, clubs and society meetings. The minutes with important decisions can also be displayed on school notice boards and key issues arising deliberated upon during school assemblies.

- **The school environmental policy**

A school environmental policy is a binding document or statement of objectives, intentions and principles demonstrating the school's commitment to environmental and sustainability friendly actions. In the Eco-Schools programme, the development of school policy relating to whole-school sustainability programmes serves to outline the school's commitment to sustainability goals and directs areas for action. This feature is also common to the EnviroSchools of New Zealand and Eco-Schools of South Africa (Henderson & Tilbury, 2004:36).

The school environmental policy includes a vision, mission, and shared or agreed values that each member of the school community will adhere to. In the Kenyan Eco-Schools, curriculum work is usually a common feature of the school environmental policy. This is also the case in South Africa.

The schools environmental policy is usually developed through a consultative process involving learners, teachers, parents, community representatives as well as local experts from fields relevant to the key environmental issues of concern to the community. The school environmental policy development is usually guided by the findings of the environmental reviews/audits (FEE International Secretariat, 2004a)

It is always critical that the school environmental policy should relate to the action plan, the eco-codes as well as to curriculum work. Additionally, it is pertinent that policy statements describe or prescribe objectives, missions, shared values and actions that all stakeholders can realistically and successfully partake in.

- **The eco-codes**

An eco-code is a statement of shared and agreed values for the environment and sustainability. Eco-codes can also be described as statements or sets of rules that each member of the school community should adhere to as demonstration of commitment to environmental and sustainability friendly actions.

Eco-codes are developed through a consultative process involving the learners, teachers, parents, community representatives as well as local experts in the thematic areas of interest or concern to the school and community. The eco-codes once developed are often prominently displayed in the school compound and can be updated as new issues are addressed. Eco-codes help learners and other members of the school and community to develop personal and communal values and codes of conduct in relation to environmental and sustainability goals founded on the issues of concern.

- **The action plan**

The action plan is the guiding document for implementation of Eco-Schools activities. It is a written document that outlines a series of specific activities and targets to be implemented or achieved within a specified time. According to Henderson and Tilbury (2004:37): “Action plans can assist schools with assigning roles and responsibilities and identify the process by which schools aim to achieve the school and environmental improvements”. The action plan lists the agreed environmental objectives and activities along with deadlines and clear responsibilities. It also specifies the persons responsible for the implementation of particular activities which together will lead to agreed environmental and sustainability improvements for the specified period.

The development of the action plan is guided by the school environmental policy and informed by the environmental issues, risks and associated sustainable development challenges of concern to the community as revealed by the environmental audit. The action plan is also often linked to some curriculum work where appropriate.

Action planning is a useful tool in governance in order to realize the desired targets and visions within specified time frames.

3.5.2.3 Curriculum work

According to Henderson and Tilbury (2004:38), a whole-school approach to sustainability requires, as part of the implementation process, that environmental education and/or sustainability content be integrated across the *curriculum*. Curriculum work is one of the major components of the Eco-Schools programme in Kenya. It is encouraged that the Eco-Schools programme activities should be considered as integral to the curriculum of the school.

The Eco-Schools programme specifically advocates for localizing of the curriculum so as to make teaching and learning processes relevant to the context of the schools and communities. To achieve this, teachers are encouraged to infuse and integrate local environmental and sustainability issues and concepts across the curriculum. Additionally, environmental *action learning* which is the basic premise of Eco-Schools emphasizes solving of problems in context through the teaching and learning processes in the school and community. Development of localized teaching and learning resources is also encouraged as a way of reinforcing the process of localizing curricula.

Additionally, Eco-Schools programme implementation requires that classroom study of themes such as energy, water and waste should involve the whole school so that most students get involved in practical initiatives such as saving water, recycling materials and preventing litter (FEE International Secretariat, 2004a). Just like Eco-Schools South Africa (FEE International, 2004), Eco-Schools Kenya requires schools to develop and implement lesson plans, with learning activities that link with the school environmental policy, micro-projects and the local environment for sustainability. Additionally, it is encouraged that the lesson plans should be issue-based.

- **Pedagogical approaches**

Action-oriented and problem solving pedagogical approaches are required in order to realize whole-school development. According to Fien (2001:24):

Important aspects of pedagogy in education for sustainability includes encouraging students to explore questions, issues and problems of sustainability, especially in contexts relevant to them and their communities; this involves student-centred and interactive enquiry based approaches to teaching and learning.

Pedagogical approaches such as student-centred learning, action learning, and co-operative learning are required to reflect the content and process of Education for Sustainability (EFS). Most programmes including Eco-Schools recognize that skilled educators are essential in whole-school approaches to sustainability, as they require new modes of teaching and learning. Opportunities for educators to share and exchange experiences is also seen as critical to promote these objectives. (Henderson & Tilbury 2004:37)

Issues-based approaches to curriculum contextualization in the context of the Eco-Schools programme provides vast opportunities for action oriented and problem solving pedagogical approaches. Such opportunities arise from Eco-school activities such as environmental auditing, school environmental policy formulation, action planning, development of eco-codes, establishment of micro-projects, school-community cooperation as well as networking.

3.5.2.4 Resource management

In the Eco-Schools programme, efficient and effective management of resources is emphasised. This is often affected through regular resource audits which are then followed up by corrective actions or measures in cases where inefficiency or wastefulness in resource utilisation is noticed. During the resource audits, environmental and sustainability issues related to the resources are also assessed. Common resource audits involve water, energy, waste, land, health, biodiversity, as well as land use and agriculture audits.

To demonstrate and enhance best practices in resource management, income-generating micro-projects are established based on the themes and issues of great concern to the school and community.

- **Micro-projects**

These are small-scale projects that are implemented at the local school / community level with the aim of addressing real environmental and sustainability problems. It is highly recommended that the micro-projects have an income-generating component for sustainability. The micro-projects are also used as teaching and learning resources for both the schools and the surrounding communities

Micro-projects offer unlimited opportunities for learners to develop the knowledge and skills needed to make responsible decisions about and for the environment and sustainability. They also directly or indirectly contribute towards addressing real environmental issues, risks and associated sustainable development challenges in context, thereby improving the quality of the environment and livelihoods in the school and the surrounding community. Further, micro-project establishment offers opportunities for schools to cooperate with local communities around issues of concern, as well as to share knowledge, skills, resources and expertise.

Schools develop their own environmental practice and engage the surrounding community in development of better environmental performance and act as learning centres for better practice on the issues that are of major environmental concern in the area. Some of the issues of concern include poverty, unsustainable agriculture and food insecurity, water management, waste management, unmet energy needs, loss of biodiversity, health concerns including HIV/AIDS, gender issues, and entrepreneurship (see section 2.2). Based on the Eco-Schools concept the project develops methods, conducts training programmes and develops educational materials in order to address the issues and disseminate results.

3.5.2.5 School operations and support

In the Eco-Schools programme, schools implement activities as per set criteria and standards. Schools which satisfactorily implement the set activities are then declared Eco-Schools and are awarded the Eco-Schools flag as a symbol of achievement.



Figure 3.1: The Eco-Schools flag at St. Joseph's Ombo Primary School

In order to ensure effective school support in the Eco-Schools programme in Kenya, project officers visit schools on a monthly basis to oversee the implementation of activities. Other support actions include: micro-project investments through a micro-

project fund; technical assistance for micro-project implementation in schools; training of teachers and community representatives in micro-project implementation; training of teachers in using the Eco-school approach in subject teaching; development and provision of Eco-school resource materials; support for network interactions between selected schools and community groups; fundraising for the Eco-Schools project; provision of a network structure for exchange and sharing of information between schools and communities as well as supervision of micro-projects. Support also involves in-service training of teachers on Eco-Schools methods through national and local workshops.

3.5.2.6 School-community partnership/cooperation

School-community partnership is crucial in implementing an Eco-Schools programme. This is because most of the environmental issues and problems often affect the school and the wider community as well.

School-community partnership promotes collaborative efforts in solving common problems through local environmental and sustainability projects. This helps build the capacity of communities to implement Agenda 21. Additionally, local environmental awards are given to best practices so as to encourage replication of the projects.

The cooperation is also important for creating a good working environment and relationship between the school and the local community members. It is particularly important because community members often contribute to the development of the school in many ways and the school can also contribute to the development of the community in various ways. Further, useful indigenous knowledge systems can easily be tapped into the formal education system through school-community cooperation.

3.5.2.7 Networking and information sharing

Networking with various stakeholders at local, national and international levels is important for the success of the Eco-Schools programme. School networks and exchange programmes are developed to promote dissemination and exchange of knowledge and information on the programme as well as on the issues of concern. This is usually through visits, school assemblies, newsletters, the media, and internet.

Networking provides an opportunity to acquire and share knowledge, information, expertise and resources. Additionally, involvement of schools in community events, campaigns for the environment, professional talks, community service and environmental clubs have proved to be very effective strategies for networking and outreach.

3.5.2.8 Monitoring and evaluation of Eco-school activities

This involves assessing progress by maintaining a record of progress and changes within and outside the school and comparing it to the time when the environmental audit was carried out. It enables a school to assess the success of the environmental and sustainability action learning programmes and make necessary adjustments if need be.

The changes and indicators can be in behaviour, school aesthetics, state of affairs with regard to the environmental and sustainability issues of concern, income generation from micro-projects, efficiency in resource utilization as well as participation of the school in environmental and sustainability activities over a defined period of time. Evaluating the success of activities allows the school community to make the appropriate decisions for the future.

In view of the above, it is clear that Eco-Schools practices can offer an appropriate context and have immense potential for strengthening issues-based approaches to curriculum contextualisation. The Eco-Schools framework, practices and participation should therefore be considered in initiatives aimed at contextualizing curricula using issues-based approaches (see Chapter 6).

3.6 CONCLUDING COMMENT

The direction of this study from the onset was inextricably linked to contextual realities of the Kenyan education system, the nature of the Kenyan curriculum, trends in environmental education, the curriculum and pedagogical realities in the formal education sector in Kenya and the ideals of socially critical environmental education processes. This chapter has provided the theoretical vantage point of this study by exploring the critical curriculum theory as basis for issues-based approaches to curriculum as well as highlighting issues-based enquiry approaches to curriculum contextualisation. Contemporary learning theory has also been illuminated using

situated learning as a model of the social learning theory. The concept of ‘communities of practice’ as context of situated learning has been elaborately discussed with reference to some Eco-Schools practices in which the study was located. In the next chapter, I describe the research methodology and process followed during this study.

CHAPTER 4

RESEARCH METHODOLOGY

4.1 INTRODUCTION

Working towards transformative environmental education research in Kenyan schools required first a clear understanding of the current environmental education (EE) practice in the formal education sector followed by trying out alternatives that can bring about real transformation in ecological, economic and socio-cultural terms through an action research process. To realize this, the study adopted a two-phase design using interpretivist and socially critical research orientations. Phase 1 of the study was guided by an interpretivist research orientation and phase 2 was guided by a socially critical research orientation. However, it should be noted that the two phases were not conducted separately and independently of each other, but rather, they overlapped and fed into each other in a reflexive process in some instances due to the enabling research orientation that this study adopted as discussed in sectioned 4.2 below. The term ‘phases’ is used for the purpose of outlining the different methodological approaches followed.

This chapter describes and discusses how the entire research process was conducted by drawing from relevant literature on methodology. Figure 4.1 below is a process diagram which illustrates the entire research process and timeline. The years of study in the research process diagram have been divided into quarters as follows: January to April (J-A), May to August (M-A) and September to December (S-D). Appendix C also shows a diagrammatic representation of the research process.

Figure 4.1: Research process diagram

MAIN RESEARCH ACTIVITIES	2003			2004			2005			2006			2007			2008			2009		
	J-A	M-A	S-D	J-A	M-A	S-D	J-A	M-A	S-D	J-A	M-A	S-D	J-A	M-A	S-D	J-A	M-A	S-D	J-A	M-A	S-D
RESEARCH DESIGN																					
Conceptualisation of the research focus			x	x																	
Proposal writing and revisions				x	x	x	x														
Development of methodologies, formulation of research methods, techniques and tools				x	x	x	x	x	x												
PHASE 1: SURVEY PROCESS AND DATA GATHERING																					
Questionnaires					x	x															
Interviews					x	x															
Focus group discussions					x	x															
Document analysis					x	x	x	x	x	x	x	x									
Sensitisation meetings				x	x	x															
PHASE 2: THE ACTION RESEARCH PROCESS AND DATA GATHERING																					
Selection of schools and negotiating access				x																	
Planning phase (formulating plans)																					
Environmental auditing; prioritisation of actions, issues to address; and action planning				x	x	x	x	x													
Acting on the plans																					
Workshopping; document analysis; participant observation; Eco-school committee meetings; development of school environmental policies; micro-project activities; school support.					x	x	x	x	x	x											
Observing outcomes				x	x	x	x	x	x	x											
Critical reflection				x	x	x	x	x	x	x	x	x	x	x							
ORGANISING AND MANAGING THE DATA				x	x	x	x	x	x	x	x	x	x	x	x						
DATA ANALYSIS AND INTERPRETATION						x	x	x	x	x	x	x	x	x	x	x					
WRITING OF RESEARCH REPORT/THESIS AND REVISIONS									x	x	x	x	x	x	x	x	x	x			
SUBMISSION OF THESIS																			x		

4.2 METHODOLOGY, DEFINING AN ENABLING RESEARCH ORIENTATION FOR THE STUDY

Methodology in this study is viewed in terms of a research process and not just in terms of ‘methods’ and ‘stages’ of qualitative research. This was due to the fact that qualitative research of this nature could not be reduced to particular techniques nor to set stages, but rather a dynamic process which linked together problems, theories and methods. In this research, the focus was on links between research design, research strategy and research techniques as well as the relationship between aspects of research design, data collection and data analysis (Bryman & Burgess, 1994:2). The significance of this approach to a study of this nature had been well summarized by Bechhofer when he stated:

The research process, then, is not a clear cut sequence of procedures following a neat pattern, but a messy interaction between the conceptual and empirical world, deduction and induction occurring at the same time (Bechhofer, 1974: 73).

Further orientation for the research design was inspired by O’Donoghue (1994b:8) who described environmental education as an *enabling* focus for “...diverse ‘grass root’ processes to inform and transform society...”. Contextualizing curricula through issues-based approaches within an action research framework was therefore a move in that direction.

4.2.1 The Interpretivist orientation of the first phase of the study.

Gaining a clear understanding of environmental education practice in Kenyan schools required a contextual review of existing approaches and views relating to environmental education in the formal education sector. This was done through the survey method guided by the interpretivist research paradigm (Lewis-Beck, Bryman & Liao, 2004: 508-510), which supports theoretical and contextual scoping and meaning making which was my interest in the first phase of the study.

The interpretivist orientation was suitable for this phase of the study due to the fact that interpretivist researchers regard people as agents who take meaningful, reflective actions, and that these meanings, rather than our outward behaviours are worth researching (Janse van Rensburg, 2001). Additionally, the interpretivist method and design reflects an interest in contextual meaning making, rather than generalised

rules. Interpretivist methods may also take a close look at individuals or small groups in naturalistic settings using in-depth case studies instead of surveying large groups. The knowledge interest of interpretivist research is often to develop a deeper understanding of a situation, person, community or other case (Janse van Rensburg, 2001). For the case of this study, my knowledge interest was to develop a deeper understanding of the conceptions and practice of environmental education in the formal education system in Kenya. This was inspired by Habermas who calls it *practical* knowledge interest, in reference to the assumptions that if people understand their own situation better, they would take practical actions within it (Janse van Rensburg, 2001).

4.2.1.1 The survey process

This phase of the study followed the **survey** method (Irwin, 2006). According to Irwin (2006: 4), a survey nearly always involves the gathering of information which we want about a phenomena or issue we are interested in. In the case of this study, it involved a contextual review/mapping of existing approaches and views relating to environmental education in the Kenyan curriculum context. I got to study situations without any prior theory, while hoping for it to emerge from my findings. Throughout this phase, I was driven by the urge to develop a deeper understanding of environmental education as currently practiced in Kenya. My main pre-occupation was to unravel the complexities surrounding environmental education practice in Kenya (Sanders & Pinhey, 1983). The survey involved a policy review, review of teachers' understandings of environmental education in Kenya, resource materials review, and curriculum review. As noted by Jackson (1995: 106), the survey in this study apparently produced valid and reliable responses and results on the many issues under investigation.

This survey was important because of the apparent tensions and ambiguities contained in the various international guiding principles, policies and action frameworks as reported by scholars such as O'Donoghue (1991), who observed that neither the scope of the environmental crisis nor the diverse nature of environmental education processes are clear-cut issues in relation to the guiding principles defined for environmental education (Tbilisi, 1978; World Conservation Strategy) (UNESCO-UNEP, 1978; IUCN, 1980; UNESCO, 2005) in / through international institutions. The survey was also necessary because of the fact that working with

conceptual tensions must be seen as a necessary part of the process of curriculum change, in any environmental education project O'Donoghue (1991).

The survey process in this study followed the procedure suggested by Irwin (2006:9), except that no prior pilot testing of the data gathering instruments was conducted. However, this did not in any way affect the quality of the data obtained.

4.2.1.2 *Methods and techniques*

Guided by the research question and the contextual realities of my situation (insufficient research budget, time constraints, balancing work demands and study), I had to explore ways of weaving my research agenda into my work plan in a way that enriched both my routine work in the Eco-Schools programme and also enabled me achieve my research goals. The most useful design decision I made was to develop and administer questionnaires to all the groups of teachers I met during Eco-Schools sensitisation sessions (see CR 4.1). This provided a relatively adequate and representative sample for the survey. I administered the questionnaires and collected responses face to face during the meetings and this may have contributed to high reliability and validity of the data obtained.

I also designed standardised open-ended interview schedules (Cohen, Manion & Morrison, 2000: 271, 274-278) for the group interviews (Cohen, Manion & Morrison, 2000: 287) which I conducted with selected teachers who were in a position to provide clear insight into aspects of interest to my research (see CR 4.2). The group interviews were also conducted in all the 12 schools which participated in the Eco-Schools pilot programme. Group interviews were chosen in anticipation that they would encourage discussions to develop, thus yielding a wider range of responses than in individual interviews. Additionally, group interviews were considered because of the fact that the respondents had been and would continue working together for sometime on a common purpose in the Eco-schools programme; It was hence useful that those concerned be aware of what others in the group are saying (Watts and Ebutt, 1987). Further, group interviews were anticipated to be quicker than individual interviews hence timesaving. The design of the interview questions was guided by the responses received earlier from the questionnaires.

To seek further insight on environmental education curriculum practice and to generate more data through an interactive process, I organised focus group discussions (Cohen, Manion & Morrison, 2000: 288-299) during the plenary sessions of the teacher training and sensitisation workshops for convenience purposes (see CR 4.3). To ascertain the presence of and orientations to environmental education concepts in the curriculum, I engaged with document analysis of select curriculum support resource materials (see CR 4.4). I further analysed policy documents of relevance to environmental education for links and interpretation (see CR 4.5).

- **Questionnaires**

The survey of teachers' understandings of environmental education in Kenya was done by administering 63 questionnaires with open-ended questions (CR 4.6) (Cohen, Manion & Morrison, 2000: 248) to teachers from various schools who participated in the Eco-Schools sensitisation sessions. The data from the questionnaires significantly contributed to the results presented in Chapter 5.

- **Interviews**

Group interviews (Cohen, Manion & Morrison, 2000: 287-288) were also conducted with twelve groups of teachers (see CR 4.7) to seek their conceptions and understandings of environment, environmental education, importance accorded to environmental education, negative influences to effective environmental education practice in their schools, and their suggestions on how to address these negative influences (see Chapter 5).

- **Focus group discussions**

Two focus group discussions (Cohen, Manion & Morrison, 2000: 288-289) were conducted with groups of teachers to seek a deeper and clearer understanding of how environmental education practice was being conducted in schools as well as the guiding frameworks, documents and content (see CR 4.8; see 5.2.4).

- **Document analysis**

Documents can provide relevant information to issues and problems under investigation (Elliot, 1991b: 77). During this study, a range of documents (see CR 4.9) were analysed in the light of the focus of this study so as to gain a better perspective on the contextual realities surrounding environmental education practice

in Kenya. Documents analysed included policy documents, subject syllabi as well as school subject text books. The information gained from the critical analysis of these documents formed a significant part of the literature review (Chapter 2) as well as part of the contextual review sections of this study (see 5.2.4.4).

The policy review entailed a review of the existing environmental education policy in Kenya through document analysis. The documents that were examined included: education acts, environment acts, education sessional papers, and environment sessional papers (see CR 4.9). This was done in order to understand policy situations and provisions for environmental education practice in Kenya (see 2.3).

To gain a better understanding of the conception and practice of environmental education in the Kenyan curriculum, I reviewed the most recent subject syllabi which are the key curriculum documents guiding education practice in schools (see CR 4.9). The information gained from this review contributed to section 2.4.2 of this study.

Additionally, curriculum support materials were examined to ascertain the presence of environmental education concepts, and how they were dealt with in relation to curriculum requirements. The materials review involved document analysis of a selection of some school subject textbooks (see CR 4.4) based on the perception that they were rich in environmental content. The materials review criteria was adapted from elements of the criteria as set in the North American Association of Environmental Education's guidelines for excellence (NAAEE, 2004) that related to the research question of this study. The purpose and direction of the materials review was as described in section 2.4.3 and the review criteria is as shown in CR 2.1.

4.2.2 The socially critical orientation of the second phase of this study.

Given the persistence of environmental issues, risks and associated sustainable development challenges in Kenya (see 2.2) and the prevailing conceptions and practice of environmental education in Kenya (Chapter 5), the adoption of a participatory, democratic and socially transformative orientation and methodology (Lotz, 1996:77) was decided upon. Additionally, phase 2 of the study was guided by a critical research orientation (Schwandt, 2007: 53-55) because my main interest in the study was to help bring about transformation through the research process itself. As Lather (1986a) described critical research as a form of praxis, the lines between

research, education and development were blurred in this study. This study aimed to try out and implement issues-based approaches to curriculum contextualisation in four case study schools. This was expected to contribute towards real problem solving in context through contextualised teaching and learning processes (see case studies in Chapter 6).

Further, the desire to reject determinism but rely strongly on rationality was a driving force for the choice of a socially critical orientation to guide phase 2 of this study (Janse van Rensburg, 2001). The underlying knowledge interest of a critical framework which Habermas called a critical or emancipatory knowledge interest due to the emphasis on helping to bring about transformation through the research process itself was a major motivating factor for the choice of a socially critical orientation for phase 2 of the study. This was further influenced by the contextual realities as exposed during phase 1 of the study (Janse van Rensburg, 2001).

A thorough consideration of the purpose of this study, made me settle for a research design that is informed by a critical perspective (Arnowitz & Giroux, 1985; Carr & Kemmis, 1986; Fien, 1993a; Giroux 1981, 1985, 1988; Hart, 1993; Huckle, 1991, 1995; Robottom & Hart 1993a) for the second phase of the study.

The characteristics of critical education research as put forth by Fien (1992:4 cited in Deetz & Kersten 1983:148-152) established three tasks for the researcher: understanding, ideology critique and educative action. This further influenced the choice of research methods for this phase of the study.

4.2.2.1 The action research process

The action research phase of this study was conducted in Nyanza province (see section 1.1.2). Action research, whose defining characteristics include collaboration, mutual education, and action for change increases the validity of research by recognizing contextual factors within the research environment that are often overlooked with more structured approaches (Lewis-Beck, Bryman & Liao, 2004:4).

The action research method was adopted so as to bring about transformation in the course of the study. This was inspired by several positions taken by many authors on research methodology who have seen emancipatory action research to be congruent with the epistemological, ontological and methodological assumptions of socially

critical environmental education (Hart 1993; Huckle 1995a; McNaught, Taylor & O'Donoghue 1990; Naidoo, Kruger & Brookes 1990; Robotom & Hart 1993a; Lotz, 1996; Atiti, 2003; Lupele, 2007). Further, the action research method was chosen in view of the fact that we are living in turbulent times characterized by rapid change and challenges to ways of thinking and acting (Fisher & Torbert, 1995). Against this backdrop, undertaking meaningful educational research has become more problematic. Additionally, the accelerated pace of deep and pervasive change calls for research methods that are dynamic and flexible, capturing the rich complexity and ever-shifting ground apparent in the contexts in which we live (Ellis & Kiely, 2000). In this context, the potential for meaningful educational research needed to be explored.

The choice of the action research process for this phase was further informed by the ecological, economic, and socio-cultural context of the study coupled by the policy framework within which the study was situated (see Chapter 2). The central questions informing the action research process were:

- How would I design my research in such a way that it could address the environmental issues, risks and associated sustainable development challenges in context through the research process itself?
- How would I design my research in such a way that the teachers in the case study schools will not find it an extra burden but a way of improving the relevance of teaching and learning processes to the context?
- How would I design my research process in such a way that the teachers will be able to improve on their practice and carry on with the approach even after the research?

My choice of an emancipatory action research design for the study would thus enable critical and engaged interaction in contextualising curricula using issues-based approaches (see case studies in Chapter 6) given the context and constraints of attempting to promote transformative environmental education processes. This choice further provided me with the opportunity to attempt to go beyond the traditional approaches to research in Kenya by placing processes of critical reflection and collaborative action at the centre of the research process (Lotz, 1996:81).

The action research process in this study involved the usual four-phase cyclical process of formulating plans, acting on the plans, observing outcomes and critical

reflection to understand the processes, strengths and weaknesses of the plans (Hillcoat, 1996:151) (see case studies in Chapter 6).

A distinctive feature of this process was that it changed shape and direction over time as actors/participants focused and refocused their understanding about what was really happening and what was really important to them (see case studies in Chapter 6). This made action research an appropriate method for this study whose interest was real problem solving in society. Further, the fact that action research addresses the unpredictability of situations, issues and contexts by enabling actors to develop new knowledge that is sensitive to continually changing and dynamic situations, and that it is concerned primarily with knowledge that is created in and for action (see case studies in Chapter 6); confirmed the value of the method for this study. This research therefore explored how the Eco-Schools programme could support contextualising curricula using an issues-based focus within an action research framework and with action learning embedded therein (see case studies in Chapter 6).

This phase of the study adopted a case study approach (MacDonald & Walker, 1975), due to the fact that it recognized the particular contexts in which innovations were embedded and aspired to describe and analyze the processes by which and the conditions in which innovations were implemented. Case studies also allowed judgements to be made in relation to particular circumstances. Four case studies were conducted in four primary schools in Nyanza province of Kenya (Chapter 6). Each school attempted to contextualise the curriculum using an issues-based focus.

The issues of focus were identified based on the findings of a baseline survey (KOE, 2003) earlier carried out by the Kenya Organization for Environmental Education and subsequent criteria which I developed (see CR 4.10). This guided the selection of the case study schools based on the prevalence rates of the issues in the schools and surrounding communities.

Subsequently, four schools were selected to work with the respective themes:

- Kosawo Primary School worked with the issue of poor waste management
- St. Josephs Ombo Primary School worked with the issue of water scarcity, poor water management and conservation and land degradation due to soil erosion

- Kandiege Primary School worked with the issue of unsustainable agriculture, food insecurity and poverty
- Muhoroni Township Primary school worked with the issue of unmet energy needs (Chapter 6).

A central theme of this research process became enablement of change by identifying and prioritising the environmental issues risks and associated sustainable development challenges of concern, action planning and planning with the teachers on how to integrate them in context into the curriculum. This was followed by whole school development work touching on issues of school governance, pedagogical approaches, resource management, actual issues-based interventions, school operations and links /partnerships with the local community (see 6.3 - 6.6).

- **Environmental audits/reviews**

Environmental audits/reviews (FEE International Secretariat, 2004a; see also 3.5.2.1) were conducted by teachers, learners and community representatives in each of the case study schools using the auditing guidelines which I prepared (see CR 4.11). I also personally gave guidance to the schools during the auditing process.

Environmental auditing was conducted after the Eco-Schools sensitisation workshops in May 2004. This involved an assessment of the state of the environment with a particular focus on environmental and sustainability issues of concern in the school and surrounding community. Auditing was used for purposes of identification and prioritization of the environmental issues, risks and associated sustainable development challenges in each case study school (see case studies in Chapter 6).

The findings from the audit also informed the development of a framework which provided a checklist for monitoring and review of achievements (Henderson & Tilbury 2004:36; see also 3.5.2.8).

- **Action planning**

Action planning focused on consultations and consensus building on the actions that were considered critical to addressing the issues in context through socially critical environmental education processes. The action planning process was led by the Eco-Schools committees (see action plans and roles of Eco-Schools committees in 3.5.2.2) in accordance with the guidelines which I prepared (see CR 4.3) in each case study school. The action planning process involved identification of actions to be

undertaken in view of the school environmental policies as well as other priorities and assigning responsibilities. Action plan documents were then developed to guide the subsequent activities. The action plans specified the tasks, justification, the persons responsible and the time frames for execution of the tasks. The action plans were also meant to serve as guiding tools for monitoring and evaluation (see case studies in Chapter 6).

- **Workshops**

Six workshops were conducted for each case study school during this study. The workshops covered aspects of planning and process of integrating local issues in context into the curriculum, whole-school development work particularly establishment of micro-projects and their use as teaching and learning resources, capacity building on appropriate pedagogical approaches in the context of the action learning framework, localising curricula, environmental auditing, development of school environmental policies and material development (see schedule of workshops in CR 4.12).

The choice of workshops was made out of the widely conveyed conviction that people learn more effectively when actively involved in making sense of their realities and experiences (Harlen *et al.*, cited in McNaught & Raubenheimer 1991:46). Planning with teachers and integration of the issues into the curriculum involved six workshops. Three of the workshops brought together representatives from all the case study schools while the rest of the workshops were conducted with teachers in the individual case study schools). The workshops were organised in a way that ensured their responsiveness to the participants. Workshops adopted strategies that aimed at achieving a balance between presentation of information and sufficient opportunities for interactive experience (Raubenheimer, 1991:47). Additionally, some workshops were held in the respective case study schools in a bid to ensure that they are contextual and not isolated from the actual teaching conditions. This also ensured that the teachers had adequate time to carry out baseline studies in the school and community to conceptualize the issues and identify opportunities for integrating them into the curriculum. Subsequent workshops (see schedule of workshops in CR 4.12) were aimed at actual integration of the issues and identifying relevant content and actions.

The integration workshops and actual curriculum processes in schools were followed by observation and critical reflection on environmental education practice in the case study schools, the findings of which were used in subsequent replanning to improve on praxis.

Capacity building workshops on appropriate pedagogical approaches in the context of the action learning framework were aimed at promoting action-oriented and problem solving pedagogical approaches targeting the environmental and sustainability issues of concern. This was inspired by Fien (2001:24):

Important aspects of pedagogy in education for sustainability includes encouraging students to explore questions, issues and problems of sustainability, especially in contexts relevant to them and their communities; this involves student-centred and interactive enquiry based approaches to teaching and learning.

Continuous capacity building on pedagogical approaches such as student-centred learning, action learning, and cooperative learning was further conducted reflexively in context so as to improve on praxis. These approaches were encouraged to reflect the content and process of Education for Sustainability (EFS) (see 2.3, 2.4). This was also conducted against the background that most programmes including Eco-Schools recognize that skilled educators are essential in whole-school approaches to sustainability, as they require new modes of teaching and learning. Opportunities for educators to share and exchange experiences were also provided since they were considered critical to promoting effective and sustainable professional development (Henderson & Tilbury 2004:37)

- **Document analysis**

Some document analysis (Elliot, 1991b: 77) was also done to enrich the integration process during this phase of the study. The documents that were analysed included syllabi, relevant school text books, teachers' schemes of work, lesson plans and other thematic texts (see list of documents analysed in CR 4.4 & 4.9).

- **Participant observation**

Participant observation was used to keep track of the innovative approaches for whole-school development. This was done during monthly school visits which were scheduled as part of the school support and monitoring mechanism in the Eco-

Schools programme. Participant observation was also done during the school-based workshops. I took research notes (see CR 4.13 for a sample of this) during each school visit and school-based workshop as a way of keeping record of my observations. These were then synthesised into the case study accounts (see case studies in Chapter 6).

The whole-school development work through curriculum activities involved innovative approaches to effectively address the issues in the four primary schools in Nyanza province that were used for case study. This involved practical interventions that were aimed at addressing the issues identified in the baseline studies. As Henderson and Tilbury (2004:7) suggested, the interventions were anchored in the possibilities for schools to innovate and showcase changes in practice for a better future.

The whole-school approaches to curriculum contextualisation considered how all levels of school life influenced such curriculum approaches as: *School governance, pedagogical approaches, resource management and school operations* (see case studies in Chapter 6). The whole-school approaches to curriculum contextualisation also involved links and partnerships with the local community (Henderson & Tilbury, 2004:9).

- ***Eco-school committee meetings***

Eco-school committees (see Eco-Schools committee in 3.5.2.2) were formed to act as decision making organs guided by gender and age sensitivity for inclusivity. This was due to the fact that the issue of *school governance* is key in the Eco-Schools programme. The committees were formed to enhance effective and efficient yet democratic school governance with regards to the Eco-Schools programme. This was enhanced through putting in place mechanisms that ensured active involvement of the school's management and governing body in all aspects of the programme planning and operations in all the four case study schools. Additionally, efforts were made to ensure that decision-making is democratic and distributed equitably across the school body, including the learners (Henderson & Tilbury, 2004: 35). To realize this, it was suggested that minutes of all the Eco-Schools committee minutes be filed for subsequent reference. Simple guidelines for minute taking were developed and provided to the schools for purposes of ensuring a uniform format (see CR 4.14). These minutes formed another source of data in the study.

I always perused through the minutes of the Eco-Schools committee meetings and made notes during my visits to the case study schools. I checked for consistency with the purpose and intentions of formation of the committees, the ascribed roles and responsibilities, learner representation during the meetings, as well as issues or items discussed in the light of the focus of this study (see CR 4.15 for a sample of notes).

- ***Development of school environmental policies***

School environmental policies were developed in each case study school guided by the findings of the environmental reviews/audits (FEE International Secretariat 2004a; see also school environmental policy in 3.5.2.2) to act as guiding documents for all the activities within the Eco-Schools programme (see CR 4.16 for an example of a school environmental policy). I led the process and development of guidelines for school environmental policies which were then provided to schools (see CR 4.17 for the guidelines). The policies were developed through a consultative process involving teachers, learners, and community representatives. The workshops earlier organised to enhance knowledge and skills for school environmental policy development significantly contributed to this process. Guidelines for curriculum work were given particular emphasis in the policies. The visions and missions in the school environmental policies included core considerations for curriculum work. I helped review and refine the school environmental policies during the monthly visits to the case study schools. Summaries of the school environmental policies from all the case study schools form part of the case study accounts in Chapter 6.

- ***Micro-project activities (meetings and observations)***

In collaboration with the teachers, I assisted in the identification of viable micro-projects for each school based on agreed feasibility criteria which I helped to develop jointly with teachers during the workshops on micro-projects establishment (see CR 4.18 for the criteria developed for assessing feasibility of micro-projects).

Additionally, I organized for continuous technical support and assistance to case study schools in the establishment of micro- projects through collaboration and cooperation with local technical experts - mainly drawn from local government departments and ministries. Further, based on the Eco-Schools concept and in collaboration with experts from government ministries and departments, training programmes were developed to improve the choice of micro-projects, their

establishment and management, and to support their use as teaching and learning resources in order to address the issues and disseminate results.

I collected data through observations during my visits to the case study schools as well as through participation in the workshops, demonstration sessions and meetings convened in the process of establishing micro-projects in the case study schools (see CR 4.19 for a sample of this recorded data).

- ***School support***

In order to ensure effective school support, I scheduled monthly visits to the case study schools for the period between March 2004 to March 2006 to assess progress and offer advisory support (see CR 4.20 for schedule of visits). I encouraged and developed a sense of an enabling and supportive environment in which teachers in the case study schools could develop and grow in terms of environmental education transformation, as well as positive transformation in ecological, economic and socio-cultural terms. To support this orientation, I embraced encouragement, enthusiasm and a sense of inclusiveness. Although support through monitoring and evaluation was also important, I chose not to impose it at the expense of an enabling and supportive context.

For every of the seventeen monthly visits to the case study schools, I prepared a monthly report as per the template which I developed (see sample of monthly report in CR 4.21). This report constituted an important part of my data which was later synthesised into the case study accounts in Chapter 6. On four occasions where I was unable to personally visit the case study schools, my colleague in the Eco-Schools programme assisted me in collecting the necessary data as per the reporting template which I developed and also took photographs of progress in the case study schools.

Support actions offered as per the provisions of the Eco-Schools programme in Kenya included: micro-project investments through the Eco-Schools micro-project fund; technical assistance for micro-project implementation in schools targeting poverty alleviation; training of teachers and community representatives in micro-project implementation; training of teachers in using the eco-school approach in subject teaching; provision of a network structure for exchange and sharing of information between schools and communities as well as supervision of micro-projects. Additionally, the teachers attended in-service training sessions on Eco-

Schools methods through national and local workshops on infusion and integration of environmental education into the curriculum; school-community cooperation; environmental problem solving, environmental action learning; networking and material development.

Materials development basically involved development of environmental education support materials for the formal education sector using participatory approaches to material development. The materials developed included; four thematic learner guides for primary school level on the themes of water, energy, agriculture, and waste and a teachers' guide (see CR 4.22). A booklet of success stories was also compiled to share success with other interested parties. Workshops with teachers and other subject matter specialists were the main avenues for material development. Additional materials were also developed as a contribution to the wider Eco-Schools programme in Kenya. This included primary school learner guides on the themes of health and biodiversity, a set of secondary school learner guides on the themes of water, energy, health, agriculture, biodiversity, and waste as well as a teachers' guide for the secondary school level. Further, a teachers' training manual was compiled out of the workshop presentations.

4.3 ORGANISING AND MANAGING THE DATA

The data generated through the use of all the above data gathering methods and sources in the two phases of the study was archived both in raw form and in electronic data files. It produced a lot of data. For each school I had the following data set:

Table 4.1: Sample data set for case study schools

Field notes	Case study schools visit reports	School environmental audit reports	School Environmental Policy (SEP)	Interview data	Questionnaire data	Focus group discussion data	Workshop reports	Research project outputs from teachers e.g lesson plans
CR-4.23	CR-4.24	CR-4.25	CR-4.26	CR-4.27	CR-4.28	CR-4.29	CR-4.30	CR-4.31

For the project as a whole I had the following data arranged into Data Files (DF): Policy documents and analyses (DF1); selected resource materials for critical review (DF2); critical review comments for the selected resource materials (DF3); field notes (DF4); questionnaire data (DF5); interview data (DF6); focus group discussion data (DF7); workshop reports (DF8); photographs (DF9); correspondence (DF10); Eco-Schools pilot materials (DF11); published Eco-Schools materials (DF12); Eco-Schools reports (DF13); diaries and schedules (DF14); Eco-Schools project document and amendments (DF15); Environmental Education Journals and an assortment of selected papers (DF15); Rhodes university research design course materials (DF16); Eco-Schools documentary video (DF17); Eco-Schools TV programme interview video clip (DF18); Eco-Schools radio programme interview audio tape (DF19); Eco-Schools newspaper articles (DF20); Research project outputs from teachers i.e. Integration and infusion plans, schemes of work and lesson plans (DF21); primary school syllabi (DF22); Papers presented during Eco-Schools trainings and sensitisations (DF23); International Eco-Schools materials (DF24); Criteria for critical review of environmental education materials (DF25); case study school reports (DF26); Eco-Schools criteria (DF27); Research design and research proposal (DF28); and assorted video clips from school visits, workshops, as well as reflection and progress review sessions (DF29).

An inventory of the data sources is listed in Appendix A and a selection thereof included in a case record. The case record items are referred to by the abbreviation CR in this thesis. The case record comprises volume two of the thesis and an inventory included in Appendix B. The main benefit of using a case record was to provide a manageable data set in some organised form so as to support the main text of the thesis and provide the thesis with validity.

Stenhouse (1978) describes the case data as all the materials assembled by the field worker during the study. Stenhouse (1978:25) further describes the case record as a “... theoretical parsimonious condensation of the case data, produced by selective editing without explicit comment”. The case record in this study represents “... a lightly edited, ordered, indexed and public version of the case data” (Rudduck, 1985:102). It includes selections, extracts and samples of primary data sources used to illustrate aspects of the thesis. The thesis is therefore a critical and reflexive presentation, synthesis and interpretation of the case, which rests upon, cites and quotes the case record (see inventory in the appendix A) for its justification.

4.4 ANALYSIS AND INTERPRETATION

Data from the two phases was represented using qualitative approach, and where relevant (as in phase 1 of the study) it was supported by quantitative methods. The data analysis process for phase 1 adopted some elements of the constant comparative method (Glaser & Strauss 1967:1). Coding was a key step in this process (see CR 4.32 for a sample of coded data) (Charmaz, 1983:111-112) as well as the use of analytic memos (see CR 4.33).

Generation of concepts in phase 1 was used as the main general process in data analysis. This basically involved immersing myself in the data, categorising responses based on key words, phrases, and sentences as conveyors of meaning (Kerlinger, 1986) and then searching out patterns, identifying issues of concern, and being sensitive to inconsistencies, such as divergent views offered by different groups of individuals (Hammersley & Atkinson, 1983). Elaboration was sought in cases where the concepts were not clearly defined initially. As Woods (1986: 133-4) recommended, I was sensitive to repetitions of incidents or key words, phrases, and sentences, irregularities, unusual occurrences and how people said things as clues to the generation of new concepts and patterns. I maintained a close connection between coding and the generation of concepts, regardless of whether the latter were pre-specified (and later revised) or emergent. However, I prioritized having codes as the building blocks for emergent rather than pre-specified concepts (Chapter 5).

The broader categories for final analysis of data from phase 1 of the study included conceptions of the terms ‘environment’ and ‘environmental education’ amongst primary school teachers in Kenya, importance accorded to environmental education by Kenyan teachers as well as environmental education practice in the Kenyan curriculum. Environmental education practice in the Kenyan curriculum was further analysed as per sub-categories which included: guiding frameworks and documents to environmental education practice; environmental topics and concepts in the school curriculum; teaching and learning approaches and methods; and environmental education in the teaching and learning resource materials. Further, analysis focused on negative influences to environmental education practice in Kenya and suggestions for improvement (Chapter 5).

Data analysis and interpretation in phase 2 was to some extent participatory as there was regular review of data with participants through critical reflection (Lotz, 1996:100). Developments and progress made in the case study schools with regard to aspects of issues-based approaches to curriculum contextualisation such as pedagogical approaches employed, creativity and innovations in aspects of whole school development work such as establishment of micro-projects and use of micro-projects as teaching and learning resources, as well as school governance issues were often shared during workshops and Eco-Schools review meetings by the teachers. Analysis involved joint negotiation and decision making with participants in the light of the interpretations gained from the data sources. Further, the process was guided by Robottom and Hart's (1993a: 67) argument for participation in the data analysis procedure and description of a process of iterative reporting in which successive versions of data sources were distributed among participants for verification and amendment. However, the analysis required more than this process of iterative engagement in the field.

Critical thinking was central to the analysis of data in phase 2 since it offered orderly approaches to framing, documenting, analysing and synthesising information (Schensul & Schensul, 1991: 195). This systematic approach to problem solving in context led to logical conclusions and new directions for action. Critical reflection was also an important part of the data analysis (Fien, 1992:12; Kirby & McKenna, 1989:129; Lather, 1986a: 267). It involved an examination of the social reality, and in order to fully understand the data and effect change, contextual patterns and how they were sustained and controlled were understood. Through this process and through careful examination of the data belonging to each case study site, I was able to identify broader categories for analysis for each case study. These included: planning; action; and reflection which were consistent with the action research process in each case. These were further refined through sub-categories which included:

- Aspects of auditing to identify the local issues of concern; prioritization of actions and issues to address; action planning; integration and infusion of issues into the curriculum planning.
- Whole-school development work and issues-based approaches which included establishment of micro-projects and resource management; pedagogical approaches for planning, auditing, investigating and researching aspects of the issues of concern, communicating and interpreting results, taking action, and

- Reflection (see case studies in Chapter 6).

These categories and sub-categories were used to structure the reporting in Chapter 6 and helped me to produce consistent and ordered accounts of the complex realities of each of the school cases. After analysing the data in phase 1 and phase 2 as described above, I needed to engage with a further process of analysis and synthesis which involved considering phase 1 findings in relation to phase 2 findings in order to fully address the research question. To do this I reviewed the findings of the study as a whole and produced Analytical Statements which helped me to structure Chapter 7. These are:

- The current curriculum orientation, practices and resource materials in Kenyan primary schools do not easily support issues-based approaches to curriculum contextualisation
- The common conceptions of environment and environmental education held by Kenyan primary school teachers potentially limit possibilities for broader and holistic engagement with issues-based approaches to curriculum contextualisation
- Auditing focuses attention to issues, situates learning processes and enhances curriculum contextualization
- Engagement with issues in planning and whole-school development work enhances and strengthens curriculum contextualisation
- Eco-Schools framework and practices support and enhance issues-based approaches to curriculum contextualisation and problem solving
- The Eco-Schools programme in Kenya provides opportunities for establishment of communities of practice with the local environmental and sustainability issues at the centre of negotiation of '*joint enterprise*'
- Micro-projects in schools facilitate contextualised curriculum processes, problem solving and school-community cooperation
- The issues-based enquiry approach to pedagogy can help enhance curriculum contextualisation within a wider technocratic orientation to curriculum

4.5 VALIDITY

Schwandt (2007:309) describes validity in social science as one of the criteria that traditionally serve as a benchmark of inquiry. He explains that validity is an epistemic criterion. In this study, triangulation and thick description strategies were adopted to ensure validity. Additionally, improvement in the situation or improvement of practice were the central features for catalytic validity in the action research phase of this study. Evaluating whether or not the research produced the intended consequences was the way in which validity was judged.

A further dimension was the improvement of practice outside of the learning set environment and the closer integration of theory and practice. The overarching criteria for validity were project effectiveness and environmental improvement (Ellis & Kiely, 2000). Lather (1986) described this process as catalytic validity. Further guidance for validity measures in critical research provided by Lather (1986b: 78) together with Elliot (1991: 129) and Winter (1987:144) were used to establish the credibility of the research account. These included ensuring face validity through regular member checking through workshops and school based progress review meetings involving all stakeholders.

The responsiveness of the research process with minimal prescription and a balance between presentation, shared experience and critical reflection with contextual considerations was an important contribution towards validity of the research process (Lotz, 1996:129).

4.6 ETHICAL PRACTICE

Doing environmental education research in Kenya, in a society and school system in which top-down approaches are the norm, and educational policies, curricula, and syllabi are prescriptive and final, posed a unique ethical challenge to me in this study.

Being a researcher from a non-governmental organization (I work in the Eco-Schools programme) provided an ethical challenge to me due to the nature and interest of my study as well as the perceived rigid nature of the Kenyan education system (as captured in the first paragraph above). My study's interest in trying out an issues-

based approach to curriculum contextualisation in the context of the Eco-Schools programme (which was new and being piloted) presented several challenges. Key among them were: Convincing the teachers and school system that Eco-Schools was a good programme and that it would help in contextualising the curriculum and make it relevant to local contexts; getting the teachers to understand and accept that the initiative would not add an extra workload or burden to them; and that the process would add value to their practice in line with changing trends in education especially during the Decade of Education for Sustainable Development (DESD).

The contextual realities facing myself and the study led me to devise strategies of presenting the study and Eco-Schools programme as a collective learning experience for both the teachers and me with potential benefits of capacity enhancement of the teachers and the case study schools. The micro-projects component of Eco-Schools which had an investment grant for schools served as an attraction.

Negotiating access and gaining permission to conduct the study gained from the pledged and actual participation of officers from the Ministries of Education, Environment and Agriculture as well as curriculum and material developers from the Kenya Institute of Education in the project. This signalled government support and approval and hence promoted acceptance and willingness of teachers to participate. Additionally, the fully catered for capacity building and sensitisation workshops, some of which were held in conjunction with officials from the Ministry of Education and the Kenya Institute of Education served to confirm that there would be no unbearable extra workload coming with the project and study. The assurance of school support further served to convince the teachers to embrace both the programme and study.

The ethical considerations of the research in schools and with teachers were guided by; respect for truth, respect for persons, and respect for democracy (Bassey, 1999). This was done by ensuring regular and open sharing of progress in the case study schools, treating all participants with respect and dignity, ensuring open deliberations and negotiations with all stakeholders including the learners as well as taking into consideration suggestions and views and opinions of all participants. Further, the ethical considerations of the research were guided by a view of the world as a complex interaction of reflexive subjects, rather than objects or 'others' on which scientists do research (Goodman, 1992:121). Relationship of trust and mutual

understanding built on the principles of respect for persons, honesty and justice were nurtured and sustained through a process of open sharing and reflecting on progress and discussions for the purpose of making the research meaningful and socially transformative (Fien,1992; Elliot, 1991a; McNaught & Raubenheimer 1991).

As a participant in this process, I was challenged to find ways of involving myself as a full participant or co-learner who could provide support for practical and emancipatory empowerment of teachers in contextualising the curriculum using issues-based approaches and in their own learning.

To uphold truthfulness, I was challenged to accurately and keenly collect data, interpret it and truthfully share reflections in a manner that portrayed respect for all participants, their opinions and democratic rights. To ensure this, I devised a strategy of constantly seeking approval and confirmation from participants in the process.

At the onset of this study, I made it explicit to all stakeholders and participants that I will be collecting data for my study as we continue to engage in the project and sought their permission to collect data on an ongoing basis (see CR 4.34). However, a number of other ethical issues were negotiated on an ongoing basis during the research. These included; my relationship with the participating teachers and school headmasters in view of the existing power relations- in which case for instance the participating teachers had to attend the workshops and only brief the headmasters alongside other teachers contrary to tradition where the headmaster does the briefing; my interpretations of data, sharing of reflections and participation in workshop situations among others. This required that I assume the role of a supportive co-learner and researcher assisting teachers and being assisted as we jointly grapple with the emerging findings and trends.

Wherever possible, I had to find ways of involving teachers in the organisation of their own capacity enhancement, empowerment and enlightenment to the social and political realities of their teaching and learning situations. This was one of the strategies for enhancing respect for democracy and persons. I also used the Eco-Schools programme as capital and focus for these social and dialogical encounters so as to allow for free, independent and open participation without imposing or predetermining any rigid controls. I summarised my reflections and recollections of involvement in the research process in a memo which I wrote at the end of the research process and the pilot phase of Eco-Schools in Kenya. This is included as CR 4.35.

4.7 CONCLUDING COMMENTS

The contextual review phase of this study provided useful insights that informed the action research phase. The information on the status and practice of environmental education in the formal sector guided the design of the action research phase and also provided useful information on the capacity building and professional development needs of the teachers.

A clear strength of the research methodology was the degree to which the research design provided for ample time to gather relevant background information touching on the environmental issues, risks and associated sustainable development challenges and the conceptions and practice of environmental education. Figure 4.1 indicates the phased nature of the research and the time that it took. Additionally, the process enabled teachers to participate fully in decision making, examine their practice, beliefs, actions and the school contexts and to make desirable changes. In the next Chapter I present the contextual review which constituted phase 1 of this study.

CHAPTER 5

CONTEXTUAL REVIEW; UNDERSTANDING ENVIRONMENTAL EDUCATION PRACTICE IN KENYA

5.1 INTRODUCTION

This chapter details the findings of the contextual review and scoping of this study which was conducted during the first phase. The main focus was to unravel the complexities surrounding environmental education practice in Kenya. It was conducted in order to develop a deeper understanding of environmental education as currently practiced in Kenya and is informed by the prevailing views, conceptions and approaches to environment and environmental education (EE). The findings are presented in a form that shows the range and numerical indication of the responses received for the different parameters considered for investigation in this study. This was necessary for the sake of establishing patterns in some instances. The most critical findings from this chapter are further discussed in chapter seven guided by analytical statements 1 and 2.

5.2 CONTEXT AND STATUS OF ENVIRONMENTAL EDUCATION CURRICULUM PRACTICE IN KENYA

The data presented here was drawn from questionnaires, interviews, focus group discussions, and document analysis as described in the methods section (Chapter 4).

5.2.1 Conceptions of the term ‘environment’ among Kenyan teachers

The term ‘environment’ is conceived variously by teachers in Kenya. Individual questionnaires (see CR 5.1) administered to teachers across the country and group interviews (see CR 5.2) conducted mainly in rural parts of western Kenya revealed diverse understandings of the term revealing that it was commonly conceived of as the ‘general surroundings’.

The initial question put in both the questionnaire and group interviews was: *What does the term ‘environment’ mean to you?* 63 respondents to the questionnaires, offered 114 responses many of which overlapped or were elaborated upon. One

response was invalid for failing to understand the question. A total of 73 responses were received from the 12 group interviews.

Responses were analyzed by looking at key words used and whole sentences as conveyors of meaning (Kerlinger, 1986). The responses are categorized and summarized in Table 5.1 below.

Table 5.1: Teachers’ responses to the question: What is your understanding or definition of the term ‘Environment’?

Specific words, key words and phrases used in the definition of/description of the term ‘environment’	Individual questionnaire responses N = 63 n Responses = 114	Rank	Group interview responses N = 12 n Responses = 73	Rank
General surrounding	50	1	13	2
Living and non-living things/biotic and abiotic factors/living nature	19	2	8	4
Physical features/Natural scenery/vegetation/habitat for living things	17	3	10	3
Man-made phenomena/buildings	9	4	5	5
Climate/soil/air/water/land/Natural resources/Natural phenomena	8	5	22	1

The data from the 12 group interviews, all drawn from rural areas gave more specific and often elaborate responses as compared to those from the individual questionnaires.

The data revealed that most teachers (50 and 13 responses from the questionnaires and group interviews respectively) conceive of the term ‘environment’ simply in terms of the general surroundings. This is traceable to the common use of the term in daily speech to imply things around us. It may also suggest that most teachers have not had the opportunity to engage deeply with the term ‘environment’ during their schooling or study periods, hence the continued conception of the term in very general terms as used by people in daily speech. The implication of this general conception of the term ‘environment’ in reference to the general surrounding could be inferred from the conception and perceived content of environmental education.

A striking pattern that emerged from the data is that of describing the environment in terms of only the biophysical components which included living things and their life support systems. This constituted three of the five categories each with responses ranging between eight and 19 in the case of the questionnaires and eight and 22 in the case of the group interviews. The narrow depiction of ‘environment’ in only the biophysical sense has the potential of leading teachers and learners alike to only consider the biophysical aspects and issues of the environment as opposed to holistic consideration of the ‘environment’ with due consideration of the interrelationships between the biophysical, economic, socio-cultural and socio-political aspects and issues.

Nine responses from the questionnaires and five from the group interviews described the environment in terms of man-made phenomena and with a mention of buildings as constituents of the environment. This was the least popular category ranking fourth in the informal questionnaire responses and fifth in the group interview responses. This pattern suggests that very few teachers consider man-made phenomena as constituents of the environment despite their contribution to environmental issues, risks and associated sustainable development challenges. Viewed against the focus of this study, this pattern has the potential of concealing the real contribution and effects of human activities to environmental issues, risks and associated sustainable development challenges (see 2.2) and to the environmental crisis in general. In terms of environmental education practice, this pattern can be potentially misleading if teaching and learning processes fail to probe and challenge human activities that are detrimental to environmental sustainability and social justice as well as sustainable economic development (see case studies in Chapter 6).

5.2.2 Conceptions of environmental education among Kenyan teachers

The term ‘environmental education’ (EE) is commonly used by Kenyan teachers. However, its conception cannot be assumed to be generally agreed upon and universal to all teachers. The understanding of the term ‘environmental education’ can influence environmental education practice in schools hence the necessity for teachers to have a standardised or generally agreed upon conception. In order to successfully conduct an environmental education action research project on contextualizing curriculum using issues-based approaches in the context of the Eco-Schools programme in Kenya, it was necessary to first establish the prevailing understanding of environmental education among Kenyan teachers (Chapter 4).

In both the questionnaires and the group interviews, teachers were asked to respond to the question: *What is your understanding or definition of environmental education?* A total of 63 teachers responded to the questionnaires offering 186 responses, and the 12 group interviews offered 42 responses. In consultation with my supervisor, we analyzed the responses and categorized them based on the relatedness of key words, phrases and concepts used by the teachers. Three of the responses from the group interviews were rendered invalid since they seemed after close scrutiny, not to correspond with the question and could not fit into any of the categories. It should be noted that many responses overlapped and fell into more than one category. This was largely due to the elaborations on the conceived essential elements of environmental education given by teachers owing to the open-endedness of the question.

The results are summarized in Table 5.2 below.

Table 5.2: Teachers' responses to the question: What is your understanding or definition of environmental education?

Specific words, key words and phrases used in the description/ definition of 'environmental education' (EE)	Individual questionnaire responses N = 63 n Responses = 186	Rank	Group interview responses N = 12 n Responses = 42	Rank
Calling for or indicative of some action and skills to conserve/protect/preserve or improve the environment.	60	1	9	3
*'Knowledge' and 'information' implied.	40	2	26	1
*To do with 'teaching/transmission/passing on' of 'knowledge/information/ideas'	32	3	5	7
To do with 'conservation'	26	4	7	5
*To do with 'creating awareness'	22	5	8	4
*'Learning' implied	14	6	4	8
'About environmental phenomena'	11	7	10	2
To do with 'using/utilizing the environment'	11	7	6	6
To do with 'sustainability'/'sustainable development'	10	9	1	10
To do with 'attitudes' and 'behaviour'	7	10	2	9
To do with 'environmental'	2	11	1	10

issues/problems'				
To do with 'experiences'	1	12	0	12
Recognition of media e.g. books, TV, videos	1	12	0	12

From the responses, it can be inferred that most teachers conceive environmental education in terms of an education that *calls for or is indicative of some action and skills to conserve/protect/preserve or improve the environment*. This category of responses received 60 out of the 186 responses from the questionnaires which was the highest, and nine out of the 42 responses from group interviews becoming the third most popular category. It is my considered observation therefore that what is central in this conception of environmental education is not necessarily real action in environmental education practice, but advocating or calling for action that enhances environmental conservation, protection or preservation. Additionally, socially critical environmental education practice can also not be qualified if it is only *indicative* of action. I interpret this as a portrayal of lack of commitment, experience or opportunity for action taking for problem solving in environmental education practice.

Another 40 out of the 186 responses from the questionnaires and 26 out of 42 responses from the group interviews described environmental education in terms of knowledge and information. This category ranked second and first in the questionnaire with group interview responses respectively making it the second most common conception of environmental education. Other related definitions described with implications of learning and creating awareness to do with conservation, environmental phenomena, sustainability or sustainable development as well as using or utilizing the environment. The number of responses and ranks of these categories were as shown in Table 5.2 above.

A striking feature from the responses is the emergence of a super group (with related responses and the largest number of cumulative responses) of cognitive issues (marked with an *) in table 5.2 above. This super group related to learning, teaching, knowledge and awareness and received 108 responses from the questionnaires and 43 responses from the group interviews making it the largest group. This can be interpreted to imply that most teachers conceive of environmental education more in terms of the cognitive domain.

The least popular categories from both the questionnaires and group interviews were those that described environmental education as being to do with ‘*experiences*’ and that which showed ‘*recognition of media such as books, Television and video*’. These categories received only one response from the questionnaire and none from the group interview ranking. This can be interpreted to imply that teachers have very little regard for experiential learning and the use of varied media in their EE practice. From the perspective of the focus of this study, experiential learning is considered important for purposes of identifying and responding to environmental issues, risks and associated sustainable development challenges (see 2.2) in context. This could evoke the need for action to address these issues (see 3.1.2, see also case studies in Chapter 6). Additionally, it can be argued that the use of various media such as TV, video, newspapers and books can be used to highlight contemporary issues of concern in society which then can evoke the need for action and build the case for real action to address real environmental issues, risks and associated sustainable development challenges.

It was, from my point of view regrettable that only two responses from the questionnaires and one response from the group interviews described environmental education in terms of ‘*environmental issues/problems*’ which happened to be the central concern in this study. This suggests that teachers may bother least with environmental issues in their environmental education practice. It also suggests that a lot needs to be done to make environmental issues, risks and associated sustainable development challenges a central concern in environmental education practice and processes among Kenyan teachers.

The conceptions of environmental education revealed in this study lead me to the questions once posed by Irwin (1993:27), thus: “Where then do we stand with this wide range of viewpoints? How do we both celebrate diversity and have a sense of direction for environmental education?” I tend to agree with Irwin’s (1993:27) suggestion that, “a viable solution focussing on the actual process of environmental education lies in crystallising the essence of environmental education from the multifaceted concept which has been described and viewing it in combination with the Tbilisi Declaration (UNEP, 1977)” and more recent guiding frameworks as reported in Chapter 2.

5.2.3 Importance accorded to environmental education by Kenyan teachers

The importance of environmental education in Kenya is widely acknowledged. This is evidenced by Kenya's participation in many international conferences relating to environment and environmental education and being a signatory to declarations on environmental education, as well as the many national policies that recognise the importance of environmental education (see section 2.3 in Chapter 2) and also Ndaruga (2003: 3-6, 46); Kamunge (1980:66), Lindhe *et al.* (1993:17).

For this study, it was deemed necessary to establish if environmental education was considered important by Kenyan teachers and if so, the reasons why, before embarking on action research case studies. This was done by posing the question: *why do you consider environmental education important?* through 21 questionnaires and 12 group interviews (see CR 4.1 and 4.7 for questionnaire and interview questions; see also Chapter 4) following a declaration by all teachers that environmental education was important. It should however be noted that this was done after Eco-Schools sensitization workshops that sought to define environmental education in Nyanza province. 87 and 49 responses were received from the questionnaires and group interviews respectively.

Table 5.3 below presents a categories' summary of the reasons why teachers considered environmental education important.

Table 5.3 Teachers' responses on the reasons why they consider environmental education important

Reasons why teachers consider environmental education important	Individual Questionnaires N = 21 n Responses = 87	R a n k	Group Interviews N = 12 n Responses = 49	R a n k
*To provide knowledge <i>for</i> action for the environment. Examples of phrases in this category included; knowledge <i>for</i> ... environmental conservation, care for the environment, proper waste management, managing the environment, proper management of resources, environmental preservation, curbing or coping with natural disasters, proper planning of resources.	32	1	13	2
*To provide knowledge <i>about</i> ... 'the environment', 'protecting the environment', 'conserving the environment', 'available resources', 'environmental problems', 'issues affecting society'	22	2	15	1
To develop <i>attitudes</i> ...	11	3	7	4

*To provide knowledge for <i>sustainable development</i> and or <i>sustainability</i> .	8	4	4	5
* <i>Creating awareness</i> /enlighten people about... ‘the environment’, ‘importance of the environment’, ‘activities in the environment’, ‘environmental problems’, ‘environmental issues’	8	4	8	3
*To provide ‘knowledge’ and ‘skills’ for <i>using/utilizing</i> the environment.	6	6	3	6
To build <i>skills</i> ...	6	6	7	4
*To provide <i>knowledge</i>	2	8	3	6

The data shows that, 70 responses from the questionnaires and 38 responses from the group interviews considered environmental education important because it enhanced knowledge in some way. However, the teachers offered various dimensions of the knowledge they felt could be promoted through environmental education.

That the teachers felt that environmental education was important for providing knowledge for environmental action was evidenced by an overwhelming category of 32 responses from the questionnaires and 13 responses from the group interviews becoming the most popular response. The indicative key words and phrases captured in this category included responses such as: to provide knowledge *for* ... ‘environmental conservation/preservation’, ‘proper waste management’, ‘good care of the environment’, ‘proper management of resources’, ‘maintaining the environment’, ‘curbing natural disasters’ and ‘proper planning of resources’. From these responses, it is clear that the emphasis was more on the biophysical dimension of the environment and some of the environmental concerns including environmental conservation, waste management and natural disasters.

The category with the second highest frequency related to environmental education being regarded as important for providing knowledge *about* the environment. This ranked first in the responses from the group interviews with 15 responses and second in the responses from the questionnaires with 22 responses. Some of the key words and phrases used by teachers in this category included: To provide knowledge about... ‘the environment’, ‘protecting the environment’, ‘conserving the environment’, ‘available natural resources’, ‘environmental problems’ and ‘issues affecting society’. It is worth noting again that knowledge about conservation and natural resources dominated this category albeit with a general mention of knowledge about environmental problems and issues affecting society which was the focus of this study.

The responses in Table 5.3 above show the emergence of a super group with a very high frequency of knowledge related responses as the reason why environmental education is considered important. This further confirms the dominance of the cognitive domain in environmental education curriculum practice in Kenyan primary schools (see also the responses in Table 5.2). The implication of this pattern with regard to the focus of this study could be interpreted to suggest that Environmental education curriculum practice is still strongly regarded from a cognitive perspective with little regard to the psycho-motor which could enhance the acquisition of practical skills necessary for problem solving and addressing the environmental issues, risks and associated sustainable development challenges in context.

Only eight out of 87 responses from the individual questionnaires and four out of 49 from the group interviews felt that environmental education was important for enhancing knowledge for sustainable development. This fell short of the current expectations as expressed in the Decade of Education for Sustainable Development (DESD, 2005-2014) which require that all forms of education work towards promoting sustainable development.

From the responses received, it can be inferred that different teachers consider environmental education important for reasons that are congruent with some of the goals and objectives of environmental education. However, the different teachers seemed to regard environmental education as important for only part of the reasons and rarely all. This pattern can potentially lead to a situation where teachers only promote the cognitive, affective or psycho-motor domains in environmental education practice as opposed to promoting all these mutually reinforcing domains necessary for addressing environmental and sustainability issues in context, as ascribed in the foundational documents of environmental education i.e. [Tbilisi principles of environmental education (UNESCO-UNEP, 1978) and the principles of environmental education for equitable and sustainable societies (UNCED, 1992)].

5.2.4 Environmental education (EE) practice in the Kenyan curriculum

This section describes and discusses how teachers enhance environmental education in their daily practice in schools, as obtained from the data from two focus group discussions with groups of teachers from Nyanza province of Kenya (see focus group discussions in 3.2.1.2, see also CR 4.8 and 4.29 for focus group questions and

sample data respectively). These were conducted with the aim of getting a clear picture of how environmental education was being practiced in schools. The analysis of the data obtained led to the emergence of three main categories which guide the discussion in this section. These categories are:

- The guiding frameworks and documents in environmental education practice in Kenyan primary schools
- Environmental topics and concepts in the school curriculum
- Teaching and learning approaches and methods used for environmental topics in Kenyan primary schools

Analysis of teaching and learning resource materials used in schools (see CR 2.1 for criteria) led to a fourth category:

- Environmental education, issues and teaching and learning resource materials.

The first focus group discussion involved 16 teachers. It first sought to ascertain whether they enhanced environmental education in their daily practice and were of the opinion that they practiced environmental education in their respective schools. The discussion further sought to establish what guided teachers in their environmental education practice, whether environmental education was taught independently, and what exactly happened as well as examples of specific environmental education topics that were taught. The exact sequence of questions and probing are as shown in CR 5.3.

During the second focus group discussion involving 12 teachers, I sought to gain a deeper understanding of environmental education practice in the primary school curriculum by unpacking the key questions: *How do you go about teaching and learning of environmental education in your schools?* into simpler but specific discussion areas. This question was discussed in terms of ; content of environmental education; whether environmental education was taught by first isolating and identifying it as environmental education or just taught as any other content of the respective subjects; what was done differently when teaching environmental education as compared to teaching of other ordinary subject content; and lastly, what teaching and learning methods (pedagogical approaches) were used. The exact sequence of questions and probing are as shown in CR 5.4.

5.2.4.1 *The guiding frameworks and documents in environmental education practice in Kenyan primary schools*

In general, it emerged from the focus group discussions that the subject syllabi were the only guiding documents to environmental education practice in schools.

However, some teachers observed that the practical aspects of environmental education were at times influenced by the prevailing events at the time.

In response to the question: *What guides your environmental education practice?* asked in focus group discussion 1, most of the teachers cited the subject syllabi as the key guiding document for their environmental education practice. One teacher for instance explained saying that the subject syllabi were the principle guiding documents to teaching and learning in schools. He categorically stated that: “All the environmental education we teach must be in the syllabus. Otherwise you will be wasting your time teaching your own things that can never come in the examinations”. He added that “school inspectors would also not approve of anything taught out of the syllabus”. Another teacher picked up the discussion and asserted that: “Of course it has to be the syllabus! That is the only approved guideline for teaching in schools”.

Just as in the first focus group discussion, it emerged during the second focus group discussion that the environmental education content is primarily guided by the subject syllabi. The teachers pointed out a number of environmental topics in the subject syllabi including a topic ‘environment’ which is part of the Primary Science curriculum. One teacher elaborated that ‘things around us’ constituted the basic content of this topic.

A new dimension was, however, brought in during focus group discussion 1 when a teacher observed that environmental education teaching was at times guided by the prevailing events in the school. She gave an example of ‘Labour day’ celebrations marked on the 1st of May every year as a time when teachers usually organized the pupils to plant trees around the school compound whenever the local forest officer provided the school with tree seedlings. She called this the practical part of environmental education. She further gave an additional example of routine school activities where pupils are organised to pick rubbish/litter in the compound every morning as part of cleaning the compound. This response prompted me to seek more insight into the conduct of the so called ‘practical elements’ of environmental

education as described by the teachers, by posing the question: *‘When you supervise learners planting trees and picking litter in the compound, do you ever take time to explain to them why they are planting trees or picking litter ?’* One teacher responded saying that there was no need for explaining as those activities were simply part of school routine that had to be followed by all pupils. Another teacher explained that the ‘picking of rubbish’ in the school compound as described by the fellow teachers was not a lesson as such, but school routine activities. He stated that it was the responsibility of the learners to keep the compound clean always by picking litter in the compound especially on Monday mornings when the compound was often heavily littered having been accessed by members of the community over weekends. He commented that the teachers could not start teaching in a dirty environment.

5.2.4.2 Environmental topics and concepts in the school curriculum

It was generally noted by teachers that some subjects contained more environmental topics and concepts than others. The teachers mentioned that Science and Social studies subjects carried most of the environmental topics and concepts. Pursuant to this, I sought to know more about the environmental education topics or concepts that the teachers taught in these subjects. During focus group discussion 1, I presented the question as: *I would like to know a little bit more about the environmental education topics or concepts that you teach in Science, Social studies or any other subjects... What topics or concepts do you teach?* Some of the topics and concepts that the teachers mentioned included: water, deforestation, re-forestation, air, pollution, and agriculture.

On further probing, seeking to know the specific topics that were taught, one teacher interjected at some point commenting that: “If you went through the syllabus, you will find very many environmental topics, you cannot mention them all”. According to him, the list of topics and concepts was so long and that the teachers could not remember and exhaust them all in one such a meeting, hence his suggestion that we would rather refer to syllabi. Another teacher, however, cooperated and brought in a new dimension when he stated that: “Nowadays we even teach about the water hyacinth that is growing in Lake Victoria. It has really affected the fishermen because fishermen first have to try and remove it before they continue with their fishing activities”. This represented a local environmental issue.

Another teacher whose school was located very close to Lake Victoria further explained how the Water Hyacinth had become such a big problem for the communities living along the lake, especially the fishermen. He lamented, citing recent instances and projects, the huge amounts of money that had been spent on seeking expertise locally and from abroad to address the problem but with little success if any.

On further probing, the teachers added to the list of topics and concepts by first regretting the absence of the subject syllabi in the room and later mentioning topics and concepts such as: living things such as plants and animals, air, water, hygiene, pollution, deforestation, drought, diseases and disease outbreaks. Of this new list, the latter five directly represented environmental issues and risks.

During focus group discussion 2, I sought to understand the specific environmental content, topics, concepts and ideas by unpacking the general question and probing more deeply as per the questions in CR 5.4. However, similar topics to those in group 1 were pointed out during this second focus group discussion though with additions. The additional topics mentioned included; weather, health education, properties of matter- which they said included effects of wind, uses of wind among others- and soil degradation, the later being an environmental issue.

At some point during focus group discussion 2, I sought a deeper understanding of the exact environmental topics and concepts taught in schools by probing, thus: *‘Now I would like us to go a little deeper and specifically point out the particular concepts or ideas that we teach or pass across in some of the topics that we have mentioned’*. The teachers commented that it was difficult to get into the deeper details of the concepts and topics, but offered to mention what they could remember. They said that under the topic health education, they taught about hygiene components which included teaching about cleaning latrines, toilets, and urinals. The teachers further pointed out that in these topics; the emphasis was on good health i.e. what to do to ensure good health. These in my view appear to have action components.

Additionally, teachers during focus group discussion 2 mentioned topics and concepts like; care of plants, different types of leaves and germination of seeds including simple experiments on germination. Other topics and concepts identified by the teachers included; wild animals, animals kept at home, useful animals,

separating things from water, modelling with soil, handling food, uses of plants to human beings, care of animals at home, making water safe for drinking and storing clean water for drinking. Also mentioned was; effects of weather changes on farm activities. These topics and concepts largely constitute elements of education *about* the environment (Fien, 1993)

5.2.4.3 Teaching and learning approaches and methods used for environmental topics in Kenyan primary schools

Appropriate teaching and learning approaches are central elements of environmental education practice. This study therefore sought to establish the common pedagogical approaches to environmental education by posing a series of questions and using follow up probing techniques. It emerged from the focus group discussions that teachers broadly classified pedagogical approaches into theory and practical approaches both of which were applied when teaching environmental topics. However, during focus group discussion 2, the teachers categorically explained that the most common were the theory lessons which were usually conducted in class. They also pointed out that subjects like Science had practical sessions. It further emerged that no distinct pedagogical approaches were applied when teaching environmental topics in the curriculum. The same approaches were used across all subjects and topics except that some environmental topics were taught outdoors at times. Some teachers called these the practical component of environmental education.

During focus group discussion 1, I posed the question: *‘Do you take time to teach environmental education independently? Or how exactly do you go about teaching environmental education?’* One of the teachers responded by explaining that environmental education was not specified in the school timetable as environmental education and so there was no specific time allocated for environmental education. He further clarified that environmental topics were found in subjects such as Science and Social Studies and that it was while teaching these subjects that they taught EE.

Additionally, I sought to get clarity on the actual EE practice in schools during focus group discussion 2 by posing the question; *‘Do you teach environmental education by first isolating and identifying it as EE or you just teach it as any other content of the respective subjects?’* The teachers responded stating that environmental topics were included in some other subjects and hence they taught the environmental topics

as they came across them in the subject syllabi. The teachers were, however, categorical that they could identify the environmental topics as such. They stated that it would be very difficult to first isolate the topics; claiming that such a process would be tantamount to teaching two different subjects in one. One of the teachers reinforced this position by asserting that they simply taught what was in the syllabus. He said that they hardly went further isolating environmental topics but taught them as part of the main subjects. He insisted that isolating the environmental topics would be too much extra work for teachers.

In a bid to seek further insight into the conduct of the theory and practical lessons, I sought the details of the theory and practical lesson processes by asking the question; *‘What exactly do you do in the theory and practical lessons?’* The responses received showed that the theory lessons were mainly conducted through explanations and giving notes to pupils by writing on the chalk boards. Some teachers, however, explained that they dictated notes to pupils at the upper primary school level – especially class 8 level and that the new or difficult terms were written on the chalk boards so that the pupils get the spellings correctly. Additionally, the teachers explained that the ‘question and answer’ method with further explanations from the teachers was also commonly used.

It was further observed by the teachers that the practical lessons were often conducted outdoors. The exact teaching and learning methods, however, differed from subject to subject and teacher to teacher. This in my opinion was largely influenced by the absence of specific guidelines for the conduct of outdoor environmental education. My opinion was supported by some disappointing and unfortunate confessions and revelations from the teachers to the effect that some of them only regarded the outdoor lessons as optional pastime activities when they were bored and tired of routine classroom teaching.

Following these revelations, I further sought to know what exactly happened during the outdoor practical environmental education sessions by posing the question: *‘So what exactly do you do with the pupils when you take them out of class while tired and bored?’* One teacher responded by explaining that: He often just thought of an interesting topic like formation of rain... then proceeded outdoors to show pupils the clouds in the sky and told them that it is the clouds that bring rainfall and that the trees they see around the school are responsible for creating rain. He could then

advise them to plant trees at home so as to continue having rainfall. Another teacher went on to explain that he at times took the pupils to the school farm to do some work. He cited examples of activities which included asking the pupils to go dig so as to plant vegetables in the school farm. He explained that during the previous season, the pupils helped the school plant maize from which a harvest of six bags was realized. Another teacher reiterated that, at times he would just call the lesson a 'Physical Education (PE)' lesson, during which he allowed the pupils to go and play in the games field as he walked around or did other things until the lesson period was over.

Some positive aspects of the practical environmental education processes included those in which teachers gave examples of instances when teaching topics like water, plants or insects in the science subject. One teacher gave an example of what she did when teaching the topic 'water' in science during focus group discussion 1. She explained that pupils were asked to come with some water and do some practical work. She elaborated that when teaching about filtration, pupils were asked to make the water dirty by mixing it with soil and then asked to filter it. The other experiment with water involved mixing the water with soil in a clear container, shaking it and then allowing it to settle and make observations later. She stated that this was a science lesson aimed at identifying the different particles in soil through separation.

The practical component of environmental education was also confirmed during focus group discussion 2 when teachers confirmed that they did take pupils out of the classroom for practical lessons at times. They explained that the opportune times were whenever there was something that the teachers wanted the pupils to see out of the classroom. The teachers gave examples which included instances while teaching about plants or insects in Science, when pupils were usually taken out of the classrooms to collect and identify specimens in the environment. They also gave the example of germination experiments in Science. Further examples given included the identification and comparison of different types of seeds.

During the first focus group discussion, one teacher reiterated that the respective subject syllabi outlined how all topics (including environmental topics) should be taught. He further remarked that after teaching for some years, it was no longer necessary to keep referring to the syllabus, since it was the same thing year in year out and that nothing really changed. He observed that teachers only followed those

procedures seriously while on teaching practice for the sake of assessment. This later contribution could be interpreted to imply that some teachers found the syllabi prescriptive with regard to pedagogical approaches.

5.2.4.4 *Environmental education, issues and teaching and learning resource materials*

Relevant and appropriate teaching and learning resource materials are critical for enhancing environmental education aimed at addressing environmental issues, risks and associated sustainable development challenges in context. A critical review of various resource materials currently in use in Kenyan primary schools against the criteria developed and described in section 2.4.3 in Chapter 2 and presented as case record (CR 2.1) revealed that more needs to be done to make them relevant and appropriate for enhancing socially critical environmental education processes in schools using issues-based approaches to curriculum contextualization.

School text books for the environmental education carrier subjects and some supplementary readings need to be revised so as to enable them to support issues-based socially critical environmental education for problem solving in context. Of interest to this study was an assessment of presence of environmental education concepts and environmental issues in the content, the depth of coverage of environmental education related content, concepts and environmental issues, emphasis on skills building and action orientation of the materials to support addressing environmental issues, risks and associated sustainable development challenges in context as well as potential for working with different ways of knowing (particularly indigenous knowledge and local knowledge). The discussion below provides a synopsis of the state of the available materials with regard to the criteria mentioned above and with respect to the focus of this study.

With regard to the *presence of environmental education (EE) concepts and environmental issues in the content*, a preliminary review of resource materials currently in use in Kenya primary schools (see CR 4.4) by the writer revealed that Science and Social Studies text books contain most environmental education concepts in the school curriculum. These concepts can be traced in some resource materials but the orientation and presentation of most of the concepts was not in line with the goals, objectives and guiding principles of environmental education as stipulated in the Tbilisi principles of EE (UNESCO-UNEP, 1978) and the EE principles of the Non-Governmental Organisations Forum (UNCED, 1992). The

concepts were furthermore presented in a manner that did not provide adequate opportunities for linking them to the immediate contexts and the environmental issues of concern. Text books for Science appeared to have more environmental education content than the humanities and social sciences except for Social Studies. However, the environmental education content dwelt more on the biophysical concepts, most of which touched on nature.

The *depth of coverage* of environmental education concepts and environmental issues in the content was viewed against four sub-criteria namely: awareness, focus on concepts and issues, concepts and issues in context and attention to different scales (see CR 2.1). At the level of ‘*awareness*’ sub criterion, the lower primary science text books for classes one to three provided learners with opportunities to explore the biophysical world around them through outdoor nature studies and activities. Examples of activities involved collecting of leaves and flowers from different tree species and identifying them by colour and size. The teacher activities included leading the learners in developing scientific vocabulary. A good example is where teachers were expected to lead by saying: “This is a leaf”, or “this is a flower” and the learners repeat the same in chorus. The next level of the activities involved teachers leading the learners in identifying the flowers by colour. This was often done through activities that required the teacher to say: “This flower is red in colour” and later the learners repeating the same. The Social Studies activities involved taking the learners outdoors and asking them to look at the sky and identify elements of weather such as sunshine and clouds that bring rainfall.

The above described attributes and activities in the text books seem to promote awareness of the biophysical elements of the environment around us but not other elements of the environment nor the environmental issues, risks and the associated sustainable development challenges in context.

At upper primary level (class four to class eight), the content of most textbooks is of the nature that confines learners to the classroom with very few outdoor activities. Suggestions for field work are, however, suggested in subjects such as Social Studies. This could probably be due to the impression that only younger learners need outdoor activities for purposes of leisure and enjoyment and not older learners who should spend more time in their classrooms preparing for exams. The exam-orientation of the Kenyan curriculum is probably to blame for the creation and

perpetuation of this impression in the education system. The implication of this state of affairs could be interpreted to imply that the education system sees no point nor need to engage with local phenomena and issues in context, as learners advance to higher levels in their education.

In summary, most text books for the primary school level that were reviewed (see CR 4.4 for list) have very limited activities that provide opportunities for experiences that increase learner's awareness of the environmental issues, risks and associated sustainable development challenges in context. Additionally, limited opportunities are provided for enhancing awareness of other local phenomena such as the built environment. However, some opportunities exist - especially at lower primary level- for engagement with and enhancement of awareness of the natural environment. The materials also do not adequately help learners understand the interdependence of all life forms, including the dependence of human life on the resources of the planet and on a healthy planet. Additionally, most exercises and activities do not encourage learners to identify and express their own positions regarding environmental issues, risks and associated sustainable development challenges in context.

With regard to the sub-criterion '*focus on concepts and issues*', concepts from environmental science fields such as Ecology, Biology and Conservation are seldom presented at lower primary level. However, such concepts begin to appear in the upper primary science text books. The association of environmental education with the science disciplines clearly manifests itself in the form of absence of concepts from social science fields such as aspects of Economics, History and Government and Religious studies in the science text books.

In most of the Science and Social Studies textbooks reviewed, facts are presented and vocabulary introduced and defined. This was however often not in context and support of the important concepts necessary for supporting issues-based approaches to curriculum contextualisation. Additionally, ideas that would otherwise require to be presented logically were rarely presented in a logical manner and were often not connected throughout the materials. Most resource materials also did not include a clearly articulated conceptual framework that states the concepts and issues to be learned in context and often also did not relate them to each other and to environmental issues, risks and associated sustainable development challenges of concern.

Socially critical environmental education aims at addressing issues in context. This requires that, environmental *concepts and issues should be set in a context* that includes social, economic, political as well as ecological concepts (NAAEE, 2005). This should also be looked at through the lenses of society, environment and economy as considered in the International Implementation Scheme of the Decade of Education for Sustainable Development (UNESCO, 2005). To ensure this, environmental issues should be explained in terms of specific concepts. Additionally, historical, ethical, cultural, geographic, economic, and socio-political relationships should be addressed as appropriate. It is lamentable that most textbooks with environmental education content at the primary school level in Kenya were developed with little regard to these important considerations, thus predictably reducing their potential to effectively support issues-based approaches to curriculum contextualisation.

It is suggested that learners could be offered opportunities to examine multiple perspectives on issues, and to gain an understanding of the complexity of issues, as appropriate for their developmental levels (NAAEE, 2005). Additionally, further investigations ought to be suggested to help learners probe more deeply into the ecological, social and economic aspects of issues, and their interrelationship. Concepts should also be introduced through experiences relevant to learner's lives (NAAEE, 2005). It is, however, regrettable that these components are not convincingly reflected in most textbooks currently in use in Kenyan primary schools.

It is also desirable that materials help learners to make connections among the concepts and issues, and that learning is based on learners constructing knowledge through research, discussion, and application to gain conceptual understanding (NAAEE, 2005) in line with the expectations of issues-based approaches to curriculum. However, from the resource materials review, it appeared to me that most of the resource materials in use in Kenyan primary schools do not support nor enhance the above perspectives.

Resource materials used to enhance environmental education at primary school level (that were reviewed in this study) show little or no evidence nor attempts to consider communities and issues of *different scales*, i.e. local, regional, national and global levels. Additionally, the materials reviewed do not show evidence of the use of local,

regional, continental and global geographic scales to help learners understand that issues can be important, widespread and complex. This could probably be due to the assumption that pupils at primary school level are unable to effectively comprehend and interpret such complex phenomena.

Further, the school textbooks reviewed need to present opportunities - where relevant – for pupils to examine issues over a variety of temporal scales, so that short term and long-term problems, actions and impacts are clear. A good example could be in the description of the impacts of climate change in the Social Studies textbooks.

Resource materials should provide opportunities for learners to develop and acquire skills necessary for addressing issues in context. Consideration of emphasis on *skill building to address environmental issues, risks and associated sustainable development challenges* is looked at with regard to critical and creative thinking, application of skills to issues and promotion of action skills.

With regard to *critical and creative thinking*, most of the text books reviewed at the primary school level of education do not offer pupils adequate opportunities to practice *critical and creative thinking* processes such as problem definition, forming hypotheses, collecting and organising information, analysing information, synthesising, drawing conclusions, formulating possible solutions and identifying opportunities for action (NAAEE, 2005). Some topics in Social Studies textbooks, however, attempt to offer learners opportunities for collecting and organising information fully through field work activities.

Additionally, the school textbooks reviewed do not provide pupils with opportunities to practice creative thinking processes such as modelling, using metaphors and analogies, and formulating questions at the appropriate levels of simplicity comprehensible to the learners. This potentially limits possibilities and opportunities that challenge learners to use higher level thinking processes such as identifying bias, inferring, relating, applying and reflecting (NAAEE, 2005) which could be useful while engaging with issues in context. Further, the textbooks reviewed offer learners very limited opportunities and activities to practice skills individually and in groups except for the case of some technical topics such as agriculture.

The resource materials reviewed hardly provided adequate opportunities for open-ended questions, case studies, experiments, research-based role plays and drama (Lotz-Sisitka *et al.*, 2006:29); often considered important for enhancing critical and creative thinking. Additionally, most materials reviewed did not provide opportunities for promoting dialogue, debates, excursions, hands-on activities, and other action-oriented strategies necessary for enhancing critical and creative thinking with regard to issues in context (*ibid.*). The materials reviewed also did not provide opportunities for exposing learners to multiple perspectives that are also multi-disciplinary in nature (Lotz-Sisitka *et al.*, 2006:29). With these limitations, it would be futile to anticipate that these resource materials can adequately support issues-based approaches to curriculum contextualization.

With regard to the need for teaching and learning resource materials to guide learners in *applying skills to issues*, most reviewed materials were found deficient. This deficiency manifested itself in the sense that the textbooks and the prescribed teaching and learning methods were not designed to effectively help or support pupils learn to identify, define and evaluate issues on the basis of evidence and different perspectives. Additionally, ethical and value considerations were not included in most of the content in the text books, and lists of other resources that pupils could use to explore the issues on their own were rarely included.

Opportunities to use different methods - simplified to the levels of learners (such as risk analysis, cost/benefit analysis, ethical analysis, environmental impact analysis, analysis of cumulative effects, different kinds of economic analyses, social impact analysis) of evaluating environmental issues and their potential solutions as appropriate to the intended age level were seldom provided in the textbooks reviewed. Additionally, the content of the textbooks reviewed does not support learners to develop their own solutions to issues. In some topics (such as agriculture) in the Science and Social Studies textbooks, some environmental issues were presented with a range of possible solutions as well as information about how the problems are currently being addressed. Good examples are topics touching on soil and water conservation in Science text books. However, the textbooks did not require learners to consider the implications of different approaches (NAAEE, 2005).

Regarding '*action skills*', most textbooks reviewed do not give pupils adequate opportunities to learn basic skills for addressing environmental issues. Specifically,

opportunities for developing skills (such as defining issues, determining if action is warranted, identifying others involved in the issues, selecting appropriate action strategies and understanding their likely consequences, creating action plans, implementing action plans and evaluating results) are not provided in the textbooks currently in use in primary schools. Additionally, learners are rarely provided with opportunities to perfect their ability to forecast and to plan for the long term.

Opportunities to practice inter-personal and communication skills such as oral and written communication are evident in some of the textbooks reviewed especially those of language subjects such as English and Swahili. However, the textbooks reviewed do not offer adequate opportunities for enhancing skills for group cooperation, leadership and conflict resolution, citizenship, consumer action, using the media, and community service, which are desirable for addressing the prevailing environmental issues, risks and associated sustainable development challenges (UNESCO, 2005; Rosalyn *et al.*, 2002).

Additionally, most activities in the textbooks reviewed (except some Science and Social Studies subject textbooks) do not help learners sharpen basic laboratory and field skills such as experiment design, observation, data collection, and data analysis. Further, the textbooks reviewed do not adequately facilitate learning of basic skills of applied science at a simple level, including simple environmental monitoring at the local level.

With regard to '*action orientation towards addressing issues in context*', the materials were reviewed against two main criteria, i.e. sense of personal stake and responsibility and self-efficacy (see CR 2.1 and 2.4.3). Sense of personal stake criterion takes consideration of the need to promote intergenerational and global responsibility, while the self-efficacy criterion is geared at challenging learners to apply their thinking and act on their conclusions.

The *sense of personal stake and responsibility* criterion revealed that most textbooks reviewed do not adequately promote intergenerational and global responsibility through linking historical and current actions with future and distant consequences with regard to environmental issues, risks and associated sustainable development challenges. Additionally, the materials do not provide learners with ample opportunities to reflect on the effects of their actions and to sort out their opinions

about what, if anything, they should do differently (NAAEE, 2005). The idea that many individual actions have cumulative effects, both in creating and addressing environmental issues was not conveyed in the set of textbooks reviewed during this study.

The *self-efficacy* criterion established that the textbooks reviewed did not challenge learners to apply their thinking and act on their conclusions. It is therefore probable that such materials cannot support efforts aimed at addressing environmental issues, risks and associated sustainable development challenges through teaching and learning process.

Additionally, most materials reviewed did not include a range of individual and community strategies for citizen involvement and also did not provide learners with opportunities to practice these strategies through projects targeting the issues of concern, that they generate individually in their school or in the larger community. Examples of successful individual and collective actions were also never given in the form of case studies, neither were the learners encouraged to examine what made any such actions successful. The content of the textbooks reviewed did not also encourage pupils to examine the reasons for failure in instances where actions were not successful.

Potential for working with different ways of knowing (particularly indigenous knowledge and local knowledge) criterion considered two key aspects namely; Recognition of different ways of knowing and opportunities for working with different ways of knowing with particular reference to indigenous knowledge and local knowledge.

The resource materials reviewed fared quite poorly with regard to the sub-criterion of recognition of different ways of knowing. They hardly included nor made reference to case studies of traditional education e.g. shared beliefs, cultural taboos, folklore and myths, and songs as well as community-based management approaches that contributed to both causing and addressing environmental issues, risks and associated sustainable development challenges in context. This is despite the growing recognition and appreciation that some indigenous approaches to addressing environmental and sustainability issues of concern are more effective, environmental friendly, as well as less costly than some modern methods.

With regard to opportunities for working with different ways of knowing, the resource materials further did not satisfy the requirements of this sub-criterion. The materials did not provide for direct or indirect opportunities that could expose learners to educational processes that enable acquisition of knowledge and skills for survival, and adulthood reminiscent of those in traditional settings and contexts. Additionally, the resource materials reviewed provided poor opportunities for detailed understanding of the local biological resources, environmental issues and risks that could help to develop knowledge and skills that can enable people to adapt to, and manipulate local resources such as land, flora and fauna sustainably, as well as address the environmental and sustainability issues of concern.

5.2.5 Negative influences on environmental education practice in Kenya; an account from teachers

Much as environmental education is regarded as very important by Kenyan teachers for reasons cited in this study (see section 5.2.3), and many more highlighted by among others Atiti (2003) and Ndaruga (2003), environmental education practice in Kenya is not without problems and negative influences. In this section, attention is drawn to some of the problems/negative influences affecting effective practice of environmental education in Kenyan schools as identified by the teachers. In the considered view of the teachers, these problems need to be addressed if environmental education practice in Kenya is to realize the desired outcomes. The exploration of the negative influences was inspired by the need to underscore their probable negative contribution to the current state of environmental education with regard to effective engagements with issues-based approaches, situated learning and local practices as well as contextualising processes and issues.

In this aspect of the study, 21 questionnaires were administered and 12 group interviews (see 4.2.1.2.2) conducted with teachers in a bid to establish the problems/negative influences that teachers perceived to be a hindrance to effective environmental education practice in their schools. The question was phrased as: *‘State some of the problems affecting effective environmental education in your schools’* in the questionnaires and as: *‘What problems affect effective environmental education practice in your schools?’* during the interviews. Further probing was done during the group interviews and this generated additional responses.

A total of 66 responses were received from the questionnaires and 88 from the group interviews. The negative influences/problems hindering effective EE practice in schools as identified by teachers are categorized and summarized in Table 5.4 below.

Table 5.4: Teachers’ responses on the problems/negative influences to effective environmental education practice in Kenyan primary schools

Problems/negative influences to EE practice in Kenya	Individual Questionnaires N = 21 n Responses = 66	Rank	Group Interviews N = 12 n Responses = 88	Rank
Lack of/inadequate training of teachers in EE	14	1	19	1
Heavy teacher workload	9	2	9	4
Limited time/tight schedule within the school programme	7	3	7	6
Lack of/Inadequate teaching and learning resource materials	6	4	11	3
Lack of support from fellow teachers	6	4	1	11
Little emphasis on EE in the school curriculum/Lack of awareness of EE in the curriculum/EE’s association with only the science disciplines/Lack of commitment to EE by teachers/Negative attitudes towards EE’s hands-on activities by teachers and parents/Lack of inspection of EE activities by ministry of education inspectorate staff/Laxity	6	4	12	2
Nature of the school curriculum/Exam orientation of the school curriculum/Academic orientation of the school curriculum	5	7	8	5
Lack of/inadequate funding for EE programmes and activities	4	8	4	8
Overloaded school curriculum	3	9	5	7
Lack of support from the community	3	9	4	8
Ignorance/lack of awareness	2	11	3	10
Poverty/high poverty levels	1	12	1	11

The responses revealed that, in the teachers’ view, inadequate and/or lack of training of teachers in environmental education was the main factor hindering effective environmental education practice in schools. This category ranked highest in both questionnaires and group interviews with 14 and 19 responses respectively. Many teachers confessed that they had never gone through any formal training in environmental education either in pre-service or in-service. They claimed that this negatively affected environmental education practice since teachers were hardly aware of the guiding principles of environmental education that could inform their

approaches to environmental education. This left the subject syllabi as the sole curriculum document that guides their practice despite the little emphasis they give to environmental education.

It also emerged that the ‘little emphasis and attention given to environmental education in the curriculum was another negative influence on environmental education practice in schools. This was captured in various phrases used by teachers to elaborate and explain the negative influences on effective environmental education practice in the school curriculum. This category received 12 responses from the group interviews ranking 2nd and 6 responses from the questionnaires ranking 4th.

Heavy teacher workload was also cited as a key hindrance to effective environmental education practice in schools with 9 responses from the questionnaires and 9 from the group interviews. This response ranked 2nd in the questionnaires and 4th in the group interview responses. Teachers maintained that the heavy workload occasioned by the increased enrolment following the introduction of free primary education in 2003 does not allow them to allocate adequate time to environmental education activities in schools due to pressure of marking pupils’ assignments and supervising large classes. The heavy teacher workload category is closely linked with two other categories i.e. ‘limited time/tight schedule within the school programme’ and ‘the over-loaded school curriculum’.

Additionally, the teachers cited ‘lack of/inadequate teaching and learning resource materials for environmental education’ as a major problem negatively influencing environmental education practice in Kenyan schools, this category ranked 4th and 3rd respectively in the questionnaire and group interview responses. The teachers observed that the environmental content in the school textbooks was often presented like any other content - with no distinction - and that the teaching and learning methods prescribed were similar, contrary to the expectations and requirements for effective enhancement of environmental education in schools.

Teachers also identified ‘lack of support from the community’ as another factor negatively affecting effective environmental education practice in schools. This revelation was particularly important to this study owing to the fact that school-

community cooperation is instrumental to any efforts aimed at curriculum contextualization.

Despite the long list of negative influences to environmental education practice in Kenya as observed by teachers, it is worth noting that the Kenyan education system has several strengths and opportunities which, if taken advantage of and explored fully, can contribute to positive socio-economic and ecological transformation. Among them include the recognition of environment and other sustainable development issues of concern as emerging issues in the curriculum (see 2.4). However, the scope of this study did not provide for an elaborate exploration of the strengths and weaknesses of environmental education practice in Kenya.

These responses from teachers offer a variety of factors which they feel have negative influences on effective environmental education practice in schools. It is therefore imperative that efforts should be made to address them if environmental education in Kenyan schools is to realize the desired outcomes as broadly stated in key environmental education guiding documents. An issues-based approach to curriculum contextualization in the context of the Eco-Schools programme has the potential to provide a suitable context for addressing some of the negative influences identified. It is also probable that some of these negative influences hinder other approaches and strategies aimed at addressing environmental issues, risks and associated sustainable development challenges in context.

5.2.6 Suggestions from teachers on how to overcome the negative influences on environmental education practice

There is growing need and value for teacher participation in democratic decision-making on issues pertaining to their practice as a sequel to this, teachers were given an opportunity to make suggestions on the best way to address the problems/negative influences to effective environmental education practice in schools during this study.

Recognising teachers as a source of technical expertise for the improvement of schools, advocates of enhanced professionalism have argued for increasing the authority of teachers over both school and classroom conditions (Sykes, 1990). Because teachers presumably possess substantive knowledge, technical expertise and first-hand knowledge of their students, they are well positioned to influence the

professionalisation of schools and to negotiate the complex work of instruction in the classroom (Sykes, 1990).

Genuine participatory decision making, can enhance workers' (in this case teachers') knowledge, reduce their isolation, imbue them with a sense of the whole, and ultimately transform the workplace (Sirianni, 1987 cited by Marks & Louis). Participation of this sort it is claimed empowers teachers to the extent that they develop means of engaging their students in more innovative ways in addressing environmental issues, risks and associated sustainable development challenges in the context of their communities.

To get teachers' suggestions on how to overcome negative influences on environmental education practice, 21 questionnaires were administered and 12 group interviews were conducted with teachers (see 4.2.1.2). 58 responses were received from the questionnaires and 37 responses from the group interviews.

The teachers' suggestions on how to address/overcome the negative influences/problems hindering effective environmental education practice in schools are categorized and summarized in Table 5.5 below.

Table 5.5: Teachers' responses on how to overcome the negative influences/problems to effective environmental education practice in Kenyan primary schools

Suggestions on how to address/overcome problems and negative influences to effective EE practice in schools	Individual Questionnaires	Rank	Group interviews	Rank
Training of teachers on EE (pre-service & in-service)/training of teachers on approaches and methods of EE/ EE seminars/sensitise teachers on EE/sensitise teachers on the guiding EE principles and philosophy	12	1	11	1
Start Eco-Schools programme/Initiate more EE programmes and activities in schools	9	2	4	4
Awareness creation on importance of EE to schools and communities/national campaigns on importance of EE	9	2	1	9
Provide enough teaching and learning resource materials for EE/Provide relevant EE materials	6	4	5	3
Emphasise/include EE in national	4	5	2	5

examinations/make EE examinable				
Allocate more time for EE	4	5	2	5
Provide funds for EE programmes and activities/Funding for EE	3	7	2	5
Address all the identified problems/negative influences to effective EE practice	3	7	8	2
Motivate teachers and learners involved in EE work/Award & reward EE innovations	2	9	2	5
Provide teachers with expert advice/regular visits to schools by environmental educators	2	9	0	10
Specify the objectives of EE separately in the school curriculum	2	9	0	10
Localize the EE curriculum and involve all stakeholders/Infuse EE at provincial level for all teachers to participate	2	9	0	10

The teachers overwhelmingly suggested that training of teachers on environmental education was the key to ensuring effective environmental education practice in schools. They preferred that the training in environmental education be conducted at both pre-service and in-service levels as well as through environmental education seminars and sensitisation sessions. The teachers further suggested that the teacher training should lay particular emphasis on environmental education approaches and methods as well as the underlying philosophical and guiding principles. This category received 12 responses from the questionnaires and 11 responses from the group interviews ranking 1st in both.

Initiation of environmental education programmes and activities was also identified as crucial to effective environmental education practice in schools. The teachers suggested that programmes such as the Eco-Schools programme should be initiated in schools due to their potential to enhance effective, transformative and holistic environmental education practice in schools. This category received 9 responses from the questionnaires, ranking 2nd alongside the category of responses that considered ‘awareness creation on the importance of environmental education to schools and communities as well as national campaigns for environmental education based on the importance of environmental education’. On the other hand, the former category received 4 responses from the group interviews ranking 4th while the latter received one response from the group interviews ranking 9th. This discrepancy could have been due to the timing of the question having been preceded by the question in

which most of the teachers were in agreement over the importance of environmental education.

Other suggestions made on how to overcome the negative influences/problems in effective environmental education practice in Kenyan schools included: Provision of adequate and relevant teaching and learning resource materials, allocating more time for environmental education in the curriculum, emphasising/including environmental education in the national examinations/making environmental education examinable, provision of funds for environmental education programmes and activities as well as motivation of teachers and learners involved in environmental education work, and awarding/rewarding environmental education innovations. Additionally, the teachers also suggested that teachers should be provided with continuous professional support and advice on environmental education by experts through regular visits to schools by environmental educators. It was also suggested that the goals, principles and objectives of environmental education should be distinctly specified in the school curriculum.

The other significant suggestion was that in which teachers suggested that the environmental education curriculum needs to be localised through the involvement of all stakeholders and the infusion and integration of local environmental concerns into the curriculum at the provincial level. The teachers claimed that this would allow full participation of teachers. This suggestion appeared to capture the spirit and interest of this study. Some teachers suggested that all the identified problems/negative influences to effective environmental education practice need to be addressed.

5.3 CONCLUSION

Owing to the purpose of phase 1 of this study whose findings have already been presented above, and the design of phase 2 of this study, it is apparent that the widely held conceptions of the terms environment and environmental education influence the scope and practice of environmental education. Despite the importance accorded to environmental education, the findings show that there is inadequate institutional support for teachers. Additionally, some aspects of environmental education practice and the prevailing view of curriculum potentially limit possibilities for innovations such as issues-based approaches to curriculum contextualisation. The key findings of

this survey are further integrated in the discussion in Chapter 7 guided by specific categories and analytical statements 1 and 2. In Chapter 6 I report on case studies of contextualising curriculum using issues-based approaches in four primary schools in Nyanza province of Kenya.

CHAPTER 6

ACTION RESEARCH CASE STUDIES

6.1 INTRODUCTION

The second phase of this study as presented in this chapter represents an exploration of the praxis of socially critical environmental education (education *for* the environment) through four case studies of contextualizing curricula using issues-based approaches. It represents an attempt to address issues in context through socially critical environmental education. The orienting theoretical framework for this thesis is informed by the assumptions and theoretical perspectives of socially critical environmental education (Fien, 1993a; see Chapter 3).

The action research case studies were guided by the critical research orientation owing to the main interest in the study, which was to help bring about transformation through the research process itself. As Lather (1986a) described critical research as a form of praxis, the lines between research/education/development were blurred in this phase of the study.

As indicated in Chapters 1 and 4, the action research case studies were conducted in Nyanza province of Kenya (see map in Figure 1.1) in four primary schools. The strategy was informed by the ecological, economic, and socio-cultural contexts of the schools and the environmental issues, risks and associated sustainable development challenges of concern coupled with the Eco-Schools contextual framework within which the study was situated (see section 3.5).

The case studies focused on the issues of poor waste management, water scarcity, poor water management, conservation and land degradation due to soil erosion, the issues of unsustainable agricultural practices, food insecurity and poverty as well as the issue of unmet energy needs.

The action research involved re-conceptualisation of the terms ‘environment’ and ‘environmental education’ (see 5.2.1 and 5.2.2), planning with teachers and integrating the issues in context into the curriculum as well as planning for actual issues-based interventions through micro-projects, executing the plans through whole

school development work, materials development as well as theoretical work on localizing/contextualizing curriculum.

Re-conceptualisation of the terms ‘environment’ and ‘environmental education’ involved one workshop while the actual integration of the issues into the curriculum and planning with teachers involved on average five workshops with teachers. This ensured adequate time for teachers to carry out baseline studies in the school and community to establish the real issues and their manifestations and identify opportunities for integrating them into their curriculum practice. Ideas for actual interventions through micro-projects were also generated and developed during the workshops. Subsequent workshops were aimed at actual integration of the issues and identifying relevant content and actions.

The whole-school approaches to curriculum contextualisation considered how all levels of school life such as: school governance, pedagogical approaches, actual issues-based interventions, resource management and school operations practices influenced curriculum approaches (Henderson & Tilbury, 2004:9). They also involved links and/or partnerships with the local community (*ibid.*).

The most critical findings from this chapter are further discussed in chapter seven guided by analytical statements 3 to 8.

6.2 RE-CONCEPTUALIZING THE TERMS ‘ENVIRONMENT’ AND ‘ENVIRONMENTAL EDUCATION’

Following the diverse and un-standardised definitions and understandings of the terms ‘environment’ and ‘environmental education’ (see 5.2.1 and 5.2.2) given by teachers in the first phase of the study, it was necessary to first establish a common understanding of the terms amongst the teachers in the case study schools before venturing into the action research process. To achieve this, a joint workshop was held to try and build a common understanding of the terms ‘environment’ and ‘environmental education’ among the participating teachers. The joint workshop brought together teachers from the four case study schools as well as those from eight other schools that were to implement the Eco-Schools programme in Kenya on a pilot basis.

•Moving towards a common conception of the term ‘environment’

Given the variety of conceptions of the term ‘environment’ (see 5.2.1) held by teachers across the country, it was deemed appropriate to build on and improve on these definitions as a way of coming up with a common understanding of the term ‘environment’. The participating teachers in this workshop were asked to give their conceptions of the term ‘environment’ as one of the activities. These definitions (see CR 6.1) were then compared to those that had earlier been received during the survey and the pattern was basically the same. The definitions were further broken down into key words and phrases (see 5.2.1) and these were used as conveyors of meaning during analysis.

To be all inclusive, a descriptive conception of the term ‘environment’ was agreed upon rather than one standard definition. It was further agreed that based on the widely held definition of the term ‘environment’ as all that surrounds us, this description was bound to change from place to place or from context to context. With guidance from the description provided in the Tbilisi principles of environmental education (UNESCO-UNEP, 1978) it was agreed that the term ‘environment’ should always be considered and described in its totality. This should include the natural and built, technological and social (economic, political, technological, cultural, historical, moral, aesthetic) aspects of the environment. Examples of elements of these aspects were to include living organisms and life support systems as well as the non-living things and other phenomena under the above categories in the surroundings. Case record (CR 6.2) shows an excerpt of a listing of the components of the environment that was used in coming up with the standardised definition of the term environment during the workshop.

Additionally, guided by the focus of this study i.e. issues-based approaches to curriculum contextualisation, it was further agreed that the term ‘environment’ shall also be looked at in terms of the prevailing environmental issues, risks and associated sustainable development challenges of concern in any given context.

•Moving towards a common conception of the term ‘environmental education’

Given the variety of conceptions of the term ‘environmental education’ (see 5.2.2) held by teachers across the country, and guided by the new found understanding of the term ‘environment’ and the need to work towards issues-based approaches to

curriculum contextualisation, it was thought necessary to gain a common working understanding of the term ‘environmental education’ amongst participating teachers. Teachers gave their current conceptions of environmental education (see CR 6.3) and these were later compared to those earlier received from the survey in phase 1 of the study and the same pattern was evident.

The definitions were further broken down into key words and phrases (as in 5.2.2) and these were used as conveyors of meaning during analysis. The key words and phrases were then synthesized into a descriptive definition of ‘environmental education’ that was adopted as the standardised conception. Case record (CR 6.4) shows some key words adopted by teachers as important in defining ‘environmental education’. These key words were related to those provided by other scholars and in key environmental education documents (see list of scholars and environmental education documents in CR 6.5).

Key components of the agreed upon conception of environmental education included the need to consider environmental education as a holistic approach involving all three domains of human development (cognitive, affective, and psychomotor). Additionally, it was agreed that environmental education should be looked at as about understanding political processes and creating political structures in order to be able to participate actively in decision making about environmental issues on a local, national and global scale.

Further, it was agreed that environmental education practice in schools should be guided by the Tbilisi principles of environmental education (UNESCO-UNEP, 1978) and the Principles of Environmental Education for Equitable and Sustainable Societies (UNCED, 1992). It was agreed that the goals of environmental education should be guided by the goals as set out in the Tbilisi principles (see CR 6.6). The objectives should also be guided by key components as set out in the Tbilisi objectives with due consideration of awareness, knowledge, attitudes, skills, and participation.

Most importantly, it was agreed that the critical curriculum theory of education *for* the environment be used as a guide to the new understanding of environmental education given its appropriateness to the challenge of the global environmental crisis (Fien, 1993:40). Education *for* the Environment as an ideological practice was

used in order to establish the characteristics by which environmental education practice and programmes can be scrutinised for their counter hegemonic potential (Fien, 1993:11). Insights gained from the scrutiny and analysis of environmental education practice in Kenya, were further used to identify and analyse defining characteristics of critical pedagogical practice in the context of environmental education practice in Kenya (Fien, 1993:12). Crucial to this study was the perspective that education *for* the environment emphasizes the development of a critical environmental consciousness based upon a holistic view of the environment as a totality of the interdependent relationship between natural and social systems. Case record (CR 6.7) shows an excerpt of notes taken during the workshop which reflect this discourse.

Further, the emphasis of education *for* the environment on the development of critical thinking and problem-solving skills through a variety of practical and interdisciplinary learning experiences which focus on real-world problems and involve the study of a wide range of sources and types of information was considered as a key factor in this study (Fien, 1993:12). Sections 6.3, 6.4, 6.5, and 6.6 that follow provide the case study accounts of curriculum contextualisation processes in the four primary schools in Nyanza province.

6.3 KOSAWO PRIMARY SCHOOL

6.3.1 About the school

Kosawo Primary School is located within Kisumu municipality in Kisumu district. It is surrounded by the informal settlements of Manyata. The area is mainly inhabited by the urban poor. The major issues of concern include the high poverty levels, poor waste management, poor sanitation and hygiene, as well as water contamination.

The selection of Kosawo Primary School for this study was informed by among others; the prevalence of environmental issues, risks and associated sustainable development challenges in the school and surrounding community, the potential success of micro-projects, the strategic location of the school and its apparent convenience to act as a demonstration centre for other schools and community members. This was with due consideration of factors such as accessibility and centrality. Additionally, the interest and enthusiasm of the teachers and the good prospects of a supportive school community as evidenced by the historical close

participation of community members in school activities and development projects influenced the selection of the school.

Poor waste management was found to be the most serious of the issues and was hence considered the key issue of focus in this study.

6.3.2 Planning phase for issues-based approach

The planning phase involved school environmental audits, prioritization of actions and action planning to guide implementation.

6.3.2.1 *Environmental auditing to identify issues*

The school environmental audit involved an assessment of the state of the environment in the school and the surrounding community. Due consideration was given to the prevalence of environmental issues, risks and associated sustainable development challenges in the school and surrounding. Resources and facilities in the school and community were also audited with a view to identifying the areas of weakness where improvements were necessary. The audit process also took cognizance of the five components of the Eco-Schools programme for purposes of building on existing structures and experiences. The guidelines used for environmental auditing are as shown in case record (CR 6.8).

With regard to prevalence of environmental issues, risks and associated sustainable development challenges, it emerged that poverty levels were significantly high in Kosawo. The waste menace was identified as most critical of the environmental issues. This linked closely with health risk resulting from poor sanitation. Inadequate and impure water supply was also found to be a critical risk in Kosawo. Additionally, environmental degradation was evident. This was largely attributed to overpopulation and low standards of living.

The waste audit revealed that large amounts (about 100 kilogrammes) of waste materials were generated daily. The waste materials included assorted types of bio-degradable and non-biodegradable waste. The bio-degradable waste matter was mainly composed of kitchen waste and other organic matter. Plastic bags formed the largest proportion of the non-biodegradable waste matter. Some scrap metal was also cited as a common form of non-biodegradable waste material in the area

The energy audit revealed that most families relied on charcoal and paraffin for domestic energy supply. Some houses, however, had electricity supply whose use was often limited to lighting and running of light electrical appliances.

The resource audit revealed that most of the people relied on very small acreages of land. This was found to be a major limiting factor for agricultural and other investments that require large acreages of land. The school compound was also quite small as compared to the high population of pupils. The relatively high population of pupils in the school had resulted in acute soil erosion with no vegetation on site. The dust from the bare loose soil was reported to be a major contributor to the eye infections that often affected the pupils.

Poor health was also identified as a major issue of concern. The health issues revolved around risks associated with poor sanitation and hygiene concerns, and water borne diseases that were attributed to contamination of water used for domestic purposes, as well as HIV/AIDS related complications. Despite the high prevalence of health issues, there were inadequate health facilities in the area. Other health concerns were found to be those often associated with poor living conditions such as poor nutrition.

The Eco-Schools components - related audit revealed that very few Eco-school related activities were on course in the school. In curriculum work, some ecological/biophysical concepts were evident in the curriculum. However, the content was presented more in the form of learning *about* and *in* the environment. A further probe into environmental education practice in the curriculum revealed limited adherence to the principles of environmental education.

No micro-projects had been initiated in the school except for an attempt to plant trees at the perimeter of the school compound to secure the school boundaries. Attempts to enhance school-community cooperation were evident through the involvement of local community notables in the running of the school through the school management committee.

With regard to formal networking, the school had not initiated any formal networking activities with defined objectives. The school only networked through routine school calendar activities such as sports, music and drama festivals.

Additionally, there was no formal school environmental policy in place. Some policy components were, however, reflected in some writings on the school walls that spelt out the school motto as well as advocating for good hygiene practices in the school. Case record (CR 6.9) shows the summarised environmental audit report of Kosawo Primary School.

6.3.2.2 Prioritization of actions, issues to address and action planning

As indicated above, the school environmental audit revealed a number of environmental issues, risks and associated sustainable development challenges that required urgent attention. However, all the issues could not be attended to at once. This called for prioritisation of the issues to be addressed. Out of necessity, the issue of poor waste management was identified as being top of the agenda. This was due to the gravity of the situation and to potential negative health impacts associated with poor waste management.

Action planning is critical to addressing issues of concern in a structured, efficient and effective manner. The action plan is the guiding document for implementation of curriculum contextualisation activities within an Eco-Schools framework (see 3.5.2.2)

The Kosawo Primary School action plan outlined a series of specific activities and targets to be implemented/achieved within a specified time so as to address the issue of poor waste management. The action plan listed the agreed environmental and sustainability objectives related to the issue of waste, along with deadlines and clear responsibilities. It also specified the persons responsible for the implementation of particular activities which together led to agreed environmental and sustainability improvements for the year. It was developed using the information from the environmental audit. The action plan closely linked with curriculum work. Case record (CR 6.10) shows the action plan for Kosawo Primary School. Key features of the action plan are; planned actions, reason or purpose for the planned action, planned activities, persons responsible and the timelines. The planned actions in Kosawo Primary School included: collecting and sorting of waste; composting of degradable waste to produce manure; routine clean-up exercises; and public awareness and education campaigns.

To ensure that all the activities and set targets are achieved, a monitoring and evaluation plan was developed. This involved a checklist which was reviewed on a monthly basis to ensure that the activities were implemented as planned.

6.3.2.3 Integration and infusion of local waste issues into curriculum planning

Incorporation of local waste issues into the curriculum took the approaches of infusion and integration of waste and related environmental concerns into the curriculum.

The first step involved the development of integration and infusion plans (see CR 6.11 and 6.12 respectively). The key features of the integration plan included: core message, plug-in point, classes and references. An exemplar integration plan excerpt with waste as the core issue of concern had waste auditing as the core message. The plug-in points were identified as the topic of: tables and graphs and sub-topics of tables, bar graphs, line graphs and pie charts. The designate class level was identified as class six and the suggested references included the syllabus and pupils' mathematics book for class six.

The integration approach involved bringing waste and other related environmental concepts into non-carrier subjects by way of combining the concepts touching on the waste theme with the content of the subjects. For example, in mathematics waste auditing was used to build mathematical skills as well as to address waste issues in the context of the school (school environment, home environment and community environment).

The infusion approach involved the incorporation of content and skills related to the issue of waste into existing subjects without jeopardizing the integrity of the subjects by respecting the integrity of both scope and sequence of the content and skills. It was applied in carrier subjects such as Science and Social Studies that had specific environmental content related to waste.

The integration and infusion plans were followed by integration and infusion into schemes of work to guide the lesson plans (See CR 6.13 – Teacher Scheme of Work (TSW) for class 6 Maths).

The schemes of work comprised of columns documenting: week, lesson number, topic and sub-topic, specific objectives, teachers' activities, learners' activities, teaching and learning resources, assessment as well as a column for remarks.

Examples of lesson plan excerpts from the scheme of work for class six Mathematics included the following:

Table 6.1: Excerpts of planned lessons from a teacher's scheme of work for class six Maths

	Lesson 1	Lesson 2
Topic	Graphs	Graphs
Sub-topic	Bar graphs	Bar graphs
Specific objectives	By the end of the lesson the learner should be able to present waste audit data on bar graphs	Read and interpret waste audit information from graphs
Teacher's activity	Guide the learners on how to present waste audit data on bar graphs	Guide learners on reading and interpreting waste audit information from graphs
Learners' activities	Learners practice how to present waste audit data on bar graphs	Practice to read bar graphs and interpret waste audit information from bar graphs
Teaching and learning resources	Mathematics text book for class six	Mathematics text book for class six
Assessment	Written exercises and oral exercises	Written exercises and oral exercises

The integration and infusion schemes of work were followed by integration and infusion into lesson plans (see CR 6.14 – An example of lesson plan).

The lesson plans outlined the topics, sub-topics, specific objectives, teaching and learning resources, as well as the order of presentation which included an introduction, lesson development and conclusion. This format is the standard one recommended by the Ministry of Education. However, it was modified during this study to allow for detailed engagement with issues in the process of curriculum contextualisation in the course of teaching and learning processes (see CR 6.14; Odeke, Otieno & Wabwire, 2006a:99-112 i.e. *Teachers' Guide for Upper Primary level* whose photocopied pages are presented as CR 6.15). The new features in the modified version included a specification of the issue, goals/objectives, class, potential subjects, curricular links, and related content topics from waste, learners' guide, activity site, teacher preparation, resources, procedure, assignments, extension work, assessment and ideas for extra-curricular activities.

One of the lessons plans from Kosawo Primary School had the topic as bar graphs and the specific objective was to present waste audit data on bar graphs. The teaching and learning resource materials included the class six mathematics textbook, graph books, drawing books, pencil and rubber. The first step in lesson presentation was introduction and 5 minutes were allocated to it. The teacher's activity was to give an overview of the types of waste generated in the school and explain the need to reduce, recycle or reduce waste in the school through a combination of explanations and question and answer session. The learners' activities during the introduction step were spelt out as listening to the explanation and answering the questions posed by the teacher.

Step 2 of this lesson was referred to as lesson development and 25 minutes were allocated to it. The teacher's activity was given as 'guide the learners on how to present waste audit data on bar graphs', while the learners activity was given as 'practice how to present waste audit data on bar graphs'.

The third and last step was referred to as conclusion and 5 minutes were allocated to it. The teacher's activity was given as 'recap by asking learners to reflect on the amount of waste generated in the school and ask them to think critically and creatively of how to effectively and efficiently manage waste in the school'. The learners' activity was spelt out as 'give their views on the seriousness of the waste issue in the school and give their opinions on how to effectively and efficiently address the issue of waste in the school and community'.

6.3.3 Whole-school development work and issues-based approaches

Following the revelation from the environmental audit that poor waste management was the main environmental issue of concern in Kosawo Primary School and the surrounding community, the Eco-Schools committee decided that it should be the main issue of focus in the Eco-Schools programme. The committee further decided to co-opt a local community notable who had been actively involved in waste management issues into the committee. Whole-school development work was looked at in terms of school governance, pedagogical approaches, actual issues-based interventions, resource management and school operations practices.

6.3.3.1 School governance

The issue of waste management became an important feature in school governance following the decision to have waste management as a central concern in the Eco-Schools programme. This led to waste management being discussed and deliberated upon in Eco-school committee meetings as well as in school management meetings.

In conformity with the Eco-Schools framework, the issue of waste management became the central feature in the school environmental policy (see Table 6.2 below), the eco-codes (see Table 6.3 below) as well as in the eco-school action plans (see CR 6.10).

- **School Environmental policy**

The school environmental policy for Kosawo included a vision, mission, and shared or agreed values that each member of the school community was to adhere to. The issue of waste featured prominently in all the components of the policy (see Table 6.2 below).

Table 6.2: The place of the ‘waste’ issue in the school environmental policy of Kosawo Primary School

The Kosawo Primary School environmental policy and the issue of waste
• Vision To have a clean and healthy environment • Mission statements Kosawo Primary School will endeavour to maintain cleanliness by ensuring that all members of the school community effectively and efficiently manage waste at home, school, community and work environments. • Shared values At all times, learners, teaching and non-teaching staff, and community will strive to: 1. Effectively and efficiently manage waste at school, home, community and work places. 2. Practice waste reduction, by introducing reusing and recycling alternatives in waste management. 3. Collect and separate waste as degradable and non-biodegradable and put it into different bins. 4. Promote composting as a way of waste recycling and use the compost in the school garden to save on cost of buying manure and fertilizer. 5. Promote public education and awareness on the need for a clean and safe environment.

- **Eco-codes**

On realising the need to promote effective and efficient waste management in the school and surrounding community, the learners in consultation with the teachers and the entire community continuously developed an additional set of rules, which were aimed at promoting a clean and healthy school and surrounding. Some of the eco-codes included the following (see Table 6.3 below). The eco-codes were used as a tool for operationalising and internalising the mission and shared values of the Kosawo Primary School environmental policy with regard to the issue of waste.

Table 6.3: Some of the eco-codes developed at Kosawo Primary School

Eco-codes	
•	No careless throwing of papers and other waste all over the compound
•	Waste material is wealth (<i>taka ni mali</i>)
•	No eating of food in the classrooms
•	All waste should be dumped at the appropriate dumping sites

The action plan (see CR 6.10) became an important tool for governance and addressing the issue of poor waste management in Kosawo Primary School. It specified actions and activities that needed to be carried out in a bid to enhance effective and efficient management of waste in the school and the surrounding community, giving time schedules and assigning roles and responsibilities.

6.3.3.2 Pedagogical approaches

The teachers of Kosawo Primary School tried out action-oriented and problem solving pedagogical approaches based on waste as the issue of concern, the key being an integrated waste management micro-project. Teachers from various subjects were able to contribute towards addressing the issue of poor waste management by following the *issues-based enquiry approach* advanced by Gough (1992) and Chambers (1995). This approach consisted of the following phases: planning; investigating and researching aspects of the theme and particular issues of concern; communicating and interpreting the results of the investigations; reflecting on the investigation, and taking action. It is, however, worth commenting that some teachers felt that this approach brought with it extra work. This was despite the

sensitisation workshops earlier conducted. Some of the pedagogical approaches employed by the teachers are discussed below.

- ***Pedagogical approaches in waste auditing***

Waste auditing activities were used to develop mathematical skills of addition and multiplication. Some of the enthusiastic teachers asked learners to keep track of all the waste material that was being generated and deposited in the litter bins from the various classrooms. They would then add these up to find out the total amount of waste generated in the school in a day. To approximate the total amount of waste generated in the school in one week, month, term and year, they would multiply the daily waste collection by the number of days then find out the product. Other addition and multiplication activities were also carried out using different variables. These activities were mainly carried out by some enthusiastic teachers who found it an interesting approach of linking Maths lessons with local waste issues.

- ***Pedagogical approaches in investigating and researching aspects of waste issues***

Investigating and researching aspects of waste issues in the school and community provided an opportunity for a wide variety of learner centred pedagogical approaches in Science and Social Studies. In some teaching and learning activities, the pupils for instance were asked to find out the types of waste materials often produced in their homes and community, how the waste matter was disposed of, who was responsible for waste disposal and management, as well as the common methods of waste management at home and community, then report back to the respective classes. In Science, the pupils were also guided to investigate and research some effects of poor waste disposal and management to human beings and other living things in the community giving specific examples such as health hazards resulting from pollution.

In Science, the issues of waste tied in well with topics on health education in which aspects of hygiene were investigated. Notable examples included cleanliness of personal items, cleaning of classrooms and compound and proper disposal of refuse. Other topics such as proper use of and cleaning latrines and toilets were also investigated and discussed in relation to good health.

- ***Pedagogical approaches in communicating and interpreting the results of the investigations***

The language subjects i.e. English and Swahili provided opportunities for communicating and interpreting results of the investigations while at the same time building the requisite language skills among the learners. Creative writing, listening and speaking, public speaking, debating, as well as poetry skills were used by some teachers as avenues for communicating and interpreting results of investigations into aspects of waste issues. For example, under creative writing, an English teacher engaged pupils in writing compositions, poems and short stories on topics related to the issues of poor waste management (see CR 6.16).

Under the topic of writing, some teachers engaged pupils in exercises aimed to enable them to communicate effectively in writing using a variety of sentence structures but on topics touching on the issue of waste. This was done through creative writing work involving poems, compositions, as well as dialogues. Aspects of institutional writing especially business letters were also included. A good example was an exercise given by a teacher to the pupils requiring them to write a business letter to the National Environment Management Authority complaining about poor waste management practices in Manyata slums where Kosawo Primary School is located (see CR 6.17).

Some language teachers gave exercises aimed at enhancing listening and speaking skills. Examples included sessions when learners were required to report back the findings of their investigations to the rest of the class. The pupils had the opportunity to respond appropriately to oral information on a variety of subjects as well as maintain acceptable communication skills through the guidance of the teachers.

Additionally, correct use of grammar was enhanced through exercises that required the use of knowledge of grammar to interpret information related to different aspects of waste issue from various sources. Extensive reading of simple literary and non-literary materials on contemporary waste issues was also encouraged by teachers through collection of newspaper articles on the issues of waste. These were then discussed and interpreted with the guidance of the teachers. A collection of some newspaper articles was kept in the deputy head teachers' (who was also the head of English department) cupboard for use by other teachers in the department.

Interpretation of the results of the investigations also gained from scientific skills. This was mainly through simple analysis of the effects of poor waste management to human health, and projections of likely effects of poor waste management both to humans and other living things now and in the future. These interpretations were also linked to other topics in Social Studies.

- ***Pedagogical approaches for reflecting on the investigations***

Reflection on the investigations took various forms in different subjects. However, no specific pedagogical accounts of reflection were captured. Reflection often resulted from post-presentation discussions guided by the teachers who had a keen interest in the Eco-Schools programme. The most significant reflections were guided by the focus of the Eco-Schools programme in Kosawo Primary School. Pupils in different classes contributed suggestions on the best approaches towards addressing the waste issues in context, with due regard to their causes. These included composting of biodegradable waste to produce manure and sorting and selling of plastic waste to recyclers.

Some Science teachers reported that learners, through the guidance of teachers, were able to realize and appreciate the fact that they could make some contribution towards addressing the waste issues by simply making some choices that could contribute to reduction, re-using as well as recycling of waste in the school, home and community. One of the key decisions they made was to avoid buying water, groceries, kerosene and other consumable products in thin gauge plastic bags that could be discarded almost immediately, but instead, go for durable containers that could be reused over and over again. This was out of the realization that thin gauge plastic bags constituted the largest proportion of waste in the school and community.

Other reflections in Social Studies, Business Education, Mathematics, Creative Arts as well as Science revolved around the need to enhance entrepreneurship in activities in waste management. This was greatly influenced by the Eco-Schools micro-project component in which entrepreneurship for poverty alleviation was emphasised. Simple innovations in waste management that could generate income for the school were encouraged.

The outcomes from classroom subject reflections were presented by some enthusiastic teachers to the Eco-Schools committee for consideration. Some learner

representatives in these committees also made some contributions to the Eco-Schools committee. It was confirmed that some of the reflections from classroom discussion (such as the need to initiate a composting micro-project for kitchen gardening) influenced the Eco-Schools decisions with regard to the development of the school environmental policies, eco-codes, action plans as well as elements of the integrated waste management micro-project and actual action interventions on the waste issues.

- ***Pedagogical approaches for taking action***

Action-oriented pedagogies directed at addressing the issues of poor waste management were employed in different subjects. Social Studies, Science and Creative Arts were quite useful in enhancing action as discussed below.

Science topics touching on properties of matter and health education were used by some teachers to emphasised proper refuse disposal in the school. Pupils were encouraged to practically sort all waste collected in the school into categories of degradable and non-biodegradable waste. These waste products were then deposited into specific yards in the waste collection area which was part of the integrated waste management micro-project. The science behind the classification of waste into degradable and non-biodegradable was elaborated on by the teachers but only to the requisite detail as per the school syllabi prescriptions (CR 6.18 shows the waste handling and sorting shed at Kosawo Primary School that was used for enhancing action taking pedagogies).

Follow up action involved composting of the degradable waste by different classes so as to get manure. The teachers helped in exploring and simplifying the science of decomposition for the learners to understand. The manure was used by each class to grow vegetables in class plots as part of the practical component of Agriculture. The vegetables were sold to teachers and the surrounding community and each class maintained an account of the proceeds from the sale of the vegetables. The record keeping and commodity-for-money transactions forming part of the enterprise constituted good practical lessons for business education topics. The entire process of growing vegetables for cash contributed to the development of entrepreneurship skills amongst the learners and the surrounding community (CR 6.19 shows the vegetable gardens at Kosawo Primary School).

Additionally, promoting the use of manure in kitchen gardening as opposed to chemical fertilisers was used as reference in topics touching on pollution in Science and Social Studies subjects. The economics of cash savings on inputs that accrue from using manure instead of buying chemical fertilisers was reported by some teachers to have formed interesting learning areas for business education as well as mathematics.

Non-biodegradable waste handling in Kosawo Primary School also provided interesting cross-curricular pedagogical linkages. These included aspects of action taking in practical collection and sorting of waste, selling of recyclable waste materials to waste dealers for cash, as well as making of musical and other instruments from some waste materials (CR 6.20 shows some of the recyclable waste materials in Kosawo ready for the market).

Creative Arts teachers used some waste materials to make musical instruments, ornaments and jewellery as a practical activity with the learners. These were displayed during the Eco-Schools exhibition day at Kosawo Primary School (see some photographs on CR 6.21). This was quite useful in developing creative art and craft skills among the learners, and also demonstrated that materials already declared to be of no further use can still be put into use.

As is evident from the discussion above, the integrated waste management micro-project was used by some enthusiastic teachers and learners in relevant subjects across the curriculum as a teaching and learning resource. Learners in classes five, six, seven, and eight were particularly reported by their teachers to have engaged in real practical activities that related to specific topics in the respective subjects. Much as the pedagogical engagements were reported to have been successful by some enthusiastic teachers, this could not have been without challenges of resistance and cold feet by some teachers who found it to be extra work for them. This was confided to me by the deputy head teacher who also rounded up as the Eco-Schools coordinator and head of English department.

6.3.4 Actual issues-based interventions, resource management and school operations practices

As indicated above, the issues-based approach to curriculum contextualisation in the context of the Eco-Schools programme in Kosawo Primary Schools focused on waste as the main issue of concern. This made a big contribution towards addressing the issue of poor waste management in Kosawo Primary School and in the surrounding community improving resource management as well as school operations and grounds (see CR 6.22 for the improved and clean school grounds of Kosawo Primary School).

The major achievement over the two and a half year period considered for this study was that, efficient and effective waste management was realised through adoption of best practices in waste management. This was as result of training as well as interaction with other experts in waste management who helped the school develop effective and efficient practices in waste management. The integrated waste management micro-project played a significant role in improving waste management in the school and the surrounding community by acting as a teaching and learning resource as well as a demonstration site. The micro-projects also led to an array of resultant interventions and improvements in aspects related to waste management. Consequently and over time, there was marked improvement in waste management in the school and surrounding community as reported by the teachers in the school and confirmed by the Kisumu District Environmental Officer.

The practice of sorting and separating waste into biodegradable and non-biodegradable waste made waste management easier. Additionally, biodegradable waste was composted to produce manure, part of which was sold for income and part of it used in the school garden for growing of vegetables for sale. The use of manure instead of chemical fertilizers also contributed to reduction of incidences of land and water pollution by chemical fertilisers.

The production of compost manure from waste also led to new ideas on how to utilise and manage the land resource in the school. Consequently, a piece of fallow land was fenced off and converted to a vegetable garden in July 2004 (see photograph in CR 6.19). A variety of both indigenous and traditional vegetables were grown in this garden with each class maintaining a section of the garden and keeping the proceeds in class accounts.

The non-biodegradable waste was sorted into various categories such as plastic, metals and glass. Companies and individuals dealing with recycling and reuse of these categories of waste were then sought and were welcome to purchase them from the school.

A notable outcome from this initiative was the reduction in the amount of thin gauge plastic papers in the school and community. This was largely attributed to the awareness and sensitization campaigns that were launched by the school. It was also noted by teachers that as a result of sensitization and education on waste management, the general hygiene conditions in the school showed a marked improvement.

There was also a marked improvement in the school grounds. A major school greening initiative was launched in August 2004 during which grass and trees were planted in sections of the school compound using the compost manure produced in the school on a rotational basis. Sections of the school compound were fenced off and grass and trees planted. Once the trees and grass were established, another section of the compound was again fenced off for purposes of establishing a grass cover and growing trees. This led to a major improvement of the school grounds which were initially bare, dusty and prone to erosion (see CR 6.22 for photographs of the greening initiative that led to the improved and clean school grounds).

The Kosawo Primary School initiative attracted the attention of other important stakeholders in waste management who then moved in to assist in addressing issues of waste management in Kosawo Primary School and in the surrounding Manyata slums. Some of the notable collaborators included the National Environment Management Authority (NEMA) District officer, who later requested the school to host an open day for other schools to learn from the success story of Kosawo Primary School. A local Community-Based Organization (CBO) called K- CORE whose core business had been waste management later partnered with Kosawo Primary School in waste management leading to major improvements. The school initiative also attracted the attention of other donors who were willing to support the school to further improve their waste management initiative. The school administration confirmed that the Nile Basin Initiative was one of the organisations that developed interest to work with the school on waste management issues.

Following the success story of Kosawo Primary School in enhancing entrepreneurship in waste management, other members of the community followed suit and started collecting valuable waste for sale to recyclers as an income generating activity. It was reported by teachers at Kosawo Primary School that, neighbouring schools such as Manyatta Primary School also ventured into waste management activities following in the footsteps of Kosawo Primary School. However, their major drive was reported to have been commercial. This led to some sort of competition that ultimately led to concerted efforts from multiple stakeholders towards addressing the issue of poor waste management in Kosawo Primary School and the surrounding community.

Through the process of curriculum contextualisation over a period of two years in Kosawo Primary School using the waste generated locally as the critical issue of concern and entry point, a number of associated issues, risks and associated sustainable development challenges were addressed as follows:

- Health concerns associated with poor waste management
- Poverty
- Sanitation, hygiene and school aesthetics challenges
- Nutrition/food insecurity concerns.

However, it is worth noting that the improvements and results realised in addressing the above issues cannot be claimed to have been the exclusive outcome of this study and the Eco-Schools project. This is because no definite controls were put in place during the study and it is therefore probable that other factors beyond the intervention and influence of this study and the Eco-Schools project would have made some contributions.

6.3.5 Links and/or partnerships with the local community around issues

Owing to the fact that waste issues and associated sustainable development challenges affected both the school and the surrounding community, it was deemed necessary that the school and surrounding community cooperate or partner in addressing the issues of poor waste management.

The Eco-Schools committee served as an important avenue for enhancing school community cooperation around issues. Members of the surrounding community were

represented in this committee and views and suggestions from the community on how to address the issue of poor waste management were considered by the Eco-Schools committee. A good example was the suggestion from the members of the community that the school and surrounding community launch monthly clean-up campaigns. Additionally, local community notables who were engaged in waste management and related enterprises were often invited to the school to offer technical advice and guidance on waste management. One notable example was that of a gentleman from a local community-based organisation K- CORE, who trained the teachers and the pupils on composting and also offered guidance on other aspects of waste management (see CR 6.23 for a photograph taken during one of the training sessions with a facilitator from K-CORE).

The school organised sensitisation and training seminars for members of the local community on appropriate approaches to waste management. The school invited guest facilitators with necessary expertise and experience to serve as facilitators during these seminars. It was acknowledged by the community representatives and teachers that, these sensitisation and training seminars helped provide knowledge as well as build the skills of community members on waste management. This made a significant contribution in promoting sound waste management practices in the school and surrounding community.

During the establishment of the integrated waste management micro-project in the school, members of the community made a contribution of up to about 30%. This was mainly in kind through volunteering time to work in the micro-project, as well as contributing materials for the construction of shades and fencing. This served to promote cooperation between the school and the community. Community members later on also brought in valuable waste materials that could be sold for recycling to the school. In so doing, they were helping in managing waste in the community as well as earning additional income for themselves. The school helped in finding a market for the recyclable waste thus acting as a marketing agent for the community members. This further helped in cementing the relationship between the school and the surrounding community.

Part of the school-community cooperation accord also required that members of the surrounding community voluntarily assist in taking care of the integrated waste management micro-project in the school during holidays and over weekends. This

saved the school a significant amount of money that would otherwise have been spent to hire private security. On their part, members of the community saw this as an opportunity to give back to the school in return for the good gesture of having been trained by the school on waste management. A community member from Kosawo Primary School community rightly said during the project evaluation session, thus:

Tunarudisha shukrani nyingi sana kwa shule ya Kosawo kwa kuleta hi mradi hapa. Imetusaidia sana kupata masomo na ujuzi ya usafi na kutengeneza pesa kutoka kwa takataka ambayo kitambo tulikuwa tumewachia tu waninja. Tutazidi kusaidiana na shule hata kama ni kulinda takataka yao ambayo wameweka tayari kwa kibanda ndio maninja wasiibe.

This translated to English reads:

We are very grateful to Kosawo Primary School for having started this project here. It has helped us learn and acquire skills on cleanliness and how to make money from waste, which we previously used to ignore and leave for the street boys (locally referred to as *ninjas*). We shall continue cooperating with the school even if it means offering security to the waste already collected and stored in the shed so that the street boys do not steal any.

School-community cooperation in addressing waste management issues was further enhanced by the school through fundraising initiatives for community groups who had gained knowledge and skills in waste management. Kosawo Primary School managed to raise ten thousand Kenyan shillings for a youth group which had been working closely with the school in the integrated waste management micro-project. The youth group was able to build a waste collection and sorting shed and replicated a similar initiative such as the integrated waste management micro-project in the school. This further improved waste management in the community as other youth groups followed suit.

The school also organised clean up campaigns and events in the community on a monthly basis, during which pupils and teachers cleaned up the surrounding Manyata slum area. This served to raise awareness on the need to manage waste efficiently and effectively. The cleanups made a big contribution towards improving cleanliness and waste management in the slum area (see CR 6.24 – photograph taken during one

of the clean-ups). Members of the community always joined the pupils and teachers during the clean ups and it later became routine for all members of the community to participate. This was after realising the importance of keeping their surroundings clean.

6.4 ST. JOSEPH'S OMBO PRIMARY SCHOOL

6.4.1 About the school

St. Joseph's Ombo Primary School is situated in Migori District in the southern part of Nyanza province. The poverty level in the district is estimated to be about 58% (see 2.2.3). The choice of St. Joseph's Ombo was influenced by the prevalence of environmental issues, risks, and associated sustainable development challenges in the school and community. The issues of greatest concern were water scarcity, poor water conservation, management and land degradation due to soil erosion. Further, the strategic location of the school and the potential to act as a demonstration centre for other schools and the surrounding community influenced the selection of the school.

6.4.2 Planning phase for issues-based approach

The planning phase involved school environmental audits, prioritization of actions and action planning to guide implementation.

6.4.2.1 Environmental auditing to identify issues of concern

Environmental auditing followed the same procedure as earlier described in the first case study (see 6.3.2.1).

With regard to prevalence of environmental issues, risks and associated sustainable development challenges, it emerged that poverty levels were significantly high in the vicinity of Ombo Primary School. The specific issues of concern included water scarcity occasioned by low and unreliable rainfall patterns as well as poor water management and conservation evidenced by lack of innovations to harvest rainwater for use during the dry spells. Soil erosion was also evidently serious as shown by the bare ground and gullies all over the school compound (see CR 6.25).

The waste audit revealed that fairly large amounts (an average of about 65 kilogrammes) of both biodegradable and non-biodegradable waste materials were

generated in the school and its immediate surroundings daily. The bio-degradable waste comprised of kitchen waste and other organic matter. Plastic bags formed the largest proportion of the non-biodegradable waste.

The energy audit revealed that most families relied on firewood, charcoal and kerosene for domestic energy supply although there was electricity supply in Migori town. Electricity use was often limited to lighting and running of light electrical appliances.

The resource audit revealed that the school had a reasonably large piece of land that could be put into productive use with reliable water supply. However, the sloped and ragged terrain was a negative factor that aggravated soil erosion leading to bare ground with very low vegetation cover. Some members of the community also owned large pieces of land which were not being put into agricultural use due to the low and unreliable rainfall.

Poor health was also identified as a major issue of concern. The health issues revolved around poor sanitation and hygiene concerns linked to poor water supply in the school for basic hygiene practices such as washing of hands after visiting the toilets, water borne diseases were attributed to contamination of water used for domestic purposes, as well as HIV/AIDS related complications.

The Eco-Schools components - related audit revealed that very few Eco-school related activities were on course in the school. In curriculum work, some ecological/biophysical concepts were evident in the curriculum. However, the content was presented more in the form of learning *about* and *in* the environment. Further probing into EE practice in the curriculum revealed limited adherence to the principles of environmental education.

No micro-projects targeting the critical issues of concern had been initiated in the school. Attempts to enhance school-community cooperation were evident through the involvement of local community notables in the running of the school through the school management committee.

With regard to formal networking, the school had not initiated any formal networking activities with defined objectives. The school only networked through

routine school calendar activities such as sports, music and drama festivals. Additionally, there was no formal school environmental policy in place. Case record (CR 6.26) shows the summarised environmental audit report of St. Joseph Ombo Primary School.

6.4.2.2 Prioritization of actions, issues to address and action planning

Out of necessity, the issues of water scarcity, poor water conservation and management and soil degradation due to erosion were prioritized for immediate action due to their seriousness as well as the need to demonstrate best practices to the surrounding community.

The *action plan* for St. Joseph's Ombo Primary School (see CR 6.27) was developed using the information from the environmental audit. The action plan closely linked with curriculum work. The main components of the action plan are as earlier described in the case of Kosawo Primary School (see 6.3.2.2) and the key planned actions included: rain water roof harvesting; drafting and operationalising a water use policy in the school; and erosion control in the school compound. Just as in the case of Kosawo Primary School (see 6.3.2.2), a monitoring and evaluation plan was developed to ensure that all the activities and set targets are achieved.

6.4.2.3 Integration and infusion of local issues of water scarcity, poor water conservation and management, and soil degradation due to erosion into curriculum planning

Incorporation of the above local issues and the associated sustainable development challenges into the curriculum took the approaches of infusion and integration. The first step involved the development of integration and infusion plans (see examples of plans in CR 6.11 and 6.12 respectively as earlier presented for the case of Kosawo primary school). An extract of the infusion plan from St. Josephs Ombo Primary School showed ways of controlling water pollution as the core message. The *plug-in* point was identified as the topic of water, which is covered in classes six to eight. The specific suitable plug-in point was identified as in- between the sub-topics: effects of water pollution on plants, animals, and on soils and the sub-topic : ways of conserving water as shown in CR 6.28.

The integration and infusion plans were followed by development of integration and infusion schemes of work and lesson planning to guide the teaching and learning processes (see CR 6.13 and CR 6.14 for the earlier examples and formats adopted).

Integration approach was applied in the case of non-carrier subjects that had limited or no outright opportunities for infusion such as Mathematics. An example of integration approach in the case of Mathematics involved the use of: water use auditing activities to build mathematical skills as well as address water wastage issues in the context of the school (school environment, home environment and community environment). The infusion approach was applied in carrier subjects that had content related to the issues of concern. Examples involved the incorporation of content and skills related to the concepts and issues of water scarcity, poor water conservation and management, and soil degradation due to erosion into existing subjects without jeopardizing the integrity of the subjects by respecting the integrity of both scope and sequence of the content and skills. Case record (CR 6.29) is an excerpt of an infusion scheme of work for class seven Science that shows infusion as applied at St. Joseph's Ombo Primary school.

Examples of lesson plan excerpts from the scheme of work included the following:

Table 6.4: Excerpts of a planned lesson from a teacher's scheme of work for class seven Science

	Lesson 1
Topic	Water
Sub-topic	Water pollution
Specific objectives	Define water pollution State how water gets polluted
Teacher's activity	Guide learners to state how water gets polluted (in addition to only guiding learners to define water pollution as originally stated)
Learners' activities	State how water gets polluted (in addition to simply discussing and defining water pollution)
Teaching and learning resources	Polluted water points or sources; tools and equipment; science text books)
Assessment	Oral tests, written questions and project evaluation.

In the scheme of work whose excerpt is presented in Table 6.4 above, it was interesting to note that the teaching and learning resource materials recommended

included polluted water points or sources as well as tools and equipment in addition to the Science text books. This provided an opportunity for real enquiry in the outdoors.

Follow up lessons as per the same scheme of work added an action component by considering the effects of water pollution and later practically exploring ways of controlling water pollution and ways of conserving water. This was to be done through demonstration activities by teachers and practical participation of learners in activities to control water pollution, and to conserve water at school, home or surrounding community. Learners were then expected to observe and record information while in the real sites where water issues were evident. They were then expected to reflect on, and appreciate the importance of conserving water and controlling water pollution (see CR 6.29). The recommended assessments involved oral tests, written questions as well as project/activity evaluation.

The integration and infusion schemes of work were followed by lesson plans, some of which were later improved on and presented as exemplar lesson plans in the Eco-Schools environmental education teachers' guide developed as one of the teacher resources for Eco-Schools in Kenya (see CR 6.30; Odeke, Otieno & Wabwire, 2006a: 50-52; 55-56).

One of the lesson plans (in CR 6.30) titled '*Water; every drop counts*' looked at the issue of misuse of water. The main objectives were to: identify ways through which water is misused, explore ways through which misuse of water can be minimised as well as develop positive attitudes towards minimising misuse of water. As part of teacher preparation, it was recommended that the teacher prepares a guide for establishing the amount of water used for different activities such as washing of hands after visiting the toilet, cleaning of classrooms, washing clothes at home, cleaning bodies, cleaning utensils, flushing toilets, activities involving spillage of water as well as running taps and leakages. The suggested teaching and learning resources included: containers used for storing water and cleaning classrooms, containers that spill water and those that do not as well as pictures and photographs of running taps while the water is not being used. The learner activities were to conform to the general guidelines as per method or approach adopted (see CR 6.31; Odeke, Otieno & Wabwire, 2006a:117-123).

The action component required that learners react to findings from the field visits or pictures or storylines and then suggest ways of reducing misuse of water through assignments such as essay and composition writing and where possible take necessary action to reduce misuse of water. Additionally, it was recommended that learners come up with policies for efficient and effective water management in the school. Assessments were to include oral and written examinations as well as project evaluation. Further, ideas for extra-curricular activities were suggested to include water audits, action projects as well as cultural activities touching on lifestyle habits (see CR 6.30).

6.4.3 Whole-school development work

The environmental audit at St. Josephs Ombo Primary School and the surrounding community revealed that the issues of water scarcity, poor management and conservation of water, and soil degradation due to erosion were the main environmental and sustainability issues of concern. This revelation led the Eco-Schools committee to decide that these would be the main issues of focus in the Eco-Schools programme. The committee further decided to co-opt some local community notables with knowledge, skills and expertise in these issues into the committee.

6.4.3.1 School governance

The issues of water scarcity, poor water conservation and management, and soil degradation due to erosion became important features in school governance following the decision to have them as central concerns in the Eco-Schools programme. This led to these issues being discussed and deliberated upon in Eco-school committee meetings as well as in school management meetings.

In conformity with the Eco-Schools framework, these issues featured prominently in the school environmental policy, the eco-codes as well as in the Eco-school action plans.

- ***The school environmental policy***

As a means of focusing attention and efforts to the issues of concern as prioritized by the school, these issues featured prominently in all the components of the school environmental policy as shown in Table 6.5 below.

Table 6.5: The place of the issues of concern in the school environmental policy of St. Josephs Ombo Primary School

• Vision A school community with a sense of commitment and will to conserve and use water wisely for sustainability. • Mission statement St. Josephs Ombo Primary School will endeavour to equip the school community (pupils, staff, parents and community representatives) with the necessary skills and knowledge that will enable them to take the necessary measures to conserve and use water wisely. • Shared values At all times, the pupils, staff and community will try to: 1. Efficiently use water resources and avoid wastage. 2. Channel all used water to the recycling tank for reuse. 3. Use water more wisely with the aim of conserving it. 4. Use containers instead of direct running taps when washing hands. 5. Manage and maintain the water sources e.g. tanks, more wisely. 6. Enforce rules on water use in the school for sustainability. 7. Improve the school grounds and control soil erosion by planting trees so as to increase the local water catchment. 8. Enhance cooperation and collaboration in the use of water resources with the local community. 9. Engage with good environmental practices aimed at protecting the water resources.
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- **Eco-codes**

On realising the need to address the issues of water scarcity, poor management and conservation of water, and soil degradation due to erosion in the school and surrounding community, the learners in consultation with the teachers and the entire community developed an additional set of rules, which were aimed at developing and internalising values and positive attitudes towards addressing the identified issues of concern. Some of the eco-codes included the following:

Table 6.6: Some of the eco-codes developed at St. Joseph's Ombo Primary School

ECO-CODES • Close all running taps when not in use • Do not drink water directly from the taps using your hands; use a cup instead • Water flower gardens only during dry seasons and early in the morning • Consider harvesting rainwater for future use • Recycle and reuse waste water from the kitchen or other sections of the school.

6.4.3.2 Pedagogical approaches

The teachers of St. Josephs Ombo Primary School tried out action-oriented and problem solving pedagogical approaches based on the issues of water scarcity, poor water management and conservation, and soil degradation due to erosion. The teachers adopted an issues-based enquiry approach. Some of the lesson plans developed by teachers with these issues as the focus and with provisions for various pedagogies were later improved on and included as part of exemplar lesson plans in the Eco-Schools Environmental Education Teachers' Guide (see CR 6.32; Odeke, Otieno & Wabwire, 2006a:47-56).

Using the Eco-Schools micro-projects - which included roof rainwater harvesting, a tree nursery and a soil erosion control and greening project – as teaching and learning resources, teachers from various subjects were able to contribute towards addressing the issues of water scarcity, poor conservation and management of water, and soil degradation due to erosion as follows:

The planning phase involved environmental auditing, prioritization of issues and actions, action planning as well as integrating the issues identified into the curriculum. Pedagogical approaches applied included cross-curricular activities for investigating and researching aspects of the issues in the school and community, communicating and interpreting the results of the investigations, reflecting on the investigations, as well as taking action. Some of the pedagogical approaches employed by the teachers are discussed below.

- ***Pedagogical approaches; auditing issues***

Environmental auditing activities were used by some teachers to develop mathematical skills of addition, subtraction, multiplication and division. The teachers and learners kept track of water use in the compound by taking note of approximate volumes used for different activities daily (see CR 6.33 for a copy of the records). This constituted water quantity auditing. They then computed approximate weekly, monthly as well as annual figures using mathematical skills. Rainfall days and patterns were also observed and recorded over time by some teachers and their learners (see CR 6.34), and mathematical skills of multiplication, division, addition and subtraction developed and used to make meaning out of the observed patterns in a bid to make conclusions on reliability or unreliability of rainfall. Some teachers

also reported to have worked out with their learners approximate levels of soil erosion as well as areas of land most affected. This was done using simple mathematical procedures which led to the development of mathematical skills in due course. However, only three out of the five Mathematics teachers were reported to have been enthusiastic enough to follow such procedures citing heavy workloads.

- ***Pedagogical approaches; investigation and research***

Investigating and researching aspects of the above issues in the school and community provided an opportunity for a wide variety of learner centred pedagogical approaches in Science, Social Studies, Mathematics, as well as Creative Arts. The pupils in classes six and seven for instance were asked to investigate rainfall patterns by simply taking note of the days when rain falls (see CR 6.34). Other activities involved finding out the common uses of water at home and which activities use the largest quantities of water at school, home and in the community.

Aspects of soil erosion were also investigated by both learners and teachers. This often involved looking out for areas of land seriously affected by soil erosion in the school compound and in the community. Possible causes of soil erosion and other factors that were aggravating the rate of soil erosion in these areas were explored by some teachers and their learners with the view of looking into ways of controlling soil erosion. These activities (see CR 6.35) comfortably fitted in agricultural topics in Science and Social Studies.

- ***Pedagogical approaches; communicating and interpreting results***

The language subjects i.e. English and Swahili provided opportunities for communicating and interpreting results of the investigations while at the same time being used by some teachers for building the requisite language skills among the learners. Creative writing, listening and speaking, public speaking, debating, as well as poetry skills were some of the avenues used by some teachers for communicating and interpreting results of investigations into aspects of issues of water scarcity, poor management and conservation of water, and soil degradation due to erosion.

Creative writing activities involved writing compositions and short stories on topics related to the issues of water scarcity, poor water management and conservation and soil degradation due to erosion. Some teachers also engaged pupils in exercises aimed at building their skills to communicate effectively in writing using a variety of

sentence structures but on topics touching on the issues identified (see CR 6.36 for some of the exercises given to the pupils).

Listening and speaking skills were also reported to have been enhanced during oral presentations by learners. An example reported by the English teacher for class six was one where pupils reported back the findings of their investigations to the rest of the class.

Through simple analysis of the effects and impacts of the issues by the teachers and their pupils, it is likely that the pupils could have gained some scientific skills involving interpretation of results from investigations. However, no exact accounts of this were reported by the teachers.

- ***Pedagogical approaches for reflecting on investigations***

Reflection on the investigations took various forms in different subjects. As in the previous case, no specific pedagogical accounts of reflection were captured, and reflection often resulted from post-presentation discussions guided by the teachers who had a keen interest in the Eco-Schools programme. The most significant reflections were guided by the focus of the Eco-Schools programme in St. Josephs Ombo Primary School and specifically the issues of concern. The Eco-Schools co-ordinator reported that pupils in different classes contributed suggestions on the best approaches towards addressing the issues of water scarcity, poor water management and conservation and soil degradation due to erosion in context, with due regard to their underlying causes. However, no specific written accounts of individual class reflection contributions were obtained nor singled out in the action plans since they were all integrated.

Some science teachers reported that learners through the guidance of teachers were able to realize and appreciate the fact that they could make some contribution towards addressing the issues. Suggestions made included putting in place measures that would lead to water conservation in the school. Examples cited included: centralised hand washing points with the right type of containers; micro-projects that would increase water supply in the school such as roof rainwater harvesting; soil erosion control initiatives such as planting of trees and grass as well as construction of terraces; and other initiatives that would enhance conservation of water catchments.

Other reflections in Social Studies, Business Education, Mathematics, Creative Arts as well as Science revolved around the need to enhance entrepreneurship through micro-projects that could address the issues of concern as well as earn the school extra income. A good example was the suggestion to establish a commercial tree nursery.

The outcomes from classroom subject reflections were presented to the Eco-Schools committee for consideration and these were reported by the Eco-Schools co-ordinator, to have contributed to and influenced the Eco-Schools decisions with regard to the development of the school environmental policies, eco-codes, action plans as well as the micro-projects and other interventions on the issues of concern.

- ***Pedagogical approaches for taking action***

Action-oriented pedagogies directed at addressing the issues of water scarcity, poor management and conservation of water, and soil degradation due to erosion were employed in different subjects. Social Studies, Science and Creative Arts were quite useful in enhancing action. The micro-projects initiated in the school through the Eco-Schools programme played an important role in enhancing pedagogical approaches for action taking. Some of the pedagogical activities undertaken in the various subjects are discussed below.

Science topics touching on soil and water conservation were used to promote action-taking through practical activities to restore the eroded section of the school grounds. The local soil and water conservation officers assisted the school by organising demonstrations as well as designing the appropriate erosion control measures given the school landscape. Practical sessions in Creative Arts were also used as opportunities for action-taking involving actual restoration of the eroded school grounds. Some of the practical work involved construction of gabions and terraces as well as planting of trees and grasses to provide vegetation cover. By the end of the first year, soil erosion had been checked and the school grounds transformed into a green beautiful compound from the bare ground that it initially was (see CR 6.37 for some photographs).

The roof rainwater harvesting micro-project also provided a good opportunity for enhancing action-taking pedagogical approaches. The need for roof rainwater

harvesting was emphasised in some lessons as one of the practical approaches of addressing the issue of water scarcity in the school. Creative Arts lessons related to woodwork, metalwork and masonry were then used to expose learners to practical work during the installation of the gutters and the water tank (see CR 6.38). Rainwater was harvested from the roofs whenever it rained. This contributed to the reduction of water run-off in the compound which had been reported to be aggravating the soil erosion problem in the school compound. The harvested rain water was used for various purposes in the compound including watering the tree seedlings, trees, grasses, washing, drinking, cooking as well as cleaning the toilets and classrooms. This as reported by the school administration saved the school a lot of time and money. Additionally, members of the community were also given an opportunity to occasionally fetch water from the school tanks.

As a long term contribution to the issue of low and unreliable rainfall, relevant lessons in Social Studies and Science were used by some teachers to emphasise the role of trees in the water cycle and rain formation specifically. This was put into practice through an elaborate tree nursery micro-project. The establishment of the tree nursery micro-project involved members of the community who often worked with the school to manage the tree nursery. Some local experts in the community who had knowledge and expertise in tree nursery management assisted the school in establishing the tree nursery (see CR 6.39). Various types of tree seedlings were raised and planted in the school compound as well as sold to the surrounding community at subsidised prices.

6.4.4 Actual issues-based interventions, resource management and school operations

The issues-based approach to curriculum contextualization in the context of the Eco-Schools programme in St. Josephs Ombo Primary Schools made a big contribution towards addressing the issues of water scarcity, poor management and conservation of water, and soil degradation due to erosion in the school as well as in the surrounding community. Within two years, soil erosion was controlled through establishment of a protective vegetation cover, reduction of rainwater run-off through harvesting, as well as construction of terraces. Water conservation and management was also enhanced through the efficient use of water (see CR 6.37).

The teaching and learning processes targeting the issues of concern integrated both theory and practice aimed at solving the issues. Micro-projects established served as

useful teaching and learning resources for demonstration purposes as well as actual interventions.

The Eco-Schools committee served as the final decision-making organ that prioritised actions and issues to be addressed by considering suggestions from learners, community members, teachers, parents as well as local notables. The Eco-Schools committee greatly improved school operations by expanding the democratic space through involvement of many stakeholders in the decision-making and running of the school.

Through the commercial tree nursery micro-project, the school earned additional income through the sale of tree seedlings to members of the community at subsidised prices. Members of the surrounding community were reported to have embarked on an elaborate tree planting venture using the advantage of locally available and cheap tree seedlings. This is reported by the teachers to have ultimately led to improved aesthetics, greening and beautification of the school compound and surrounding.

It was anticipated by the teachers that the fruit trees produced in the school nursery would in the future contribute to improved nutrition both in the school and community. The trees planted as a result of the tree nursery would also help to reduce incidence of soil erosion by providing a thick vegetation cover. Further to this, they would make a contribution by positively influencing rainfall patterns and reliability in the long term through their contribution to the hydrological cycle. Additionally, it was anticipated by the teachers that, other forest products such as wood fuel and timber would become more easily accessible following the elaborate tree planting campaign initiated by the school. This would further reduce strain on the already existing natural resources.

Water management and conservation was also improved through the roof rainwater harvesting initiative. Water that would otherwise go to waste as run-off could now be harvested and stored in reservoirs for future use.

Through the process of curriculum contextualisation in St. Josephs Ombo Primary School using the issues of water scarcity, poor management and conservation of water, and soil degradation due to erosion as the focus and entry points, a number of

other issues, risks and associated sustainable development challenges were addressed as follows:

- Poverty: addressed partially through initiation of income generating activities in the school and community.
- Sanitation, hygiene and school aesthetics challenges: addressed partially through provision of water from the roof rainwater harvesting initiative.
- School-community conflicts borne out of trespassing into the school compound, illegal grazing in the school compound and theft of school property including tree seedlings: addressed partially through mutual engagement of the school and community in the whole enterprise.
- Nutrition/food insecurity concerns: addressed partially through the fruit tree seedlings that were produced in the school nursery and sold to the local community at subsidized rates.
- Flooding in and around the school compound during the rainy seasons: partially checked through the erosion control measures.
- Simple accidents that were caused by the erosion gullies in the school compound and play ground were reduced through the erosion control measures.

6.4.5 Links and/or partnerships with the local community

The Eco-Schools committee served as an important avenue for enhancing school community cooperation around the issues of concern. Members of the surrounding community were represented in this committee and views and suggestions from the community on how to address the issues of water scarcity, poor management and conservation of water, and soil degradation due to erosion were considered by the Eco-Schools committee. Additionally, local community notables with knowledge and expertise in addressing the issues were invited to offer technical advice and guidance on the best approaches to addressing the issues. Examples included the local soil and water conservation officer who assisted the school in designing the most effective erosion control measures in the school, the local forest officer and a local entrepreneur who assisted the school in establishing the commercial tree nursery, as well as the local water engineer and an artisan who assisted the school in designing the roof rainwater harvesting project including calibration and estimation of the desirable gutters, pipe and tank sizes. The artisan with the assistance of local volunteers from the community assisted in the actual construction work.

The sensitization and training seminars organised by the school for members of the local and school community on appropriate approaches – both long term and short term - to addressing the issues of concern served to promote the spirit of partnership and created the need for collaborative efforts between the school and community in addressing the issues of water scarcity, poor management and conservation of water, and soil degradation due to erosion. Additionally, it is probable that the knowledge and skills gained during these sensitisation and training seminars would have helped to enhance best practices in addressing these issues of concern.

Members of the community also made a contribution of about 30% towards the establishment of micro-projects in the school. This was mainly in kind through volunteering time to work in the micro-projects, as well as contributing materials for the establishment of the micro-projects in return for some favours and privileges from the school as earlier described.

Part of the school-community cooperation accord also required that members of the surrounding community voluntarily assist in taking care of the micro-projects in the school during holidays and over weekends. This could have been motivated by the good gesture extended by the school to have them trained and sensitised on elements related to the issues of concern and focus. Consequently, it was reported by the teachers that a member of the community was employed as a caretaker of the micro-projects and was paid some income which was much less than would have been spent to hire private security.

It is worth noting here that, some of the issue-based interventions (especially those that occurred in the surrounding community) reported in this account could not be authoritatively verified during this study owing to some limitations and constraints in this study. These limitations included: inadequate time and finances for follow up and monitoring activities in the community. As such, I had to rely on secondary accounts from teachers who lived in the community. This explains the (rather passive) reporting style that I have used in some cases above, in this account.

6.5 KANDIEGE PRIMARY SCHOOL AND THE ISSUES OF UNSUSTAINABLE AGRICULTURAL PRACTICES, FOOD INSECURITY AND POVERTY

6.5.1 About the school

Kandiego Primary School is located in vast dry areas of mid-Nyando basin close to the wetlands of Lake Victoria. The school falls within Nyando district whose poverty level is rated at 54% (see 2.2.3). The key environmental issues, risks, and associated sustainable development concerns revolve around unsustainable agriculture, food insecurity and poverty. These issues are mainly caused by low and unreliable rainfall as well as poor soils. The school was also considered for the study because of its strategic location that makes it suitable to act as a demonstration centre for other schools and community groups.

6.5.2 Planning phase for issues-based approach

The planning phase involved school environmental audits, prioritization of actions and action planning to guide implementation.

6.5.2.1 *Environmental auditing to identify issues of concern*

Environmental auditing followed the same procedure as earlier described in the first case study (see 6.3.2.1).

With regard to prevalence of environmental issues, risks and associated sustainable development challenges, it emerged that poverty levels were significantly high in Kandiego Primary School and its environs. The specific issues of concern included water scarcity occasioned by low and unreliable rainfall patterns as well as poor soils with poor water retention capacity. This is characterized by very dry spells that can hardly support agricultural practices hence unsustainable agriculture leading to food insecurity. There were no innovations for water conservation in the area. This led farmers to practice peasant farming that was confined to the short rain seasons. This condition was reported by the resident teachers to have contributed to persistence of poverty.

The waste audit revealed that substantial amounts of biodegradable waste products comprising kitchen waste and other organic matter was generated in the school. Some non-biodegradable waste products mainly plastic bags were also generated in the school and its surroundings.

The energy audit revealed that most families relied on firewood and kerosene for domestic energy supply. Firewood was mainly used for cooking and kerosene for lighting.

The resource audit revealed that the school had a relatively small piece of land. This could however be put into horticultural crop production through micro-irrigation. Some members of the community around the school, however, owned large pieces of land which were fallow most of the year and hence could be leased to the school for agricultural use. The major health issues of concern revolved around malnutrition disorders and the HIV/AIDS pandemic.

The Eco-Schools components-related audit revealed that very few Eco-school related activities were on course in the school. In curriculum work, some ecological/biophysical concepts were evident in the curriculum. However, the content like in the previous two cases was presented more in the form of learning *about* and *in* the environment. A further probe into environmental education practice in the curriculum revealed limited adherence to the principles of environmental education.

The audit further revealed that no micro-projects targeting the critical issues of concern had been initiated in the school. However, attempts to enhance school-community cooperation were evident through the involvement of local community notables in the running of the school through the school management committee.

With regard to formal networking, the school had not initiated any formal networking activities with defined objectives. The school only networked through routine school calendar activities such as sports, music and drama festivals. Additionally, there was no formal school environmental policy in place (CR 6.40 shows the summarised environmental audit report of Kandiego Primary School).

6.5.2.2 Prioritization of actions, issues to address, and action planning

After the audit, the issues of unsustainable agriculture, food insecurity and poverty were prioritized for immediate action after consultations and thorough consideration of various factors. The factors considered included the current state of affairs with regard to the issues and the apparent need and urgency to take action.

The *action plan* for Kandiege Primary School (see CR 6.41) just as in the previous two cases was developed using the information from the environmental audit. The action plan closely linked with curriculum work. The main components of the action plan are as earlier described in the first case of Kosawo Primary School (see 6.3.2.2) and the key planned actions included: establishing horticultural and maize farms; and organising open days to educate the members of the school, community and other neighbouring schools on possible practical, innovative and sustainable farming methods in context. A monitoring and evaluation plan was developed just as in the first two cases to ensure that all the activities and set targets are achieved.

6.5.2.3 Integration and infusion of local issues of unsustainable agricultural practices, food insecurity and poverty in context into curriculum planning

Incorporation of the above local issues into the curriculum took the approaches of infusion and integration. The discussion below summarizes the process of curriculum contextualisation using issues-based approaches in Kandiege Primary School.

The integration approach involved bringing issues and related concepts of unsustainable agricultural practices, food insecurity and poverty in context into non-carrier subjects by way of combining them with the content of the subjects.

The first step involved the development of integration and infusion plans (see examples of plans in CR 6.11 and 6.12 respectively as earlier presented for the case of Kosawo Primary School). This was followed by development of integration and infusion schemes of work and lesson plans to guide the teaching and learning processes. The key features of these plans were as discussed in case studies 1 and 2 (see 6.3.2.3 and 6.4.2.3).

For example, in Mathematics auditing activities involving finding out of the average daily family expenditure were used by some teachers to build mathematical skills as well as estimate poverty levels by establishing the number of families that were surviving on less than a dollar a day.

Infusion involved the incorporation of content and skills related to the concepts and issues of unsustainable agricultural practices, food insecurity and poverty into existing subjects without jeopardizing the integrity of the subjects by respecting the integrity of both scope and sequence of the content and skills. It was applied in

carrier subjects that had specific environmental and sustainability content related to the issues of concern. This was done by first identifying the suitable plug-in points where local issues could fit into the curriculum. Reference was then made to local examples, cases and sites (see CR 6.12 for an example of the infusion plan).

The integration and infusion plans were followed by development of integration and infusion schemes of work and lesson planning to guide the teaching and learning processes.

An extract of a scheme of work for class seven Science (described below) shows evidence of integration of the issue of unsustainable farming practices into teaching and learning processes. The objectives of one of the planned lesson were to: explain the meaning of unsustainable farming practices, identify different examples of unsustainable farming practices as well as carry out sustainable farming practices. The teaching and learning resources were spelt out to include: a model farm/school farm, a resource person such as a farmer who practices sustainable farming, farming tools and equipment as well as relevant reference texts.

The integration and infusion schemes of work were followed by integration and infusion lesson plans some of which were later improved on and presented as exemplar lesson plans in the Eco-Schools environmental education teachers' guide developed as one of the teacher resources for Eco-Schools in Kenya (see CR 6.42 and CR 6.43; Odeke, Otieno & Wabwire, 2006a:84-86; 88-89). The key features of the lesson plans were as earlier described in case study 1 (see 6.3.2.3).

One of the lesson plans (in CR 6.42) titled '*Rich soils; bumpy harvest*', looked at the issue of soil infertility. The main objectives for this activity were to: identify factors and practices that contribute to soil infertility as well as to carry out measures to control soil infertility or restore soil fertility. The suggested teaching and learning resources included: sample crops from fertile and infertile soils, different soil samples, organic manures and inorganic fertilizers, photographs illustrating crops in infertile and fertile soils, relevant tools and equipment, the school farm as well as appropriate reading materials. As part of teacher preparation, this activity recommended that the teacher should consider options such as: organising practical activities that can determine and control soil infertility, organise for appropriate teaching and learning resources in the real environment such as crops growing in

infertile and fertile soils as well as identify or prepare for appropriate sites for the learners' activities (see CR 6.42).

The suggested extension activities included getting learners to prepare samples of organic manure such as compost and farmyard manure for use in the school farm. This activity was to be assessed as project work. The suggested ideas for extra-curricular activities included encouraging learners to participate in soil improvement activities in their homes and community as well as organising learners to have demonstration stands showing soil improvement practices at the local agricultural society of Kenya shows and exhibitions (see CR 6.42).

6.5.3 Whole-school development work

The environmental audit at Kandiege Primary School and the surrounding community revealed that the issues of unsustainable agricultural practices, food insecurity and poverty were the main environmental and sustainability issues of concern (see CR 6.40). This led the Eco-Schools committee to focus on these issues in the Eco-Schools programme. The committee co-opted some local community notables with knowledge, skills and expertise on these issues.

6.5.3.1 School governance

The issues of unsustainable agricultural practices, food insecurity and poverty became important features in school governance following the decision to have them as central concerns in the Eco-Schools programme. This led to these issues being discussed and deliberated upon in Eco-school committee meetings as well as in school management meetings (see CR 6.44 for an excerpt of minutes).

In conformity with the Eco-Schools framework, these issues featured prominently in the school environmental policy, the eco-codes as well as in the Eco-school action plans.

- ***The school environmental policy of Kandiege Primary School and the issues of unsustainable agricultural practices, food insecurity and poverty***

As a means of focusing attention and efforts to the issues of concern as prioritized by the school, these issues featured prominently in all the components of the school environmental policy, as shown in Table 6.7 below.

Table 6.7: The place of the issues of concern in the school environmental policy of Kandiege Primary School

• Vision A prosperous and wealthy school community with adequate, secure and sustainable food reserves. • Mission statement Kandiege Primary School community will strive to work towards prosperity, wealth and food security through sustainable agricultural farming practices in the school and community. • Shared values At all times, the pupils, staff and community will strive to: 1. Promote sustainable farming practices in the school and community. 2. Efficiently and effectively use available land resources for food production. 3. Practice sustainable commercial farming for income generation. 4. Explore ways of ensuring continuous production of high value horticultural crops even during the dry seasons. 5. Ensure adequate and sustainable food production. 6. All the fallow land - except the play ground - in the school compound should be converted into farmland for production of horticultural and other food crops.
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• ***Eco-codes as a tool for operationalizing and internalizing the mission and shared values of the school environmental policy***

On realising the need to address the issues of unsustainable agricultural practices, food insecurity and poverty in the school and surrounding community, the learners in consultation with the teachers and the entire community developed some additional sets of guidelines and rules, with the aim of developing and internalizing values and positive attitudes towards addressing the identified issues of concern. Some of the eco-codes included the following (see Table 6.8 below):

Table 6.8 – Some of the eco-codes developed at Kandiege Primary School

Eco-codes • Farming is wealth (<i>ukulima ni mali</i>). • Sustainable farming for good life (<i>ukulima bora ni maisha bora</i>). • Deposit all compostable waste materials into the composting area for production of manure. • Sustainable farming for adequate food (<i>ukulima bora kwa chakula kingi</i>) • No trespassing in the school farm.

6.5.3.2 Pedagogical approaches

The teachers at Kandiego Primary School tried out action-oriented and problem solving pedagogical approaches based on the issues of unsustainable agricultural practices, food insecurity and poverty in the school and surrounding community. The pedagogical approaches were guided by the *issues-based enquiry approach* advanced by Gough (1992) and Chambers (1995). Some of the lesson plans developed by teachers with these issues as the focus and with provisions for various pedagogies were later improved on and included as part of exemplar lesson plans in the Eco-Schools Environmental Education Teachers' Guide developed as one of the teacher resources for Eco-Schools in Kenya (See CR 6.42 and 6.43; Odeke, Otieno & Wabwire, 2006a:84-89)

Using the Eco-Schools *micro-projects* - which included horticultural farming, a fruit tree nursery, and cereal crop (maize) production - as teaching and learning resources, teachers from various subjects were able to contribute towards addressing the issues of unsustainable agricultural practices, food insecurity and poverty in the school and surrounding community by extension.

The planning phase for the pedagogical approaches involved environmental auditing, prioritization of issues and actions, action planning as well as integrating issues of unsustainable agricultural practices, food insecurity and poverty in the school and surrounding community into the curriculum. To effectively contribute towards addressing these issues in the course of teaching and learning, appropriate pedagogical approaches were applied. These involved cross-curricular activities for investigating and researching aspects of the issues in the school and community, communicating and interpreting the results of the investigations, reflecting on the investigations, as well as taking action. Some of the pedagogical approaches employed by the teachers are discussed below.

- ***Pedagogical approaches: auditing issues***

Environmental auditing activities were used by some teachers to develop mathematical skills of addition, subtraction, multiplication, and division. The teachers and learners sought to estimate poverty levels in the community by asking learners to find out the average daily family expenditure in their homes. The learners in class seven were asked to keep track of daily family expenses for a week or a month then add this up to get the sum total of weekly expenses (see CR 6.45). This

was then divided by seven i.e. the number of days in a week of by the number of days in that particular month to find out the average daily expenditure. This average daily expenditure was then compared to the United Nations poverty line of 1 dollar per day, and the number of people living below the poverty line in the community was estimated.

Other auditing activities used by teachers to develop mathematical skills involved estimations of the amount of food harvested per season in the various households and how long it sustained the families before resorting to buying additional food supplies. The teachers reported that in so doing, learners were able to learn concepts of food insecurity by inference. The class seven Maths teacher described an inference example that he had used as follows: In cases where the food harvested could not sustain the family through to the next harvest, it was inferred that these particular households suffered from food insecurity. Average figures from households in the community were then used to find the general status of the community with regard to food security and conclusions made as to whether the community was suffering from food insecurity or not.

Additionally, another teacher described an integrated example involving auditing of the common agricultural practices in the community as follows: It involved finding out the productivity of the practices in terms of output per unit area of land. The harvest and estimated value in farms where simple inter-cropping of maize and beans was practiced was compared to that of farms which practiced mono-cropping of say only maize or beans alone per season. The monetary values of the harvests were then calculated and the efficiency in terms of profitability per unit area when either inter-cropping or mono-cropping was practiced was worked out using simple mathematical procedures. The teacher explained that in the process, the pupils' mathematical skills were developed and that their attitudes and values towards the need to adopt practices such as inter-cropping for food security and higher profits could have been positively influenced.

- ***Pedagogical approaches; investigation and research***

Investigating and researching aspects of the above issues in the school and community provided an opportunity for a wide variety of learner centred pedagogical approaches in Science, Social Studies, Mathematics, as well as Creative Arts. The pupils, with the guidance of the teachers, for instance investigated the common

farming practices in the community. Some of the investigations involved finding out the common land use practices in terms of intensive or extensive use of land. This entailed finding out the extent to which inter-cropping and mono-cropping was practiced in the community, the extent to which zero-grazing or free-range practices were used in livestock rearing among others (CR 6.46 shows some of the research questions as used in the teaching and learning process). Follow-up activities involved finding out the efficiency of the practices with regard to land acreage requirements, outputs per unit areas of land, profitability with regard to the monetary values of harvests/outputs from unit areas of land among others.

Investigations of agricultural practices also involved establishing the common inputs or factors of production – such as fertilisers, seeds and labour used in agricultural production. According to the teachers, this was done with the view of looking at alternative approaches to minimising inputs and costs while maximising outputs and profits. The investigations aimed to explore possibilities of promoting organic farming practices through for instance encouraging the use of manure as opposed to chemical fertilisers (see CR 6.46 for the research questions used).

The levels of food insecurity and poverty in the school and community were also investigated and researched through auditing activities as described in the section above. The relationships between issues of unsustainable agricultural practices, food insecurity and poverty were also explored by some enthusiastic teachers through cross-curricular activities in Science, Social Studies, as well as Mathematics. A good example given by the headmaster was: the investigation of how mono-cropping led to under-utilization of land, labour and other inputs leading to low returns and enhancing food insecurity and poverty. On the other hand, inter-cropping ensured effective and efficient utilization of land and other factors of production leading to higher returns per unit area. These translated to an adequate and a variety of food production leading to food security as well as potential for poverty alleviation through sales of surplus produce for income.

- ***Pedagogical approaches: communicating and interpreting results***

The language subjects i.e. English and Swahili provided opportunities for communicating and interpreting results of the investigations while at the same time building the requisite language skills among the learners. Creative writing, listening and speaking, public speaking and debating were cited by the language teachers to

have been used as avenues for communicating and interpreting results of investigations into aspects of issues of unsustainable agricultural practices, food insecurity and poverty.

Creative writing activities involved writing compositions and real short stories on topics related to the issues of unsustainable agricultural practices, food insecurity and poverty. Pupils also engaged in exercises aimed at building their skills to communicate effectively in writing using a variety of sentence structures but on topics touching on these issues. Most of the creative writing work involved composition writing (CR 6.47 – shows a collection of some exercises given to the pupils).

Listening and speaking skills were also reported by the teachers to have been enhanced during sessions when learners were required to report back the findings of their investigations to the rest of the class.

Additionally, correct use of grammar was enhanced through exercises that required the use of knowledge of grammar to interpret information related to different aspects of issues of unsustainable agricultural practices, food insecurity and poverty from various sources. A good example was an activity in which class five pupils were asked to describe in short sentences the common types of food they eat at home, the source of this food and how often they ate this food (see CR 6.48).

Simple analysis of the effects and impacts of unsustainable agricultural practices, food insecurity and poverty on the lives of the people in the community, were cited as some of the scientific skills that contributed to interpretation of the results of the investigations. An example given by the class eight Science teacher involved: Going through case study discussions touching on instances of poor/unsustainable farming practices, and how they contributed to food insecurity and enhanced poverty. This was then followed by exploration of future anticipated unfavourable effects with due consideration of the rapid increase in population. Additionally, appropriate remedial measures with regard to adoption of sustainable farming practices were explored as options for the near future. These interpretations were closely linked to agricultural topics in Science and Social Studies (CR 6.49 shows the activity developed by the Science teacher for class eight pupils).

- ***Pedagogical approaches: reflecting on investigations***

Reflection on the investigations was reported to have taken various forms in different subjects. However, no specific pedagogical accounts of reflection were captured in this case just like in the previous two. The teachers reported that reflection resulted from post-presentation discussions guided by the teachers who had a keen interest in the Eco-Schools programme. The most significant reflections were reported (by the teachers) to have been guided by the focus of the Eco-Schools programme in Kandiego Primary School, and specifically the issues of unsustainable agricultural practices, food insecurity and poverty. The Eco-Schools coordinator reported that, pupils in classes six, seven and eight contributed some useful suggestions on the best approaches towards addressing these issues, with due regard to their underlying causes.

Some teachers reported that through their guidance, pupils were able to realize and appreciate the fact that their individual contributions towards addressing the issues of concern would make some significant difference. Additionally, it was reported by some teachers that some pupils realised and intimated to them that; efforts by their families and those of other members of the community towards addressing the issues of unsustainable agricultural practices, food insecurity and poverty would result in a prosperous community. Suggestions made included promoting sustainable agricultural practices that would lead to lower costs of production and higher yields. The specific suggested practices included use of manure instead of expensive commercial fertilizers, practicing micro-irrigation to ensure continuous production of horticultural produce such as fruits and vegetables for both subsistence and commercial purposes, practicing inter-cropping to ensure intensive use of land resources and labour, soil erosion control among others.

Reflections in other subject topics such as Business Education, Mathematics, Creative Arts, Social Studies as well as Science were reported by teachers to have revolved around the need to enhance entrepreneurship through micro-projects that could address the issues of concern as well as earn the school and community extra income. However, no tangible evidence was received to support this.

Outcomes from classroom subject reflections were presented to the Eco-Schools committee for consideration and some of them were reported by the Eco-Schools coordinator to have influenced the Eco-Schools decisions with regard to the

development of the school environmental policies, eco-codes, action plans as well as the micro-projects and other interventions on the issues of concern (CR 6.50 shows an extract of field notes taken during an informal discussion with teachers during one of the visits to Kandiege Primary School).

- ***Pedagogical approaches for taking action***

Action-oriented pedagogies directed at addressing the issues of unsustainable agricultural practices, food insecurity and poverty were employed in different subjects. Social Studies, Science and Creative Arts were quite useful in enhancing action. The *micro-projects* initiated in the school through the Eco-Schools programme played an important role in enhancing pedagogical approaches for action taking. Some of the pedagogical activities undertaken in the various subjects are discussed below.

Agricultural topics in Science and Social Studies were used to promote action taking through practical activities in the school farm where horticultural crops such as assorted vegetables, tomatoes, onions and fruits were grown. Maize and beans were also grown on the school farm and on the adjacent farms which were leased from the members of the community. The learners were involved in activities such as planting, watering, weed control, pruning, disease and pest control, mulching, as well as harvesting (see CR 6.51). The local agricultural extension officer was very cooperative and assisted the school in organising demonstrations on best practices in sustainable farming for both the pupils and members of the community. Practical sessions in creative arts were also reported by the teachers to have been used as opportunities for action-taking pedagogies. This involved activities such as construction of nursery bed sheds and storage sheds.

Marketing of farm produce was also used by some teachers as an opportunity for enhancing action-taking pedagogies. The pupils, with the guidance of the teachers, were involved in marketing the farm produce from the school farm. The learning elements included raising awareness and promoting the various farm products available in the school to members of the community and beyond. The main promotional strategies used (as reported by the teachers) involved: letting the potential consumers know of the subsidised prices of the produce, the good quality of the produce, the potential for continuous supply of the produce to the market even

during the dry season (due to the micro-irrigation system), the philosophy behind the micro-project and the entire Eco-Schools project, among others.

The income earned from the sale of farm produce was reported (by the teachers) to have demonstrated that entrenching a strong element of entrepreneurship in sustainable farming practices - through aggressive marketing of produce among others - had a high potential of alleviating poverty in the community while ensuring food security. Some teachers reported that lessons in Business Education and agricultural topics in Science were used to enhance this thinking through integration of both practical and theory lessons, and by making reference to and inferring from the success stories in the school farm (CR 6.52 shows an excerpt of field notes taken during a review and reflection session with the teachers of Kandiege Primary School).

Open days were organised during which members of the community and neighbouring schools were invited to the school to learn from and witness the successful projects in the schools. The local agricultural office cooperated with the school to organise the open days during which exhibitions, demonstrations, and talks on best practices for sustainable agriculture were held (see CR 6.53 for some photos taken during the open day). Other organisations doing related work in the region were also invited to exhibit their work and make presentations during the open days. During the sensitisation sessions, appeals were made to learners and members of the community to adopt the successful sustainable practices in agriculture for food security, prosperity and poverty alleviation. This proved to be a useful learning and experience-sharing session for both learners and members of the community thus, further supporting action-taking pedagogical approaches.

6.5.4 Actual issues-based interventions, resource management and school operations

The issues-based approach to curriculum contextualization in the context of the Eco-Schools programme in Kandiege Primary School made a big contribution towards addressing the issues of unsustainable agricultural practices, food insecurity and poverty in the school as well as in the surrounding community. Within two years, members of the school and community had adopted some sustainable agricultural practices which significantly contributed towards food security and poverty alleviation. The teaching and learning processes targeting the issues of concern integrated both theory and practice aimed at solving the issues. Micro-projects

established served as actual interventions as well as useful teaching and learning resources for demonstration, reference and inference purposes.

The Eco-Schools committee prioritised issues to be addressed and the actions to address them by considering suggestions from learners, community members, teachers, parents as well as local professionals and notables with requisite experience and expertise in addressing the issues of concern.

School operations were reported (by the teachers) to have improved through the involvement of many stakeholders in decision-making and running of the school via the Eco-Schools committee. This further served to expand the democratic space useful for efficient and effective governance.

Unsustainable agricultural practices and their shortcomings or disadvantages were exposed. This led to a growing interest in new and sustainable agricultural practices with proven successful results. The local agricultural extension office took the lead in supporting and educating the school and community on the need to adopt sustainable farming practices. Through demonstrations and actual micro-projects with entrenched sustainable agricultural best practices, the school and members of the community adopted these practices and were reported by the teachers to have realised higher yields, more income and profits (see CR 6.54 for an excerpt of field notes). These made a positive contribution towards food security and poverty alleviation in the school and community. Additionally, the continuous supply of fresh farm produce in the form of fruits and vegetables due to adoption of micro-irrigation methods during the dry seasons contributed towards food security and improved nutrition in the school and community. The extra income earned through the sale of farm produce further contributed towards poverty alleviation. The head teacher reported that he had used part of the income from the micro-projects to support some orphaned children in the school. The sale of surplus farm produce to the community at subsidised prices further led to a reduction in expenditure on these products thus leading to cash savings, ultimately contributing towards poverty alleviation.

The sale of vegetable and tree seedlings, produced in the school nursery, to the community at subsidised prices, coupled with education and sensitisation on sustainable agricultural practices served to encourage and motivate households to

grow their own vegetables and fruits. This led to a reduction in expenses on such products and contributed towards both food security and poverty alleviation (see CR 6.54).

The process of curriculum contextualisation using the issues of unsustainable agricultural practices, food insecurity and poverty as entry points in Kandiege Primary School also contributed towards addressing a number of other issues, risks and associated sustainable development challenges. These included the following among others:

- Nutrition concerns were addressed through provision of fruits and vegetables which are important constituents of a balanced diet.
- Reduction in use of chemical fertilizers and pesticides as a result of advocating for organic farming as part of the sustainable agricultural practices contributed to reduction in incidences of pollution caused by these chemical agricultural inputs.
- Potential and actual school-community conflicts were addressed and school-community cooperation enhanced through the close working relationship that developed between the school and the surrounding community.

6.5.5 Links and/or partnerships with the local community

The Eco-Schools committee served as an important avenue for enhancing school community cooperation around the issues of concern. Members of the surrounding community were represented in this committee and views and suggestions from the community on how to address the issues were considered. Cooperation with the surrounding community was further necessitated by the fact that the issues of unsustainable agricultural practices, food insecurity, poverty and other associated sustainable development challenges affected both the school and the surrounding community.

Mutual engagement of the school and community in the whole enterprise led to a realization that the school and community were mutually dependent on each other and that both had something to gain from each other through partnership. Additionally, local community notables with knowledge, expertise or experience in addressing these issues were invited to offer technical advice and guidance on the best approaches to addressing the issues. Examples included the local agricultural extension officer who worked hand in hand with the school in implementing the agricultural micro-projects and in organising demonstration and training sessions on

sustainable agricultural practices for learners and members of the surrounding community. A social worker from the community with interest in traditional vegetables was also instrumental in helping establish a traditional vegetable garden in the school. Other experts from the VI-Agroforestry organisation also supported and guided the school in establishing a tree nursery and integrating agroforestry as an important sustainable agricultural practice.

The demonstration and training sessions organised by the school for members of the local and school community on sustainable agricultural practices for food security and poverty alleviation served to promote the spirit of partnership and created the need for collaborative efforts between the school and community in addressing these issues of concern. Additionally, the knowledge and skills gained during these demonstration and training sessions enabled members of the community to adopt and enhance these best practices with ease. This was evidenced by the increased rate at which sustainable agricultural practices were reported to have been adopted.

Members of the community also made contributions towards the establishment of micro-projects in the school which amounted to about 30% of the total cost. This was mainly in kind through volunteering time to work in the micro-projects, offering free technical support and advice, as well as contributing traditional vegetable seeds for the micro-projects. Additionally, members of the surrounding community were reported to have voluntarily assisted in taking care of the micro-projects in the school during school holidays and over weekends. In return, community members bought vegetables, beans, maize and tree seedlings from the school at subsidised rates and at times got some for free. Community members were also given the opportunity to take some farm produce on credit (see CR 6.55).

Members of the surrounding community further considered this as an opportunity to give back to the school in return for the good gesture extended by the school to have them attend the training and demonstration sessions on sustainable agricultural practices organised by the school. After some time, it was reported by the teachers that members of the surrounding community regarded the school in its entirety as part and parcel of the wider community and incidences of theft from the school had reduced as well (see CR 6.55). This further served to promote cooperation between the school and the surrounding community.

School-community cooperation in addressing the issues of concern was further enhanced through fundraising initiatives for community groups by the school. Community groups were introduced to several other organisations that were keen on supporting and working with them on similar or related enterprises. Some of the organisations included Sunny Solutions Organisation - that was promoting the use of solar energy for cooking, heating and lighting as a contribution towards poverty alleviation through savings on energy expenses, as well as VI-Agroforestry organisation - which was involved in promoting sustainable agroforestry practices in schools and communities.

6.6 MUHORONI TOWNSHIP PRIMARY SCHOOL AND THE ISSUE OF UNMET ENERGY NEEDS

6.6.1 About the school

Muhoroni Township Primary School is located in the Muhoroni sugar belt in Nyando district. The poverty levels in Nyando have been estimated to be at 54% (see 2.2.3). The key environmental issues, risks, and associated sustainable development concerns revolve around unmet energy needs. This is mainly due to lack of forest resources for wood fuel energy supply occasioned by large sugarcane plantations that occupy large tracts of land with no provisions for growing trees. Electricity supply is still scarce and the majority of the poor cannot afford the high costs of installation and use. The school was considered for the study because of its strategic location suitable to act as a demonstration centre for other schools and community groups.

6.6.2 Planning phase for issues-based approach

The planning phase involved environmental auditing, prioritization of actions and action planning to guide implementation, as in the other cases (see sections 6.3.2, 6.4.2, and 6.5.2).

6.6.2.1 Environmental auditing to identify issues of concern

Environmental auditing followed the same procedure as earlier described in the first case study (see 6.3.2.1).

As mentioned above, with regard to prevalence of environmental issues, risks and associated sustainable development challenges, it emerged that poverty levels were significantly high in Muhoroni Township and its environs. The specific issues of

concern included unmet energy needs and low income levels. There were no innovations for renewable energy alternatives, energy conservation nor efficient and effective use options for the limited and scarce energy resources. Most families relied on firewood and kerosene for domestic energy supply. Firewood was mainly used for cooking and kerosene for lighting. A few families living in houses with electricity used it mainly for lighting. The scarcity of wood fuel had resulted in it being sourced from neighbouring districts hence the high wood fuel prices which further aggravated the poverty situation in the area.

The waste audit revealed that large amounts of waste products were generated in the school and from the surrounding community. These waste products consisted of both biodegradable and non-biodegradable waste. Kitchen waste and other organic matter comprised the bulk of the biodegradable waste, while plastic bags comprised the bulk of non-biodegradable waste products.

The resource audit revealed that the school owned a small piece of land which could support activities such as establishment of tree nurseries and a small wood lot. The land could also support horticultural farming on a smaller scale. The major health issues of concern revolved around malnutrition disorders and the HIV/AIDS pandemic.

The Eco-Schools components audit revealed that very few Eco-school related activities were on course in the school. In curriculum work, some ecological/biophysical concepts were evident in the curriculum. However, the content was presented more in the form of learning *about* and *in* the environment. A further probe into environmental education practice in the curriculum revealed little adherence to the principles of environmental education as spelt out in the foundational documents of environmental education.

The audit further revealed that no micro-projects targeting the critical issues of concern had been initiated in the school. However, attempts to enhance school-community cooperation were evident through the involvement of local community notables in the running of the school through the school management committee.

With regard to formal networking, the school had not initiated any formal networking activities with defined objectives. The school only networked through

routine school calendar activities such as sports, music and drama festivals. Additionally, there was no formal school environmental policy in place (see CR 6.56).

6.6.2.2 Prioritization of actions, issues to address, and action planning

The issue of unmet energy needs was prioritized for immediate action. This emerged from consultations and thorough consideration of various factors which included the prevailing energy situation and its cost implications on the already impoverished majority of the residents.

Options for micro-projects included the manufacture of briquettes from sugar cane bagasse which is a waste product from the nearby Muhoroni sugar factory. However, the school could not afford the initial high costs of equipment and installation leading the Eco-Schools committee to consider other affordable options as reflected in the action plan (see CR 6.57).

The *action plan* for Muhoroni Township Primary School (see CR 6.57) just as in the previous three cases was developed using the information from the environmental audit. The action plan closely linked with curriculum work. The main components of the action plan are as earlier described in the first case of Kosawo Primary School (see 6.3.2.2) and the key planned actions included: establishing a tree nursery; establishing a wood lot; adopting appropriate technologies for energy conservation/efficient use as well as effective use of renewable energy resources; initiate energy micro-projects that will convert sugar cane waste material (e.g. bagasse) from the Muhoroni sugar factory into fuel for cooking; and organise open days. A monitoring and evaluation plan was developed just as in the first two cases to ensure that all the activities and set targets are achieved.

6.6.2.3 Integration and infusion of local issues of unmet energy needs into curriculum planning

Incorporation of the above local issues into the curriculum took the approaches of infusion and integration. The procedure followed was earlier discussed in the previous case studies (see section 6.3.2.3, 6.4.2.3 and 6.5.2.3). The discussion below summarizes the process of curriculum contextualisation using issues-based approaches in Muhoroni Township Primary School.

The first step involved the development of integration and infusion plans (see examples of plans in CR 6.11 and 6.12 respectively as earlier presented for the case of Kosawo Primary School). This was followed by development of integration and infusion schemes of work and lesson plans to guide the teaching and learning processes. The key features of these plans were earlier discussed in case studies 1 and 2 (see section 6.3.2.3, 6.4.2.3).

For example, in Mathematics, energy auditing activities were used by some teachers to build mathematical skills as well as establish amounts and cost of energy used in the schools and community. The findings from the energy audits informed decisions and actions to enhance efficiency in energy use as well as exploring sustainable approaches to energy supply, use and conservation. Some of the decisions and actions formed integral components of teaching and learning processes in Science and Social Studies. The entire process contributed to addressing the issue of unmet energy needs in the context of the school environment, home environment and community environment.

Infusion involved the incorporation of content and skills related to the concepts and issues of unmet energy needs into existing subjects without jeopardizing the integrity of the subjects by respecting the integrity of both scope and sequence of the content and skills. It was applied in carrier subjects such as Science and Social Studies that had specific environmental and sustainability content related to the issue of unmet energy needs. The integration and infusion plans were followed by integration and infusion schemes of work and lesson planning to guide the teaching and learning processes.

An extract of a scheme of work for class eight Social Studies and class seven Science showed evidence of integration of the issue of unmet energy needs and the associated sustainable development challenges into teaching and learning processes. The objectives of one of the planned lesson were to: identify sources of energy in the community, classify energy resources, identify the scarce energy resources in the community, identify activities in the community that contribute to scarcity of energy resources, participate in activities that can enhance availability of energy and show a sense of responsibility towards conserving the scarce energy resources. The teaching and learning resources were spelt out to include: actual samples of energy resources, photographs and charts showing energy resources, guest speakers or resource

persons with expertise on energy issues as well as relevant reference texts (see CR 6.58).

Another extract from the scheme of work for class seven Science targeted the issue of inadequate technology for tapping renewable/free energy resources. The specific objectives included: gaining knowledge on appropriate energy technologies, identifying appropriate technologies for tapping renewable/free energy resources and acquiring relevant skills for developing appropriate technology for tapping renewable energy resources. The suggested teaching and learning resources included: reference materials for the appropriate technologies, technical experts for the appropriate technologies as well as materials and equipment for demonstrations and actual projects (see CR 6.58).

Some of the lesson plans developed at Muhoroni Township Primary School were later improved on and presented as exemplar lesson plans in the Eco-Schools environmental education teachers' guide (see CR 6.58; Odeke, Otieno & Wabwire, 2006a:57-64).

One of the lesson plans (in CR 6.58) titled '*Go technical; energy wise*' looked at the issue of inadequate technology for tapping renewable energy resources. The main objectives for this activity were to: Gain knowledge on appropriate energy technologies, identify appropriate technologies for tapping renewable/free energy resources and acquire relevant skills for developing appropriate technology for tapping renewable energy resources. The suggested teaching and learning resources included: reference materials for the appropriate technologies, technical experts for the appropriate technologies as well as materials and equipment for demonstrations and actual projects. Teacher preparation for this activity included researching and collecting information on the available technology for tapping renewable/free energy resources, investigating appropriate technology for tapping renewable energy resources, inviting technical experts to demonstrate to learners skills on appropriate technologies for energy conservation, setting up projects for appropriate technology for learners to apply skills and continue using the technology and searching the internet for further information on appropriate technology for energy conservation and efficient use.

The suggested extension activities included getting learners to sensitise their parents and other members of the community on the need to tap renewable energy using the appropriate technologies as well as assisting in setting up similar projects in the community. The suggested ideas for extra-curricular activities included appropriate technology audits, technology projects and competitions, participation in events such as energy days, public awareness campaigns, club and community activities as well as income generating projects (see CR 6.58).

6.6.3 Whole-school development work

As mentioned above, the environmental audit at Muhoroni Township Primary School and the surrounding community revealed that the issue of unmet energy needs was the main environmental and sustainability concern. This revelation led the Eco-Schools committee to decide that the issue of unmet energy needs would be the main focus in the Eco-Schools programme. The committee co-opted some local community notables with knowledge, skills and expertise in energy matters and related concerns.

6.6.3.1 School governance

The issue of unmet energy needs became an important feature in school governance following the decision to prioritise it as a central concern in the Eco-Schools programme. This led to energy concerns being deliberated upon in Eco-school committee meetings as well as in school management meetings, and featuring in the school environmental policy, the eco-codes as well as in the eco-school action plans.

- ***The school environmental policy of Muhoroni Township Primary School***

As a means of focusing attention and efforts to the issue of unmet energy needs as prioritised by the school, energy concerns featured prominently in all the components of the school environmental policy as reflected in Table 6.9 below.

Table 6.9: The place of the issue of unmet energy needs in the school environmental policy of Muhoroni Township Primary School

• Vision A school community that conserves and sustainably utilizes energy resources • Mission statement Muhoroni Township Primary School community will endeavour to acquire and share appropriate knowledge, skills and resources that will ensure conservation and sustainable use of energy. • Shared values At all times, the pupils, staff and community will strive to: 1. Sustainably utilize energy resources. 2. Conserve energy through all available means. 3. Adopt or develop and share energy saving technologies. 4. Educate/sensitise the community on the need to conserve and sustainably use energy resources. 5. Start energy projects in school and in the community that will have little or no damage or negative effects to the environment. 6. Share information, knowledge, ideas and skills with other schools and stakeholders with the view to enhancing energy conservation and sustainable use. 7. Improve cooperation throughout the school community with the view to encouraging energy conservation and sustainable use.
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- ***Eco-codes as a tool for operationalizing and internalizing the mission and shared values of the school environmental policy***

On realising the need to address the issue of unmet energy needs and the associated sustainable development challenges in the school and surrounding community, the learners in consultation with the teachers and the entire community developed additional sets of guidelines and rules with the aim of developing and internalizing values and positive attitudes towards addressing the issue of unmet energy needs and enhance sustainable use and conservation of energy resources. Some of the eco-codes included the following (see Table 6.10 below):

Table 6.10: Some of the eco-codes developed at Muhoroni Township Primary School

Eco-codes • Switch off all energy-using equipment when not in use • Make use of (tap) renewable and free sources of energy such as solar energy • Use energy-saving equipment whenever possible • Plant more trees for cheap and sustainable wood fuel supply.

6.6.3.2 Pedagogical approaches

The teachers of Muhoroni Township Primary School tried out action-oriented and problem solving pedagogical approaches based on the issue of unmet energy needs and the associated sustainable development challenges. They adopted an issues-based enquiry approach. Some of the lesson plans developed by teachers with the issue of unmet energy needs as the focus and with provisions for various pedagogies were later improved on and included as activities in the Eco-Schools environmental education teachers' guide (see CR 6.59; Odeke, Otieno & Wabwire, 2006a:57-64).

Using the Eco-Schools *micro-projects* - which included establishment of wood lots for sustainable wood fuel supply, establishment of a tree nursery for provision of seedlings, manufacture of briquettes from charcoal dust, waste paper and soil, as well as simple solar panels assembly for simple electrical appliances – as teaching and learning resources, teachers from various subjects were able to contribute towards addressing the issue of unmet energy needs. The pedagogical approaches were guided by the *issues-based enquiry approach* advanced by Gough (1992) and Chambers (1995) as indicated below.

The planning phase involved environmental auditing, prioritization of issues and actions, action planning as well as integrating the issues, risks and associated sustainable development challenges of unmet energy needs into the curriculum. To effectively contribute towards addressing the issue of unmet energy needs in the course of teaching and learning, appropriate pedagogical approaches were applied. These involved cross-curricular activities for investigating and researching aspects of the issues in the school and community, communicating and interpreting the results of the investigations, reflecting on the investigations, as well as taking action. Some of the pedagogical approaches employed by the teachers are discussed below.

- ***Pedagogical approaches: auditing issues***

Environmental auditing activities were used by some teachers to develop mathematical skills of addition, subtraction, multiplication and division. The teachers guided learners in keeping track of energy use in the school and community by assessing energy utilisation and management while taking note of the types and approximate amounts of different energy resources used for different activities daily (see CR 6.60).

Assessment of energy use involved checking for efficiency and wastefulness in energy. An example for class seven Mathematics involved keeping records of the amount of wood fuel, charcoal or kerosene used per day, week or month at school and home. In the case of electricity, meter readings were monitored. Using mathematical exercises involving addition, subtraction, multiplication as well as division, the weekly, monthly and annual figures were computed. This made it possible to identify areas of energy wastage and efficient use. These findings informed suggestions and recommendations for improvement that were forwarded to the Eco-Schools committee for consideration.

Energy auditing activities also involved assessments of the common sources of energy, the amounts of energy used per unit periods of time, the cost equivalents of the amounts of energy used, how energy is used, when energy is used, as well as the forms of energy used. These activities were linked to Science, Social Studies and Mathematics. For the case of electricity, the monthly bills gave the costs of energy per month. This was then used to find out the average weekly, daily and annual costs as well as energy units used through mathematical computations involving multiplication, division, addition as well as subtraction. A simple table was designed for purposes of assessing energy use in Muhoroni Township Primary School (see CR 6.61). The school management found energy auditing and the resultant recommendations generated through the teaching and learning processes quite useful in making decisions and adjustments on energy use and management in the school.

- ***Pedagogical approaches: investigation and research***

Investigating and researching aspects of the above issue in the school and community provided an opportunity for a wide variety of learner centred pedagogical approaches in Science, Social Studies, Mathematics, as well as Creative Arts. The pupils of classes seven and eight for instance engaged in investigating common sources of energy available, the amounts of energy used per unit for a period of time, the cost equivalent for the amount of energy used, how energy is used, when energy is used, as well as the forms of energy used.

The pupils also investigated possible causes of energy wastage and the factors limiting adoption of appropriate technologies and practices for energy conservation and sustainable use. This was done with the view to developing strategies for enhancing efficiency and sustainable use of energy (see CR 6.62). Subjects like

Creative Arts, Science, Social Studies as well as Mathematics proved useful in enhancing pedagogical approaches for investigating and researching aspects of the issue of unmet energy needs.

- ***Pedagogical approaches: communicating and interpreting results***

The language subjects i.e. English and Swahili provided opportunities for communicating and interpreting results of investigations on the issue of unmet energy needs, while at the same time building the requisite language skills among the pupils. Creative writing, speaking and listening, public speaking, debating, as well as poetry skills were identified by some teachers as avenues for communicating and interpreting results of investigations.

Creative writing activities for classes six, seven and eight involved writing compositions on topics related to the issue of unmet energy needs. Pupils also engaged in exercises aimed at building their skills to communicate effectively in writing using a variety of sentence structures on topics touching on the issue of unmet energy needs (see CR 6.63).

Speaking and listening skills were also enhanced by some teachers during sessions where learners were required to report back the findings of their investigations to the rest of the class. The pupils had the opportunity to respond appropriately to oral information from the findings on a variety of subjects through the guidance of the teachers.

Additionally, correct use of grammar was enhanced by some teachers through exercises that required the use of knowledge of grammar to interpret information related to different aspects of the issue of unmet energy needs from various sources such as newspaper cuttings.

Interpretation of the results of the investigations also gained from scientific skills. This was mainly through simple analysis of the effects and impacts of energy wastage and unsustainable use and supply of non-renewable energy resources to the environment, economy and society. Projections of the likely future effects of the issue of unmet energy needs and the continued unsustainable use and supply were also anticipated and precautionary measures explored in context. These

interpretations were closely linked to topics in Social studies, Science as well as Creative Arts.

- ***Pedagogical approaches: reflecting on investigations***

Reflection on the investigations took various forms in different subjects. However, just as in the other case studies, no specific pedagogical accounts of reflection were captured. Reflection was reported by teachers to have resulted from post-presentation discussions guided by some of them who had keen interest in the Eco-Schools programme. The most significant reflections were guided by the issue of unmet energy needs in the context of the Eco-Schools programme. Pupils in classes six, seven and eight contributed suggestions on suitable approaches to addressing the issue of unmet energy needs in context, with due regard to the underlying causes.

Some Science teachers reported that learners through the guidance of teachers were able to realize and appreciate the fact that they could make some contribution towards addressing the issue of unmet energy needs through simple practices aimed at conserving and sustainably utilising energy resources. Suggestions made by pupils from classes six, seven and eight pupils included: putting in place measures that would lead to energy conservation and sustainable use in the school, establishing micro-projects that would increase supply of energy resources in the school and community, tapping and use of renewable and cleaner energy resources such as solar energy, as well as initiatives that would reduce pressure on the energy resources.

Other reflections in Social Studies, Business Education, Mathematics, Creative Arts as well as Science revolved around the need to enhance entrepreneurship through micro-projects that could address the issue of unmet energy needs as well as earn the school extra income.

Outcomes from classroom subject reflections were reported by some teachers to have been presented to the Eco-Schools committee for consideration. Some of these were said to have contributed to the Eco-Schools committee decisions with regard to the development of the school environmental policies, eco-codes, action plans as well as the choice and design of micro-projects and other interventions on the issue of unmet energy needs.

- ***Pedagogical approaches for taking action***

Action-oriented pedagogies directed at addressing the issue of unmet energy needs were employed in different subjects. Social studies, Science and Creative Arts were quite useful in enhancing action. The micro-projects initiated in the school through the Eco-Schools programme played an important role in enhancing pedagogical approaches for action taking, discussed below.

Science topics touching on energy and properties of matter were used by some teachers to promote action taking through practical activities aimed at enhancing efficiency in energy utilisation, minimising energy wastage as well as tapping renewable sources such as solar energy. Practical sessions in Creative Arts and Science were also used as opportunities for actual interventions through action-taking pedagogies. For example, briquette making from charcoal dust, waste paper and soil was done as part of practical sessions in Creative Arts and Science. The briquettes were sold to teachers and other members of the community. Additionally, simple solar panels for powering radios were assembled during science lessons as an action-taking pedagogy (see CR 6.64). These activities also constituted the Eco-Schools micro-projects in Muhoroni Township Primary School.

Establishment of tree nurseries and wood lots in the school formed part of the action taking pedagogical approaches. This was mainly done as part of the practical sessions in the agricultural topics. Design, siting and construction of tree nurseries as well as siting and establishment of wood lots proved to be a useful action taking pedagogy that benefited both the pupils and members of the community. Officers from the local forestry and agriculture departments assisted the school in setting up these micro-project components as well as in training pupils, teachers and members of the community on best practices for tree nursery and wood lot establishment (see CR 6.64).

Open days and field days were jointly organised by the school and local departments of agriculture and forestry. Support from a local company called Homa Lime was used to enhance action taking pedagogies involving the pupils, teachers as well as members of the community. During these sessions, participants were trained, sensitised and demonstrations were held on different aspects of the energy concerns. Campaigns for sustainable utilisation and conservation of energy were also launched during these open days and field days. It was later reported that a culture of energy

conservation and sustainable utilisation gradually developed and some best practices were adopted in the school and surrounding community.

All the above action-taking pedagogies contributed to addressing the issue of unmet energy needs. This was mainly through practical demonstrations and promotion of the use of renewable resources through simple technologies such as the simple solar panel assembly, increasing supply of wood fuel through establishment of tree nurseries and wood lots in the school and community and reusing charcoal waste, waste paper and soil through briquette making for cooking. All these contributed to knowledge and skills development for addressing the issue of unmet energy needs and the associated sustainable development challenges. Savings on energy expenses were also realised. Additionally, the tree nurseries and wood lots also contributed to the improvement and beautification of the school and community environments.

6.6.4 Actual issues-based interventions, resource management and school operations

The issues-based approach to curriculum contextualisation in the context of the Eco-Schools programme in Muhoroni Township Primary School made a positive contribution towards addressing the issue of unmet energy needs and the associated sustainable development challenges in the school and surrounding community. In two years, members of the school and community adopted some best practices for sustainable energy utilisation, conservation as well as tapping of renewable, free and cleaner energy resources. Additionally, measures and strategies aimed at ensuring sustainable supply and abundance of wood fuel energy in the near future were put in place. These constituted a contribution towards addressing the issue of unmet energy needs (see CR 6.65).

The teaching and learning processes targeting to address the issue of unmet energy needs integrated both theory and practice. The micro-projects that were established (i.e. the briquette making micro-project, tree nursery, wood lots, and the simple solar panel assembly) served as useful teaching and learning resources for demonstration, reference as well as inference purposes. Additionally, the micro-projects served as actual interventions for the issue of unmet energy needs.

The Eco-Schools committee served as the final decision-making organ that prioritised actions and issues to be addressed by considering suggestions from pupils, community members, teachers, parents as well as local professionals and notables

with experience and expertise in addressing the issue of unmet energy needs and related concerns. The Eco-Schools committee improved school operations through the involvement of many stakeholders in decision-making and running of the school. This further served to expand the democratic space necessary for efficient and effective governance.

The shortcomings, disadvantages and flaws associated with the prevailing practices in energy utilisation were exposed. This led to a growing interest and need for new sustainable options, strategies, technologies and practices that would enhance efficiency and conservation in energy utilisation. Some local experts from the departments of agriculture, forestry as well as from Homa Lime Company supported the school's initiatives aimed at addressing the issue of unmet energy needs. The adoption by the school and community of some best practices, and the resultant benefits of efficiency in energy use and savings on energy expenses, were attributed to the learning from demonstrations and actual micro-projects targeting the issue of unmet energy needs and related concerns.

The extra income and profits earned through the sale of briquettes, tree seedlings and the simple solar panels from the micro-projects could also have added to the school and community's income base.

The education, sensitisation and demonstrations on best practices for sustainable energy utilisation, supply and conservation was reported by some teachers to have helped pupils, fellow teachers and members of the community to gain knowledge, skills and develop positive attitudes towards sustainable energy utilisation, conservation and supply (see CR 6.65). This could have also encouraged and motivated households to adopt and promote these best practices.

The process of curriculum contextualisation using the issue of unmet energy needs as the entry point in Muhoroni Township Primary School also contributed towards addressing a number of other issues, risks and associated sustainable development challenges. These include the following among others:

- Environmental improvement and beautification was realized in the school and community through tree planting and beautification.
- Resourceful and wise management of waste was realized through the use of waste paper, charcoal remains and soil in making briquettes, used as fuel for cooking.

- The school earned additional income and realised savings through the entrepreneurial activities for income generation in the micro-projects. This included the simple solar panels, briquettes as well as the tree seedlings.
- New technologies for tapping of solar energy were adopted thus further enhancing savings in energy expenses and contributing towards poverty alleviation.
- Potential and actual school-community conflicts were addressed and school-community cooperation enhanced through the close working relationship that developed. The benefits were realized by both the school and members of the community.

6.6.5 Links and/or partnerships with the local community

The Eco-Schools committee at Muhoroni Township Primary School served as an important avenue for enhancing school community cooperation around the issues of concern. Members of the surrounding community were represented in this committee and views and suggestions from the community on how to address the issues were considered. Mutual engagement of the school and community in the whole enterprise led to a realisation that the school and community were mutually dependent on each other and that both had something to gain from each other through partnership. Additionally, local experts with knowledge, expertise and or experience in addressing the issue of unmet energy needs were invited to offer technical advice and guidance. Examples included the local agricultural extension, home economics and forest officers who worked hand in hand with the school in implementing the micro-projects and in organising demonstration and training sessions for pupils, teachers and members of the surrounding community on best practices for sustainable energy utilisation, conservation and supply. A social worker from the community who had interest in solar cooking later in the second year joined in and introduced the concept of solar cooking.

The demonstration and training sessions organised by the school for members of the local school community on best practices for energy conservation, sustainable supply and utilisation served to promote the spirit of partnership and created the need for collaborative efforts between the school and community in addressing the issue of unmet energy needs and other related concerns. Additionally, the knowledge and skills gained during these demonstration and training sessions enabled members of the community to adopt and enhance the best practices with ease. This was evidenced by the increased pace at which best practices for sustainable energy

utilisation, supply as well as conservation were adopted and community initiatives targeting the energy concerns established. Consequently, the community realised good progress towards addressing the issue of unmet energy needs and the related concerns and associated sustainable development challenges.

Members of the community also made contributions towards the establishment of micro-projects in the school which amounted to about 30% of the total cost. This was mainly in kind through volunteering time to work in the micro-projects, offering free technical support and advice, as well as contributing materials for the micro-projects. In return, community members gained knowledge and skills on other conventional best practices through training and sensitisation sessions organised by the school. Additionally, members of the community bought some solar panels, briquettes, and tree seedlings from the school at subsidised rates. The school also extended some credit facilities to community members on the purchase of these items. These served to further promote cooperation between the school and the surrounding community.

Over the two year period, members of the community are reported (by the teachers) to have regarded the school in its entirety as part and parcel of the wider community. They also offered to voluntarily protect the school property from theft and vandalism. Additionally, incidences of trespassing and illegal grazing of livestock in the school compound reduced.

School-community cooperation in addressing the issues of concern was further enhanced by the school through fundraising initiatives for community groups that had gained knowledge and skills through training and demonstration sessions organised in the school. Community groups were introduced to several other organisations that were keen on supporting and working with community groups in similar and related enterprises. Some of the organisations included Sunny Solutions Organization that was promoting the use of solar energy for cooking, heating and lighting as a contribution towards poverty alleviation through savings on energy expenses. A women's group from the community was awarded a total of ten thousand Kenyan shillings by the Eco-Schools programme in Kenya to initiate an energy related micro-project.

6.7 REFLECTIONS ON THE ACTION RESEARCH CASE STUDIES

The process of trying out issues-based approaches to curriculum contextualisation in the case study schools though successful was not without challenges. Some of the challenges arose in the process of integrating and infusing environmental and sustainability issues into curriculum planning and practice. Some teachers felt that this was an extra burden on their already heavy workload. However, some enthusiastic teachers willingly adopted the approach as part of their curriculum practice and happily shared progress and results during the progress review sessions conducted on school visits.

It is common knowledge that preparing schemes of work and lesson plans is quite unpopular in the teaching fraternity generally, and among experienced long service teachers particularly. This, as argued by the experienced teachers is because of the feeling that having taught for many years, all that they need to teach is at their fingertips hence their reluctance to go back to the procedures and rigours of scheming and lesson planning afresh. During this study, however, some teachers were in agreement that there was need to scheme and plan afresh so as to effectively integrate the local environmental and sustainability issues into their daily curriculum practice. It could, however, be felt that even at the close of this study, some teachers still seemed not quite comfortable with the exercise of integrating and infusing local environmental issues, risks and associated sustainable development challenges into their curriculum planning and practice.

It is also worth observing that, the improvements and results realised in the case study schools and their surroundings through interventions to address the environmental issues, risks and associated sustainable development challenges in the course of this study, cannot be claimed to have been the exclusive outcome of this study and the Eco-Schools project. This is because no definite controls were put in place during the study and it is therefore probable that other factors beyond the intervention and influence of this study and the Eco-Schools project would have made some contributions.

It is worth noting here that, some of the issue-based interventions (especially those that occurred in the surrounding community) reported in some case study accounts could not be authoritatively verified by the researcher during this study. This was

due to some limitations and constraints experienced in this study. These related to issues of inadequate time and finances for closer follow up, monitoring and evaluation of progress and outcomes in this study. Consequently, I had (in some instances) to rely on the secondary information provided by teachers from the case study schools during both organised formal review and reflection sessions as well as from some informal discussions. This explains the (passive) reporting style that I have adopted in some cases.

6.8 CONCLUSION

This chapter has presented an account of the action research process in the four case study schools in Nyanza province. It represents an attempt to address issues in context through socially critical environmental education. Re-conceptualisation of the terms ‘environment’ and ‘environmental education’ led to standardised conceptions that set perspective for the action research process. The planning phase which involved environmental auditing to identify issues of concern, prioritization of actions, issues to address, and action planning to guide implementation was critical in setting the agenda of the action research process in each of the schools. Environmental auditing was particularly useful for identifying the environmental issues, risks and associated sustainable development challenges that were of concern in and around the case study schools, thus making it the most significant process in setting the agenda.

Integration and infusion of local issues of concern into curriculum planning further enriched processes of curriculum contextualisation, making them relevant to local contexts by addressing real issues through appropriate pedagogical approaches in auditing, investigation and research, communicating and interpreting results, reflecting on investigations and taking action. The action research process further enhanced cooperation and partnership between the case study schools and surrounding communities with mutual benefits. The key findings and critical reflection on the action research process are discussed in Chapter 7 guided by analytical statements 3 to 8.

CHAPTER 7

DISCUSSION OF THE FINDINGS

7.1 INTRODUCTION

As indicated in Chapter 1, this study aimed to find out whether issues-based approaches serve to strengthen the contextualising and relevance of the curriculum and what might be done to orientate the curriculum to better achieve this. The key findings of the study presented here only represent the most critical findings given the focus of the study. I have had to make difficult choices in deciding what to present and discuss here, given the range of findings that emerged from the study. This chapter draws on the data analysed in Chapters 5 and 6 and the contextual and theoretical perspectives that were presented in Chapters 2 and 3 to discuss the findings in more depth. As with all chapters, the discussion and analysis is also guided by the research question, viz. *Can issue-based approaches be used in Eco-School contexts to contextualise the Kenyan curriculum?*

The discussion in this chapter is guided by analytical statements with supporting evidence taken from the data in Chapters 5 and 6. Reference to relevant theory and research is made to deepen the discussions. The analytical statements guiding the framing of this chapter are:

- The current curriculum orientation, practices and resource materials in Kenyan primary schools do not easily support issues-based approaches to curriculum contextualisation.
- The common conceptions of environment and environmental education held by Kenyan primary school teachers potentially limit possibilities for broader and holistic engagement with issues-based approaches to curriculum contextualisation.
- Auditing focuses attention on issues, situates learning processes, and enhances curriculum contextualisation.
- Engagement with issues in planning and whole-school development work enhances and strengthens curriculum contextualisation.
- Eco-Schools framework and practices support and enhance issues-based approaches to curriculum contextualisation and problem solving.

- The Eco-Schools programme in Kenya provides opportunities for establishment of communities of practice with the local environmental and sustainability issues at the centre of negotiation of '*joint enterprise*'.
- Micro-projects in schools facilitate contextualised curriculum processes, problem solving and school-community cooperation.
- The issues-based enquiry approach to pedagogy can help enhance curriculum contextualisation within a wider technocratic orientation to curriculum.

I now discuss the findings in more depth using these analytical statements.

7.2 ANALYTICAL STATEMENT 1:

The current curriculum orientation, practices and resource materials in Kenyan primary schools do not easily support issues-based approaches to curriculum contextualization

Evidence from phase 1 of this study revealed that the primary school curriculum in Kenya is heavily skewed towards what Cornbleth (1990) described as a technocratic orientation to curriculum (see 2.6; 5.2.4). The prevailing technocratic curriculum features appeared to limit possibilities for issues-based curriculum contextualisation. These features included: compartmentalisation of the curriculum into subjects/disciplines; prescriptiveness and finality of subject syllabi as the sole guiding documents for teaching and learning processes; the rigid time allocation for curriculum activities through timetabling; the exam orientation of the curriculum that enhances rote learning and discourages hands-on engagement with issues through teaching and learning; the overloaded school curriculum and heavy teacher workload; and the association of environmental education with only specific subjects among others (see 5.2.4; 5.2.5).

The common curriculum practices (see 2.4.2; 5.2.4; 5.2.5) in the schools, which are largely influenced by the technocratic orientation, further appeared to not easily support issues-based approaches to curriculum contextualization. This was partly due to the resultant dominant forms of environmental education in Kenya namely: conservation education and biophysical education which were mainly associated with the science disciplines (Atiti, 2003; Ndaruga, 2003). These dominant forms of environmental education were characterised by the apparent exclusion of social, political and economic issues/concerns and concentration on biophysical issues thus

negating the desirable holism in dealing with issues. O'Donoghue (1993a) had earlier criticised these trends on similar grounds. Further, the guiding frameworks and documents in environmental education practice, environmental topics and concepts in the school curriculum as well as the teaching and learning approaches and methods used appeared to limit the potential for issues-based approaches to curriculum contextualisation in Kenyan primary schools. Additionally, some of the negative influences on environmental education practice as identified by the teachers who were sampled in the survey (see 5.2.5) appeared to constrain issues-based approaches to curriculum contextualization.

Further, the controls exerted by the Kenyan education system on curriculum knowledge, through curriculum policymaking, and by shaping the conditions of curriculum practice with little regard to contextual influences appears to have contributed to the conceptual and operational decontextualisation of the curriculum (Cornbleth, 1990:17-18). This decontextualisation and isolation of the curriculum and curriculum construction from their structural and socio-cultural contexts, (see 2.5) results in attention being directed to the curriculum document rather than to curriculum practice, thus enhancing curriculum processes that cannot support issues-based approaches for problem solving in context.

The teaching and learning resource materials currently in use in the primary schools further appeared not to satisfactorily support issues-based approaches to curriculum contextualization (see 5.2.4.4). This became apparent after a critical review of the resource materials against the criteria developed (see 2.4.3; CR 2.1). The importance of relevant and appropriate teaching and learning resource materials for enhancing environmental education in the curricula and for strengthening issues-based approaches to learning had earlier been emphasised by Lotz-Sisitka (1996:62). Against this background, the available resource materials in schools were found deficient and limiting to enhancing issues-based approaches to curriculum contextualisation.

Additionally, the study findings seem to reflect Stevenson's (1987) earlier research, which identified a fundamental disconnection between the structure and purposes of public schools and the aims of environmental education. He provided a useful explanation for why the current orientation to curriculum, as well as curriculum practices with regard to environmental education have remained so peripheral to

school reform agendas to date. Several decades ago, Dewey (1915) gave a warning that the failure to alter these regularities has prevented widespread adoption of *progressive educational practices* aimed at integrating schools and their communities and inducting students into patterns of civic engagement essential to the maintenance of democratic institutions. This goal still appears valid today going by the findings of this study. However, an issues-based approach to curriculum contextualisation as evidenced by the results of the action research case studies successfully challenged these regularities and produced promising results (see Chapter 6).

7.3 ANALYTICAL STATEMENT 2:

The common conceptions of environment and environmental education held by Kenyan primary school teachers potentially limit possibilities for broader and holistic engagement with issues-based approaches to curriculum contextualisation

Evidence from phase 1 of the study (see 5.2.1) revealed that most primary school teachers commonly conceive the environment largely in terms of only the biophysical components. It also followed that the narrow depiction of ‘environment’ in only the biophysical sense potentially led teachers to only consider the biophysical aspects and issues of the environment as opposed to holistic consideration of the ‘environment’ with due consideration of the interrelationships between the biophysical, economic, socio-cultural and socio-political aspects and issues, as recommended in among others; the Tbilisi principles of environmental education (UNESCO-UNEP, 1978) and the principles of environmental education for equitable and sustainable societies (UNCED, 1992). Viewed against the background of this study, this narrow conception of the environment potentially limits broader and holistic engagement with issues-based approaches to curriculum contextualisation.

Additionally, the conceptions of environmental education commonly held by primary school teachers in Kenya (see 5.2.2) potentially limit possibilities for broader and holistic engagement with issues-based approaches to curriculum contextualisation. Evidence from phase 1 of the study showed the emergence of a super group that comprised of responses that conceived environmental education as related to learning, teaching, knowledge and awareness (see responses marked with an asterix * in Table 5.2). This could be interpreted to imply that most teachers

conceive of environmental education more in terms of the cognitive domain. Only two responses from the questionnaires and one response from the group interviews (see Table 5.2) described environmental education in terms of '*environmental issues/problems*' which was the central concern in this study. This may be interpreted to suggest that, given the little attention, recognition or concern accorded to environmental issues in the teachers' conceptions of environmental education, they may not be interested in broadly and holistically engaging with contextualised issues-based approaches in their curriculum practice. This perceived pattern raises concern given the ever growing complexity and rising levels of environmental issues, risks and associated sustainable development challenges in Kenya (see 2.2).

It is, however, worth noting that some definitions of environmental education given by teachers called for, or were indicative of some action and skills to conserve/protect/preserve or improve the environment. These presented an opportunity and goodwill for issues-based enquiry approaches (Gough, 1992; Chambers, 1995), for real problem solving in context which was later explored through the action research case studies in four primary schools.

The adoption of standardised conceptions of the terms 'environment' and 'environmental education' at the start of the action research process in four case study schools, through reconceptualisation of the terms (see 6.2) worked to enhance and improve engagement with issues-based approaches as shown by the process and results in the four case studies (see 6.3, 6.4, 6.5 and 6.6). This was because it allowed for consideration and recognition of local issues involving all dimensions of the environment (economic, political, technological, cultural, historical, moral, aesthetic) and their inter linkages, guided by the Tbilisi principles of environmental education (UNESCO-UNEP, 1978) as well as the concept of education *for* the environment (Fien, 1993). As reported in Chapter 6, this contributed to the development of a range of practical and interdisciplinary learning experiences in the local environment, aimed at addressing real issues in context through engagement with issues-based approaches and curriculum contextualisation in practice. This enhanced contextualised and holistic issues-based enquiry approaches in teaching and learning (Gough, 1992; Chambers, 1995).

7.4 ANALYTICAL STATEMENT 3:

Auditing focuses attention on issues, situates learning processes and enhances curriculum contextualisation

Environmental auditing (see 3.5.2.1) is considered the foundation of Eco-Schools practices. In the context of this study, auditing served to focus attention on issues by exposing, bringing to the fore and prioritising the environmental issues, risks and associated sustainable development challenges that were of greatest concern in the case study schools and surrounding communities. The prioritised issues later became the focus and basis of curriculum contextualisation efforts that significantly contributed to addressing the identified issues in context. It can be argued that the decontextualised nature of the Kenyan curriculum (see 2.5; Cornbleth, 1990) could partly be due to absence of auditing as a foundational step in curriculum planning in context. This argument can be supported by the evidence from the results of the action research process (phase 2) in the four case study schools (see 6.3, 6.4, 6.5 and 6.6) which showed that auditing serves to set the agenda of issues-based approaches to curriculum contextualisation.

Auditing further contributed to situating learning processes in the case study schools. This was by way of linking curriculum processes to the local contextual realities based on the local issues of concern that were identified through environmental auditing. Links and partnerships were also established with the local communities during and after the auditing processes that required school-community interactions. Auditing also helps to foster situated learning (see 3.4.1); social learning theory emphasising contextualised learning. Scholars such as Benzie *et al.* (2005:180) have argued in favour of situated learning by suggesting that ‘the context and the activities through which learning takes place are an integral part of what is learned and the environment in which the learner engages in learning is an integral part of the learning experiences and shapes that which is learned’. Taylor and Mulhall (2001) maintain that situated learning is generally characterised by links between teaching and learning processes and experiences with local contexts (school, home and community environments) and communities.

It can also be claimed that some of the the main characteristics of Lave and Wenger’s concept of situated learning (Lave & Wenger, 1991, as described by Altrichter, 2005) emerged from the results of the action research process in the four

case study schools. Auditing set the foundation for: situated learning, and engaging in the social world; learning to occur in and through communities of practice; learning to occur in socially structured situations; and for formation of identity in communities of practice through learning (see 3.4.1, see also 6.3, 6.4, 6.5 and 6.6).

In the course of this study, learners in the case study schools and community members engaged mutually in the learning process through which real issues were addressed. The mutual engagement in the learning process involved sharing of knowledge, skills, expertise as well as resources on the basis of the issues that were identified through the auditing process. This mutual engagement between the school and surrounding community was part of the process of situating learning.

The process of basing teaching and learning on the local issues identified through the auditing process, as well as taking learners through pedagogical approaches that involved planning, investigating and researching aspects of the issues identified, communicating and interpreting the results of the investigations, reflecting on the investigations, and taking action (Gough, 1992; Chambers, 1995) with the aim of addressing the issues identified during the auditing process served to link teaching and learning processes to local contexts and communities. This contributed to increasing the appropriateness and relevance of curriculum processes to local contexts. Curriculum contextualisation was further enhanced through constructing new knowledge, methods and approaches of addressing the local issues through learning process in the case study schools.

It is, however, worth noting that despite the fact that the results obtained from this study support the analytical statement, further research in many more and varied contexts may be useful before making generalisations.

With the aforementioned, it suffices to say that since environmental auditing provides schools with a snapshot of their current situation and assists in identifying issues and potential action areas (Henderson & Tilbury 2004:36), it could play an important role in enhancing issues-based approaches to curriculum contextualisation with a problem-solving orientation. Additionally, auditing allows for situated learning (see 3.4.1), which as shown in this study, has potential to contribute towards issues-based curriculum contextualisation, which would make the curriculum relevant and appropriate to local contexts by addressing the local environmental

issues, risks and associated sustainable development challenges through curriculum processes.

7.5 ANALYTICAL STATEMENT 4:

Engagement with issues in planning and whole-school development work enhances and strengthens curriculum contextualisation

Evidence from the action research process (phase 2) in the four case study schools (see 6.3, 6.4, 6.5 and 6.6) generally shows that engagement with issues in planning and whole-school development work enhances and strengthens curriculum contextualisation. The action research process served to open up possibilities for engagement with issues-based approaches to curriculum contextualisation.

Reconceptualisation and adoption of standardised conceptions of the terms ‘environment’ and ‘environmental education’ (see 6.2) was a useful starting point. This was because it served to bring to the fore and emphasise the place of environmental issues in the conceptions of both terms, thus setting the stage for engagement with issues. The adoption of a conception of ‘environment’ that included the natural and built, technological and social (economic, political, technological, cultural, historical, moral, aesthetic) aspects of the environment as well as the prevailing environmental issues, risks and associated sustainable development challenges of concern in any given context (see 6.2.) allowed for consideration and recognition of local issues by school communities. This enhanced contextualised and holistic issues-based enquiry approaches in teaching and learning as advanced by among others (Gough, 1992; Chambers, 1995).

As mentioned above (see 7.4), environmental auditing as a component of planning helped to identify and prioritise local environmental and sustainability issues of concern, prioritise appropriate actions and direct action planning, as well as integration and infusion of local issues into curriculum planning. This helped to link teaching and learning processes to local contexts thus enhancing and strengthening curriculum contextualisation (see case studies in 6.3, 6.4, 6.5 and 6.6).

Engagement with issues in whole-school development work in the four case study schools (see 6.3, 6.4, 6.5 and 6.6) enhanced and strengthened curriculum contextualisation. This can be inferred from the fact that whole-school development

work - which encompassed aspects of school governance, pedagogical approaches, micro-projects and actual issues-based interventions as well as links and partnerships with local communities - revolved around the identified and prioritized issues of concern in context (see case studies in 6.3, 6.4, 6.5 and 6.6).

Eco-school governance structures and tools (school environmental policies, eco-codes and Eco-Schools action plans) took due cognisance of the prevailing local environmental and sustainability issues. This was aimed at integrating local issues of concern into school governance with the aim of exploring possible ways of addressing them through governance mechanisms (see case studies in 6.3, 6.4, 6.5 and 6.6). This process formed part of teaching and learning that involved community representatives, learners, teachers and school administrators. Consequently, it could be claimed that appropriate governance-related knowledge, skills, values and attitudes were developed as well as awareness raised for addressing local issues of concern. However, it is worth commenting that no accurate parameters and procedures were put in place to evaluate and verify this.

Further, engagement with issues-based approaches led to the development of action-oriented and problem solving pedagogical approaches aimed at addressing the local issues of concern in all the four case study schools. These pedagogical approaches were modelled around the four phases of the issues-based enquiry approaches (Gough, 1992; Chambers, 1995) that involve real enquiry and problem solving in the local context (school, home and community environments). Consequently, prioritised issues were addressed both directly and indirectly through issues-based action-oriented teaching and learning processes (see case studies in 6.3, 6.4, 6.5 and 6.6).

Additionally, micro-projects as teaching and learning resources and as sources of additional income, proved useful in enhancing action-oriented and problem solving pedagogical approaches in context. Micro-projects were also central to the actual interventions as well as demonstrations on how to effectively and sustainably address local environmental and sustainability issues in context (see case studies in 6.3, 6.4, 6.5 and 6.6).

Links and partnerships with local communities in addressing local issues of concern contributed towards curriculum contextualisation. This was by way of allowing for mutual engagement between schools and communities in addressing the issues

through sharing of knowledge, skills, resources, services and expertise. It also promoted joint vision building, with the aim of addressing the local environmental issues, risks and the associated sustainable development challenges (see Chapter 6). This was, however, never exploited satisfactorily in all the case studies.

Issues-based approaches were also integrated into the Eco-Schools resource materials development process (which I led) in Kenya during the period 2004-2006. This study influenced both the process and product of this exercise. Consequently, the resultant design, general orientation, content and activities of the Eco-Schools Learners' Guides, Teachers' Guides, and Quick Guide to Implementation strongly reflect and support issues-based approaches to curriculum contextualisation (see CR 7.1).

Evidence from the four case studies (see 6.3, 6.4, 6.5 and 6.6) points at successful attempts to contextualise the curriculum using issues-based approaches. The fact that engagement with issues was central to all processes in the case study schools therefore demonstrates it could enhance and strengthen curriculum contextualisation. Further, issues-based enquiry, as a participatory, learner centred approach, offers possibilities for learners to develop an awareness and understanding of environmental issues, and possible ways of addressing them (Gough, 1992; Chambers, 1995). Additionally, the interventions in addressing real environmental and sustainability issues in context through micro-projects and action-oriented teaching and learning processes confirms that engagement with issues-based approaches serve to strengthen and enhance curriculum contextualisation, further making curriculum processes relevant and linked to local contexts by maximising the interfaces between school, home and community learning environments (Taylor & Mulhall, 2001). The evidence further suggests that engagement with issues in planning and whole-school development work contributed to narrowing the rhetoric-reality gap (Stevenson, 1987; 2007) in environmental education practice by enhancing and strengthening curriculum contextualisation.

7.6 ANALYTICAL STATEMENT 5:

Eco-Schools framework and practices support and enhance issues-based approaches to curriculum contextualisation and problem solving

Evidence from phase 2 of this study shows that the Eco-Schools framework and practices provide a useful context for engagement with issues and support issues-based approaches to curriculum contextualisation (see case studies in 6.3, 6.4, 6.5 and 6.6; see also 3.5). The discussion that follows highlights key aspects of the Eco-Schools framework and practices that were found to support and enhance issues-based approaches to curriculum contextualisation and problem solving in this study.

The Eco-Schools framework and strategy aims at promoting action learning tailored to meet the needs of the community and to address the environmental issues in the schools and their surrounding communities. The general framework consists of auditing to identify and prioritise the environmental and sustainability issues of concern; exploration of options and potential actions to address the issues; integrating issues and potential actions into school environmental policies and eco-codes; action planning; and real action-taking to address the issues in context through a range of activities and practices. In the case of this study (see case studies in 6.3, 6.4, 6.5 and 6.6), the Eco-Schools framework and strategy provided a useful context for contextualised curriculum processes focussing on the issues. This also enabled the learners and members of community to develop a shared vision founded around the environmental and sustainability issues of concern to the community.

Additionally, the Eco-Schools framework integrated pedagogy with the social-cultural, biophysical, economic, socio-political, technical, and organisational aspects of school practice (see case studies in 6.3, 6.4, 6.5 and 6.6). This served to enhance space and possibilities for issues-based approaches to curriculum contextualisation and problem solving.

Eco-Schools practices placed emphasis on addressing the environmental issues, risks and associated sustainable development challenges in context and meeting some of the needs of the community (see case studies in 6.3, 6.4, 6.5 and 6.6). The Eco-Schools practices that supported and enhanced issues-based approaches to curriculum contextualisation included: Environmental auditing, aspects of school governance practices such as formation and functions of the Eco-Schools committee,

formulation and implementation of the school environmental policies, formulation of and adherence to eco-codes, and action planning. Other Eco-Schools practices that served this purpose included curriculum work and pedagogical approaches. Additionally, resource management activities including micro-project initiatives, school operations and support, school-community cooperation and networking, networking and information dissemination as well as monitoring and evaluation all contributed towards enhancing issues-based approaches to curriculum contextualisation. Table 7.11 below summarises Eco-Schools practices and their contribution to curriculum contextualisation.

Table 7.1: Eco-Schools practices and their contribution to curriculum contextualisation

Eco-Schools practice	Contribution to curriculum contextualisation
Environmental auditing	Establishing and prioritising environmental issues, risks and associated sustainable development challenges of concern to the school and community.
School governance aspects (Eco-Schools committee, school environmental policies, eco-codes, action planning)	- The Eco-Schools committee was charged with the responsibility of decision making and the day to day running of the Eco-Schools programme with due consideration of the prioritised local concerns. - The school environmental policies, eco-codes and action plans were formulated with the aim of addressing the prioritised environmental and sustainability issues of concern in context. All the above were linked to curriculum and pedagogical practices that enhanced curriculum contextualisation (see 6.3, 6.4, 6.5 and 6.6).
Curriculum work and pedagogical approaches	- The ‘curriculum work’ component of Eco-Schools (specifically, integration and infusion of local environmental and sustainability issues of concern into the curriculum) boosted the profile of the programme and contributed to the easy integration with other curriculum practices. - It created opportunities to use the local school, home and community environments as teaching and learning resources thus making the curriculum processes, content and methods relevant, effective and directly linked to the local contexts, experiences and daily lives of the learners and other members of the community (Taylor & Mulhall, 2001). - Some pedagogical aspects (such as action-oriented, problem-solving, learner centred, cooperative and interactive issues-based enquiry approaches) encouraged learners to explore questions, issues and problems of environment and sustainability in context and look at possible options to addressing them (see 6.3, 6.4, 6.5 and 6.6; Gough, 1992; Chambers, 1995).
Resource management activities and micro-projects	Regular resource auditing provided teaching and learning opportunities especially for mathematics (see case studies in 6.3, 6.4, 6.5 and 6.6). The audits were then followed up by corrective actions or measures in cases where inefficiency or wastefulness in resource

	utilisation was noticed, thus further providing teaching and learning opportunities in context. • The micro-projects established served: as useful teaching and learning resources for both the schools and surrounding communities; to demonstrate and enhance best practices in resource management; and to earn the schools and communities additional income.
School support	• Offering school's support in the course of implementation created opportunities for tapping local expertise in addition to the support offered by the Eco-Schools project staff (see 3.5.2.5 for support actions; and 6.3, 6.4, 6.5 and 6.6 for evidence of results).
School-community partnerships/cooperation	• Promoted mutual engagement through sharing of knowledge, skills, expertise and resources between the case study schools and surrounding communities based on the issues of concern. Additionally, community members were encouraged and supported to replicate best practices in their local homes and communities (see case studies in 6.3, 6.4, 6.5 and 6.6).
Networking and information sharing/ dissemination	• Promoted dissemination and exchange of knowledge, information and skills on the issues of focus in context.
Monitoring and evaluation	• Enabled schools to assess the progress/success of the environmental and sustainability action learning programmes and make necessary adjustments thus ensuring positive progress in curriculum contextualisation efforts as well as other project components.

The fact that Eco-Schools curriculum practices, engaged with real issues in context contributed to the authenticity which as Uzzell (1999:404) stated, was about school education getting as close as possible to the reality that awaits pupils after school. Through rethinking the approaches to curriculum, transforming the culture of teaching and learning in schools and reconstituting the school as a social institution in relation to the community, other institutions and agencies within society, spaces for legitimate participation by pupils were exposed (Elliot, 1999: 338). However, legitimate participation could not have been encouraged if schools catered for participatory education only by allocating it space in the formal curriculum. What was also important was the manner in which schools promoted actions and the nature of these actions. The participatory approach, consistent with active citizenship, allowed for a whole-school approach to develop.

The essence of the institutional dimension of Eco-Schools was its coherence in implementing the cognitive and affective knowledge constructed in the formal curriculum and in the local learning contexts. However, since institutional practice, social organisation, and links with community were often regarded as marginal to

formal learning and the core educational endeavour of schools, it becomes necessary to innovate approaches such as issues-based approaches to curriculum contextualisation, if environmental issues are to be fully integrated into the school system.

Additionally, integration and infusion of local issues of concern into the teaching and learning processes created an opportunity to use the local school, home and community environments as teaching and learning resources. These contributed to making the curriculum processes, content and methods more relevant and directly linked to the local contexts, experiences and daily lives of the learners and other members of the community (Taylor & Mulhall, 2001). Given that the Eco-Schools programme is strongly oriented towards issues-based approaches, it served as a useful context for curriculum contextualisation using issues-based approaches.

The above findings confirm that the Eco-Schools framework and practices support and enhance issues-based approaches to curriculum contextualisation and problem solving. Further, theoretical work on Eco-Schools (see 3.5), issues-based approaches (see 3.3) and on curriculum contextualisation (see 2.5) is congruent with the results of this study with regard to the Eco-Schools framework and practices being suitable context for issues-based approaches to curriculum contextualisation.

7.7 ANALYTICAL STATEMENT 6:

The Eco-Schools programme in Kenya provides opportunities for establishment of ‘communities of practice’

Evidence from the case studies in phase 2 of this study (see 6.3, 6.4, 6.5 and 6.6) shows that the Eco-Schools programme provides opportunities for establishment of ‘communities of practice’ (Wenger, 1998) with the local environmental and sustainability issues at the centre of negotiation of ‘*joint enterprise*’. The Eco-Schools framework proved to be an ideal structure for a community of practice given that Eco-school activities, which related to aspects of school governance, curriculum work, pedagogical approaches, resource management – particularly through micro-projects, as well as school operations and support, offered useful opportunities for exploration of practice and participation with due consideration of context. This served to consolidate ‘Eco-Schools communities of practice’.

It became apparent that Eco-Schools can facilitate the establishment of communities of practice in which the members of the school and surrounding community constitute the 'community of practice' in each case study school. 'Practice' in the 'communities of practice' in the context of this study included all the Eco-Schools activities that involved both the members of the case study schools and of the surrounding communities. The key characterizing feature of 'practice' in the Eco-Schools 'communities of practice' included: learning by doing in the social, economic, ecological/biophysical as well as political contexts which recognised the members of the school and surrounding community of members of the wider 'community of practice'. This practice was influenced by theory which was generated from both the school curriculum content as well as ideas from members of the local community and experts on specific issues of concern to the community. In this sense, 'practice' in the Eco-Schools communities of practice was congruent with the idea of practice in Wenger's (1998) 'communities of practice'. Which he described as "... doing, but not just doing in and of itself. It is doing in a historical/social context that gives structure and meaning to what we do" (Wenger, 1998:47). The integral nature of practice in Eco-Schools provides insight into Wenger's argument that practice is always social practice, and that the process of engaging in practice always involves the whole person, both acting and knowing at once (Wenger 1998: 47-48). This was evident in the practice of schools for instance, through the learning processes that occurred for both learners in the school and members of community in the course establishing micro-projects. This was also supported by one of the guiding premises of Eco-Schools in Kenya, viz 'learning by doing'.

It can be argued that through this study, 'Eco-Schools communities of practice' were established with the characteristic and constitutive elements akin to those described by Wenger (1998) in his concept of communities of practice. The parallels between the 'Eco-Schools communities of practice' and Wenger's (1998) 'communities of practice' are as discussed below.

Wenger (1998:4) defined a *community* as a group of people who have a common interest in achieving something. In the case of this study, an *Eco-Schools community* was comprised of the members of the school and surrounding community who shared ideas on the best way of achieving their common goal. The 'Eco-Schools community of practice' was thus characterised by *mutual engagement*, *joint enterprise* and *shared repertoire*.

Mutual engagement in all the four case study schools (see 6.3, 6.4, 6.5 and 6.6) involved learners, teachers and other members of the school community mutually engaging with members of the surrounding community and Eco-Schools co-ordinators to address the identified and prioritised environmental issues, risks and associated sustainable development challenges in context through a social learning process. This mutual engagement was founded on the common activities that members of the surrounding communities were involved in for economic well-being as well as environmental/ecological sustainability and social justice. Additionally, mutual engagement was facilitated and enhanced through the functions, negotiations and deliberations of the Eco-Schools committees which drew membership from members of the case study schools and surrounding communities. School-community cooperation and networking elements of the Eco-Schools programme proved useful in enhancing mutual engagement. Further, mutual engagement was enhanced through joint school and community participation in Eco-Schools activities such as environmental auditing, school environmental policy development, development of eco-codes, action planning as well as establishment of micro-projects (see case studies in 6.3, 6.4, 6.5 and 6.6).

Given the evidence from this study, it can be claimed that, mutual engagement realised in the ‘Eco-Schools communities of practice’ was reminiscent of that described by Wenger (1998:73-74) in which he defined a community as ‘people who are engaged in actions whose meanings they negotiate with one another’ and observed that: ‘being included in what matters is a requirement for being engaged in a community’s practice, just as engagement is what defines belonging’ (Wenger, 1998:74).

In the ‘Eco-Schools communities of practice’, *negotiation of a joint enterprise* was based on and informed by the environmental issues, risks and associated sustainable development challenges of concern in the case study schools and surrounding communities. The process of negotiation of a joint enterprise was steered by the Eco-Schools committee. It effectively started with auditing to identify the environmental and sustainability issues of concern. This was followed by vision building that was characterised by consultations and negotiations that ultimately led to the development of Eco-school visions. The visions then guided and became the driving

forces of the school environmental policies, eco-codes and action plans (see case studies in 6.3, 6.4, 6.5 and 6.6).

The Eco-Schools visions, and the process of developing them (see case studies in 6.3, 6.4, 6.5 and 6.6) was similar to the process of negotiation of a joint enterprise as described by Wenger (1998:77-82), in which he referred to joint enterprise as a goal that is shared by members of community of practice as they respond to their situation irrespective of all the factors that might be beyond their control. Wenger considers *negotiation of joint enterprise* as the second characteristic of practice as a source of community coherence. The three points about the enterprise that Wenger (1998:77-78) stated as important for keeping a community of practice together were also evident in the 'Eco-Schools communities of practice'.

The school environmental policies, eco-codes and action plans developed by the case study schools and the entire process of developing them constituted and/or contributed to the *shared repertoire* of the 'Eco-Schools communities of practice'. Specifically, the entire process of developing school environmental policies – which includes visions, missions and shared/agreed values can be explained using the concept of shared repertoire as described by Wenger (1998). This was guided by the Eco-Schools process criteria and was informed by the critical issues of concern brought out by the audit. Additionally, the shared resources and the micro-projects jointly implemented by the case study schools and surrounding communities also constituted an important part of the shared repertoire. This is in line with Wenger's (1998:83) idea that a community's set of shared resources also pass for a *repertoire*, to emphasise both its rehearsed character and its availability for further engagement in practice. The shared repertoire in the 'Eco-Schools communities of practice' reflects Wenger's (1998:83) summary of repertoire as 'routines, tools, ways of doing things, stories, words, gestures, symbols, genres, action or concepts that the community has produced or adopted in the course of its existence, and which have become part of its practice'.

Evidence from the case studies (see 6.3, 6.4, 6.5 and 6.6) further revealed that '*participation*' and '*reification*' emerged as key concepts to negotiating meaning in the practice of 'Eco-Schools communities of practice'. Wenger (1998:52) defines meaning as 'an experience that is located in the process of negotiation of meaning... and negotiation of meaning involves interaction of two constituent processes called

participation and reification and these are fundamental to the human experience of meaning and thus to the nature of practice’.

Participation in the ‘Eco-Schools communities of practice’ emanated from the interaction between and amongst learners, teachers, members of the community and local experts on aspects of the environmental and sustainability issues of concern, as they took part in the Eco-Schools activities/practice (Wenger, 1998:55-57). This participation shaped the experiences in the Eco-Schools communities of practice. Participation was particularly important for collaborative efforts in resolving environmental issues, risks and associated sustainable development challenges in context, and for involvement in the Eco-Schools practices.

The participation of the multiple actors with different experiences, knowledge, skills, values, attitudes and expertise added value to the process of establishing micro-projects in the case study schools. This particularly helped in refining some local practices through discovery and engagement with better ways of managing resources, controlling soil erosion, managing waste, conserving soil and water, tapping renewable sources of energy, growing horticultural crops, harvesting rain water and establishing tree nurseries, among others (see case studies in 6.3, 6.4, 6.5 and 6.6).

The process of vision building, policy formulation and action planning around issues of concern in the four case study schools is reminiscent of Wenger’s (1998:58) description of the concept of ‘*reification*’. Wenger (1998:58-59) cites an example of *reification* as: ‘Writing down a law, creating a procedure, or producing a tool’. This process of reification was evident in the ‘Eco-Schools communities of practice’, as plans, policies, eco-codes, and learning support materials that were developed. Wenger (*ibid*) explains that a certain understanding is given form through reification and that this form then becomes a focus for the negotiation of meaning, as people use the law to argue a point, use the procedure to know what to, or use the tool to perform an action. He concludes by claiming that the process of *reification* so construed is central to every practice.

With regard to networking learning communities, Wenger (1998) explains that communities of practice are connected to the rest of the world and those that belong to a community of practice relate to this world and learn from it. In the case of the

‘Eco-Schools communities of practice’ as emergent and structured in this study, the linkages were explored through networking the case study schools and other schools, local experts, community groups, other organisations doing work related to their themes and issues of focus, as well as other Eco-Schools around the world (specifically Denmark) for purposes of sharing knowledge and experiences so as to enhance efficiency and effectiveness in practice.

7.8 ANALYTICAL STATEMENT 7:

Micro-projects in schools facilitate contextualised curriculum processes, problem solving and school-community cooperation

The micro-projects component of Eco-Schools, which was introduced as part of the action research process in phase 2 of this study (see case studies in 6.3, 6.4, 6.5 and 6.6) served to facilitate contextualised curriculum processes, problem solving and school-community cooperation. This was in response to the literature review (see 2.5) and findings from phase 1 of this study (see Chapter 5) that revealed the decontextualised nature of the primary school curriculum in Kenya. The decontextualised curriculum, coupled with the absence of micro-project initiatives as part of curriculum practice, apparently limited possibilities for meaningful engagement with issues-based approaches to curriculum contextualisation (see 7.2) and for problem solving and school community cooperation.

Micro-projects served as facilitators of contextualised curriculum processes in all the case studies (see 6.3, 6.4, 6.5 and 6.6). They were used as teaching and learning resources for the learners in the school and members of the surrounding communities. The fact that the micro-projects were targeted at addressing local environmental and sustainability issues, offered unlimited opportunities for learners and community members to make responsible decisions and develop the knowledge and skills needed for practical interventions to address environmental issues, risks and associated sustainable development challenges in context (see case studies in 6.3, 6.4, 6.5 and 6.6).

Further, establishment of micro-projects offered opportunities for learners and local communities to learn in local contexts about the local environmental issues, risks and associated sustainable development challenges and how to address them through micro-projects and related activities. Cooperation with local communities in the

learning process led to sharing and exchange of relevant knowledge, skills, resources and expertise between the case study schools and the surrounding communities (see case studies in 6.3, 6.4, 6.5 and 6.6).

The micro-projects further helped the case study schools to develop their own environmental education curriculum practice with emphasis on practical hands-on activities at the micro-project sites, thus complementing classroom theoretical teaching and learning (see case studies in 6.3, 6.4, 6.5 and 6.6). Additionally, the micro-project based teaching and learning activities also engaged the surrounding community in development of better practices that could be replicated in the community and in individual homes. The micro-projects can therefore be said to have acted as learning centres for better practice on the environmental and sustainability issues that were of major concern in the local community.

Additionally, *micro-projects served as key instruments for problem solving* in the four case study schools. This was by way of directly or indirectly contributing towards addressing real environmental issues, risks and associated sustainable development challenges in context, thereby contributing towards improving the quality of the environment and livelihoods in the school and the surrounding community (see the issues addressed and problems solved in the case studies in 6.3, 6.4, 6.5 and 6.6). However, the exact extent of improvements in the quality of the environment and livelihoods could not be established owing to the limitations of this study.

The extra income generated through the sale of produce from micro-projects could also have contributed towards the income base of the case study schools (see case studies in 6.3, 6.4, 6.5 and 6.6), thereby partly contributing towards the general development of the school. The head teacher of Kandiege Primary School (see case study 6.5), reported to have assisted orphaned children in the school through the proceeds from the micro-projects. However, the head teachers of the other case study schools did not make exact disclosures of the extra income realised and how it was utilised. The researcher could also not follow up more closely or make demands for this information for fear of it being interpreted as a breach of ethical practice. Evidence of income earnings from micro-projects in all the case study schools was, however, convincing.

The surrounding communities at Kosawo and Kandiego primary schools (see 6.3 and 6.5 respectively) directly benefited by buying groceries from the school horticultural micro-projects at subsidised prices. This helped them save some money which they could spend on other commodities. In this case, the micro-projects could have made a direct contribution towards poverty alleviation in the surrounding community. Additionally, the micro-projects contributed to easy access and local availability of these commodities therefore saving the local communities some time and energy that would otherwise have been spent walking long distances in search of these commodities. The products and produce from St. Joseph's Ombo and Muhoroni Township Primary Schools (see 6.4 and 6.6 respectively) also made similar contributions towards addressing their respective issues in context.

Micro-projects also helped to enhance best practices in resource management both directly and indirectly. Through micro-project interventions, water management and conservation was enhanced in St. Joseph's Ombo Primary School. Additionally, soil erosion was controlled which led to improvements in land management (see 6.4). Resource management improvements realised in other case study schools as a result of micro-project interventions included; waste management at Kosawo Primary School, energy resource management as well as biodiversity conservation at Muhoroni Township Primary School, and land and water management at Kandiego Primary School (see 6.3, 6.6, and 6.5 respectively).

Micro-projects served as facilitators and enhancers of school-community cooperation in a number of ways. Establishment of micro-projects offered opportunities for the case study schools to cooperate with local communities around the local environmental issues, risks and associated sustainable development challenges of concern. This cooperation centred on sharing of knowledge, skills, resources, services and expertise – based on the issues - between the school and members of the surrounding community (see school-community cooperation in the case studies in 6.3, 6.4, 6.5 and 6.6). Micro-projects formed the hub of school-community cooperation in all the case study schools due to the wide range of micro-project activities that were of interest to both the schools and local communities.

Micro-project activities based on the local environmental and sustainability issues of concern brought together learners, teachers, community members and local experts in the four case study schools (see case studies in 6.3, 6.4, 6.5 and 6.6). Some

community groups that closely cooperated with the school in establishing the micro-projects benefited from a grant of ten thousand Kenyan shillings from Eco-Schools. This went towards the establishment of similar or related micro-projects in the community targeting the prioritised environmental and sustainability issues of concern – further enhancing school community cooperation.

Additionally, the selling of micro-project products and produce to members of the surrounding community at subsidised prices, rendering of free services by community members to the school micro-projects e.g. free caretaking of micro-projects during school holidays and by the schools to the community e.g. community clean-ups by Kosawo Primary School (see 6.3) further served to enhance and strengthen school-community cooperation (see also other case studies in 6.3, 6.4, 6.5 and 6.6). The use of micro-projects as training, demonstration and learning sites for community members on better practices around the local environmental and sustainability issues of concern in the respective contexts further served to enhance and strengthen school-community cooperation (see case studies in 6.3, 6.4, 6.5 and 6.6).

Evidence from phase 2 of this study (see Chapter 6) confirmed that micro-projects were useful in enhancing contextualised curriculum practices using issues-based approaches, thereby making curriculum relevant and appropriate to local contexts. Micro-projects also provided opportunities for addressing real issues in context through teaching and learning processes. These would have been much easier in a critical curriculum context than it was through a technocratic curriculum context (Cornbleth, 1990).

Additionally, using micro-projects to enhance curriculum contextualisation, problem solving and school-community cooperation gained from the work of Grundy (1987), in which she advanced the concept of ‘curriculum as praxis’. Important implications of Grundy’s work in this regard included: *Curriculum is constructed within actual learning situations with actual students* – which establishment of micro-projects partly provided; *learning is a social process* – which as shown in this research can involve interaction with members of the local community through school-community cooperation in establishing the micro-projects; and *curriculum knowledge is socially constructed and subject to critique and reconstruction (or interpretation or meaning*

making) – which the process of collaborative establishment of micro-projects caters for.

Cornbleth (1990) argued that curriculum emerges from the dynamic interaction of action, reflection and setting, not action and reflection alone as put forth by Grundy (1987). Establishment of micro-projects in the case study schools provided useful context for action and reflection in context, thereby facilitating contextualised curriculum processes, and problem solving and school-community cooperation.

Further, establishment of micro-projects contributed to socially critical environmental education, which recognizes a reciprocal relationship between teachers, schools and society in which “...formal education is both shaped by, and responsive to the needs of society and, in turn, helps to shape the society of which schools are part” (Lotz-Sisitka, 1996:38). Additionally, Fien’s (1993:15-16), ideas of the three approaches to environmental education namely; Education *about* the environment, education *through* the environment, and education *for* the environment and their ideological bases find relevance in this case. The use of micro-projects as teaching and learning resources helped facilitate education *for* the environment in terms of enhancing contextualised curriculum processes, problem solving and school-community cooperation. The successful establishment and use of micro-projects as a teaching and learning resource in the case study schools also helped reinforce Stevenson’s (1987:73), view that education *for* the environment involves engaging students in the intellectual tasks of critical appraisal of environment (and political) situations and the formulation of a moral code concerning such issues, as well as the development of a commitment to act on one’s values by providing opportunities to participate actively in environmental improvement.

Micro-projects establishment and use as teaching and learning resources also fitted well into the issues-based enquiry approach model suggested by Gough (1992) and Chambers (1995). Micro-projects were particularly useful for action-taking to address the prioritised environmental and sustainability issues in context, enhancing cooperation with members of the community in all the five steps of the process as well as facilitating contextualised curriculum processes.

7.9 ANALYTICAL STATEMENT 8:

The issues-based enquiry approach to pedagogy can help enhance curriculum contextualisation within a wider technocratic orientation to curriculum

Despite the limitations posed by the technocratic orientation of the curriculum to issues-based approaches to curriculum contextualisation, it became evident from the results of the action research case studies in phase 2 of this study (see 6.3, 6.4, 6.5 and 6.6) that it was actually possible to address real environmental issues, risks and associated sustainable development challenges in context through contextualised curriculum processes. This was made possible through some key components of the Eco-Schools programme that served as useful context for enhancing detailed and sustained engagement with issues in the curriculum (see 7.5).

Using the Eco-Schools framework and activities, identification and prioritisation of the environmental and sustainability issues of concern was made possible through auditing. These then formed the basis of subsequent curriculum-linked activities aimed at addressing the issues in context. Subsequent activities included; formulation of school environmental policies and eco-codes geared towards addressing the issues, action planning, establishment of micro-projects to address the issues of concern in context, school-community cooperation and networking to address the issues of concern as well as contextualised teaching and learning processes, using appropriate pedagogical approaches focusing on the identified and prioritised environmental and sustainability issues. Evidence from this study shows that the Eco-Schools framework, strategy and activities supported an issues-based enquiry approach to pedagogy. However, the design and conduct of this study could not allow for trials, comparisons and verification of results in contexts beyond the Eco-Schools framework. This potentially limits the applicability and generalisation of these findings owing to the fact that the national schools coverage of Eco-Schools is still low.

Issues-based enquiry (Gough, 1992; Chambers, 1995), as a participatory, learner centred approach, offered learners opportunities to develop an awareness and understanding of local environmental issues, and explore possible ways of addressing them through contextualised teaching and learning processes. The teaching and learning processes also made links to the real world of the learners through teaching and learning activities that enabled learners to engage with real

issues affecting them and their communities. This approach represented a departure from traditional approaches which van Harmelen and Irwin (1995) criticised for making little, if any, links to the real world of the learners.

The issues-based enquiry approach advanced by Gough (1992) and Chambers (1995) enhanced curriculum contextualisation through its phases namely: Planning, investigating and researching aspects of the theme and particular issues of concern, communicating and interpreting the results of the investigations, reflecting on the investigation and taking action. Despite the many constraints and limited opportunities for issues-based approaches presented by the prevailing technocratic orientation to curriculum in Kenya, this study moved beyond the identification of constraints to change, and actively encouraged and explored the search for possibilities for change in spite of the apparent constraints presented by the technocratic orientation to curriculum. This direction was inspired by among others, Simon's (1992) ideas and Wilmot (2000:129) who argued for the need for reconstructing educational practices that engender a pedagogy of possibility, so that transformation is possible.

Further insight and guidance was gained from the '*Education in Action: A Community Problem Solving Programme for Schools*' work of Wals, Beringer and Stapp (1990) and Mabunda's (1999) work on '*Educating for Socio-Ecological Change; Case Studies of Changing Practice in South African Tertiary Institutions*'.

Pedagogical activities during auditing served to link teaching and learning activities with the local contexts. This is because they involved going into communities and interacting with members of the community to establish the state of affairs and issues (see case studies in 6.3, 6.4, 6.5 and 6.6).

Pedagogical approaches associated with investigating and researching aspects of the issues in the school and community (see case studies in 6.3, 6.4, 6.5 and 6.6) further enhanced curriculum contextualisation. This was by way of providing opportunities for learners to find out and understand the real state of the issues of concern in the local school and community context. In so doing, teaching and learning processes were contextualised. Additionally, pedagogical approaches associated with communicating and interpreting the results of the investigations helped in enhancing

curriculum contextualisation. This was mainly through the language subjects such as English and Swahili.

Opportunities for communicating and interpreting results of the investigations to the learners and members of the community were also provided in the language subjects i.e. English and Swahili (see case studies 6.3, 6.4, 6.5 and 6.6). Creative writing, public speaking and poetry in the respective languages served to raise awareness about the state of the issues in context and also appeal for action to address the identified issues of concern, while at the same time building the requisite language skills among the learners. This enhanced curriculum contextualisation by providing opportunities for relating school curriculum activities to real issues in context.

Pedagogical approaches for reflecting on the investigations further served to enhance curriculum contextualisation in the case study schools. This was by way of teachers guiding learners to make suggestions and decisions on the best approaches towards addressing the issues of concern in context (see case studies in 6.3, 6.4, 6.5 and 6.6), with due regard to their causes. These reflections were often founded on the findings of the audit.

Action-oriented pedagogies directed at addressing the issues of concern further contributed to curriculum contextualisation. This was mainly through integrating practical steps to address the real environmental and sustainability issues in context with the day to day teaching and learning processes. The process of establishing micro-projects based on the issues of concern further provided suitable opportunities for developing practical skills in context (see case studies in 6.3, 6.4, 6.5 and 6.6). This approach was reminiscent of the orientation to education promulgated by environmental educators such as Fien, Gough, Robottom and Spork in Fien (1993). Wilmot (2000) also recommends them due to their emphasis on development of skills and capacities in learners, problem solving, decision-making and promotion of values and attitudes necessary for sustaining life on this planet.

7.10 REFLECTIONS ON THE FINDINGS

The findings from this study as presented above cannot be claimed to have been perfect. It is worth mentioning once more that several difficulties and challenges were encountered and a few inconsistencies noted. Some of these have been highlighted in the discussion as captured while other underlying tensions remain. At the end of this study for instance, it was apparent that some teachers still seemed uncomfortable with some of the approaches and methods introduced into their curriculum planning and practice through this study. Such scenarios are, however, not unique to this study given the dynamics involved in studies of this nature.

7.11 CONCLUSION

The findings from this study point to the conclusion that issues-based approaches can be used in Eco-Schools contexts to strengthen and enhance curriculum contextualisation and improve the relevance of the curriculum to communities in Kenya, through addressing real issues in context.

The key findings of this study indicate that issues-based approaches, through participatory and learner centred approaches in the context of the Eco-Schools programme in Kenya contributed to curriculum contextualisation within the prevailing technocratic orientation to curriculum. However, the constraints and challenges presented by this orientation to curriculum were addressed using innovative approaches and strategies.

To reap better results and gains from issues-based approaches to curriculum contextualisation in environmental education, it would be a good idea to consider a shift towards a critical orientation to curriculum, whose characteristic features can be more supportive and enabling for effective contextualisation using issues-based approaches. This and other recommendations are discussed in the next chapter, Chapter 8.

CHAPTER 8

SYNTHESIS AND RECOMMENDATIONS

8.1 INTRODUCTION

This thesis has outlined the contextual, policy and theoretical situation of the study, methodology followed, the contextual review, the action research process of trying out issues-based approaches to curriculum contextualisation in four primary schools in Nyanza province of Kenya as well as the key findings from the study. This section gives a snapshot of the entire study and gives the main recommendations from the study as well as recommendations for further research for possible consideration. It also gives reflections on the research process by outlining what would be done differently if the research was to be done all over again.

8.2 SYNTHESIS OF THE STUDY

The broader purpose of the research was to establish the potential of contextualised approaches to curriculum development for guiding environmental education curriculum processes in Kenya during the UN Decade of Education for Sustainable Development in response to environmental issues, risks, and associated sustainable development challenges. Pursuant to this, the study sought to find out whether issues-based approaches in Eco-Schools contexts serve to strengthen contextualisation and relevance of the curriculum to local contexts, and what could be done to orientate the curriculum to better achieve this. In this endeavour it was desirable to first gain a clearer understanding of the existing curriculum processes so as to establish the opportunities as well as the challenges presented to issues-based approaches to curriculum contextualisation during phase 1 of the study. The second phase of the study explored innovation towards contextualisation of curriculum through issues-based approaches in the context of Eco-Schools, in four primary schools in Nyanza province of Kenya.

Given that Kenya's economy and the livelihoods of her people are dependent on natural resources, which are increasingly under pressure from unsustainable use and population pressure resulting in environmental degradation and proliferation of other issues, risks and associated sustainable development challenges, there arose a challenge to work towards sustainable economic development, social and

environmental justice as well as social cohesion and ecological sustainability. During this study, socially critical, issues-based and contextualised environmental education curriculum processes resulted in real local environmental and sustainability issues being addressed in context through teaching and learning processes. These were informed and guided by policy and theoretical underpinnings (see Chapters 2 and 3).

The two-phase design of this study ensured that a clear understanding of current environmental education practice in the primary schools was first gained during the first phase of the study. This was achieved through a survey that was guided by the interpretivist research tradition. Insights gained from the survey later informed and fed into the action research case studies- guided more by a socially critical research tradition- that explored issues-based approaches to curriculum contextualisation and local problem solving in the context of the Eco-Schools programme in the four case study schools (see Chapter 4). Further, the research methodology in this study adopted the approach of looking at methodology in terms of a research process and not ‘methods’ and ‘stages’ of qualitative research. This was occasioned by the need for reflexivity in the course of the research as well as the need to balance between my job demands in the Eco-Schools log frame-based programme and the demands of my study.

The contextual review conducted during Phase 1 of this study revealed narrow interpretations in the conceptions of the terms ‘environment’ and ‘environmental education’ as well as in the resource materials used in Kenyan primary schools (see 5.2.1, 5.2.2, and 5.2.4) that tended to narrow down the scope and limit the practice of environmental education. It also emerged that the content and pedagogy in environmental education practice in Kenyan primary schools was largely determined and guided by the subject syllabi and school textbooks (see 5.2.4) which regrettably did not substantially conform to the objectives and guiding principles of environmental education (UNESCO-UNEP, 1978). These raised the possibility of limiting or failing to adequately support issues-based approaches to curriculum contextualisation. This necessitated innovation and creativity through an action research process to try out issues-based approaches to curriculum contextualisation within the Eco-Schools framework in the four case study primary schools (see Chapter 6).

The action research case studies in the four primary schools in Nyanza province of Kenya (see 6.3, 6.4, 6.5 and 6.6) demonstrated that issues-based approaches can be used in Eco-Schools contexts to strengthen and enhance curriculum contextualisation and improve the relevance of the curriculum to communities in Kenya, through addressing real issues in context, despite the constraints and challenges presented by the prevailing technocratic orientation to curriculum. The Eco-Schools framework and strategy (see 3.5) offered a suitable, enabling and supportive context for curriculum contextualisation using issues-based approaches (see Chapters 4, 6 and 7). Establishment of income generating micro-projects targeting the identified local environmental and sustainability issues of concern, particularly strengthened contextualisation and problem solving by providing relevant teaching and learning opportunities for acquisition of skills, knowledge, values and attitudes necessary for addressing issues in context (see case studies in 6.3, 6.4, 6.5, and 6.6).

Key findings from this study highlight some constraints and challenges to issues-based approaches to curriculum contextualisation. These constraints and challenges are related to the prevailing curriculum orientation, practices and resource materials as well as the widely held but narrow conceptions of the terms ‘environment’ and ‘environmental education’. However, despite the identified constraints and challenges, evidence from the action research case studies suggests that issues-based approaches, through participatory and learner centred approaches in the context of the Eco-Schools programme in Kenya could significantly contribute to curriculum contextualisation within the prevailing technocratic orientation to curriculum. Specifically, it emerged that the Eco-Schools framework and practices appeared to support and enhance issues-based approaches to curriculum contextualisation and problem solving with auditing playing an important role in situating learning processes, focusing attention on issues, thus enhancing curriculum contextualisation. Additionally, micro-projects established in the case study schools served to facilitate contextualised curriculum processes, problem solving and school-community cooperation. The issues-based enquiry approach to pedagogy raised the possibility that it could help enhance curriculum contextualisation within a wider technocratic orientation to curriculum. The other significant finding from this study was that the Eco-Schools programme in Kenya appeared to provide opportunities for establishment of communities of practice with the local environmental and sustainability issues at the centre of negotiation of ‘*joint enterprise*’. It also became evident that the action research process in the four case study schools opened up

possibilities for engagement with issues-based approaches to curriculum contextualisation.

CRITICAL REFLECTIONS ON THE RESEARCH PROCESS

The journey through this study was never without second thoughts on how better I would have navigated through it. These thoughts always struck me whenever I felt frustrated, confused, and on the verge of resignation during the gruelling moments of data analysis and in the process of writing up the thesis when I found myself with thrice the number of page limits agreed upon with my supervisors for specific chapters. Having come to the end of the journey, I wish to keep record of these thoughts to serve as permanent reminders of those moments, as well as to offer encouragement and direction to others who may come across this thesis while in similar circumstances. If I were to do this research all over again, I would undertake several steps differently, however, I am not going to enumerate them all here, but rather outline some of the most critical ones, in order to provide a reflexive account of the study.

Setting up the scope of this study proved to be both inspiring and challenging. The consequences of which will remain in my memory as vital lessons learnt. Due to the frustrations that I went through in managing and analysing the vast amounts of data that I found myself with, one of my key considerations given another chance would be a more manageable and narrower scope of study that would provide for a more focused data collection process that yields just enough data.

Additionally, the breadth and process of this study required several extra encounters and longer uninterrupted sessions than was provided for and could be supported by the funding that I tapped into during this study. This was partly because the study was not part of the project activities, but a venture I carefully pursued on realising the inherent opportunity in the course of my work in the project. Given another chance to pursue this study, I would first seek adequate funding before embarking on it. I would also opt for a distinct research path that would be independent of the influences of the Eco-Schools project design log-frame (see CR 8.1). This is due to the fact that this study had to flow at the pace of the log-frame activities given the dependency of the study on the design, resources, and funding of the Eco-Schools pilot project in Kenya. This implied that delays and lags in the project translated into

delays and lags in the study as well; a factor which contributed to the long duration of the study.

The research methodology (see Chapter 4) was guided by an enabling research orientation leading to the approach of looking at methodology in terms of a research process and not 'methods' and 'stages' of qualitative research. This allowed for reflexive engagements, critical reviews and research findings feeding into each other at intervals in a reflexive process. However, the action research process in phase 2 of the study generated too much data that necessitated the use of a case record for easy management. This, however, partly worked to my advantage during analysis and writing due to the fact that I had adequate data in specified locations and formats to draw from. However, the result of the bulk of data is a somewhat generalised account of what took place, as it was not possible to analyse each piece of data in minute detail. Analysis was therefore of a broader nature. More detailed analyses of all data sets are possible, and could be the subject of more detailed papers in future (e.g. one might conduct discourse analysis studies of the school environmental policies and eco-codes for example) to consider how the discourse is constituted in relation to the concepts of technocratic and contextualised curriculum. This level of analysis was not possible in this study. Similarly, detailed interview analysis could shed more insight into the processes of identity formation in the Eco-Schools communities of practice, but again, this level of detailed analysis was not possible in this study.

Managing the research process in relation to workplace structures and requirements further presented challenges to this study. The frustrations and limitations that come with a rigid project log-frame, and a lack of appreciation (by the project management) for the value that research in the course of duty would add to the overall project performance and success, leads me to the conclusion and consideration that, it would have been a good idea to have provisions for study leave from duty at intervals through the research process. This would allow for considered and more intensive engagement with literature review and theoretical work for purposes of informing subsequent phases of the study. Additionally, this would enable writing up of sections or chapters of the study at regular intervals. This might also have helped to address the problem of data overload that I experienced.

Another problem that I encountered was to maintain a reflexive research-informed distance from the project implementation processes. While it was easy to become enthusiastic about the successes of the micro-projects for example, it was more difficult to consider them critically and reflexively. This is a common difficulty in action research processes where the researcher is both an actor in the action process, and researcher 'looking into' the action processes. At times I found myself over-claiming in relation to the success of the project, and had to rely on my supervisors to remind me to provide evidence for claims being made in relation to the action research processes in the schools. Compiling a case record and developing themes for analysis out of the data helped to provide this distance.

8.3 SUGGESTIONS AND RECOMMENDATIONS FOR FURTHER WORK

The study suggests a number of environmental education issues which need to be revisited and/or further investigated if environmental education curriculum processes are to become relevant and linked to local contexts and communities in Kenya. In particular, the discrepancy between the problem-solving and action-oriented goals associated with the contemporary philosophy of environmental education on the other hand, and an emphasis on the acquisition of environmental knowledge and awareness in school programmes. This had also been pointed out by among others (Childress, 1978; Greenall, 1981; Maher, 1982; Robottom, 1982; Volk, *et al.*, 1984; Stevenson, 1987). Stevenson (1987; 2007) described it as the gap between the rhetoric and philosophy of environmental education and the reality of practices in schooling.

I also offer possible perspectives and opportunities for further research where appropriate. These are grounded in my experience in this study and in the evidence, findings and results realised in the course of the study. Some perspectives represent brief overviews of the potential research areas which I was not able to pursue further in enough depth in this research.

It is not the intention of this thesis to prescribe particular options for adoption, but rather provide suggestions for possible consideration with due reference to and as informed by the findings of this study. Based on the limited scope of this study, a number of tentative recommendations are made.

8.3.1 To further support, strengthen and enhance the use of issues-based approaches to curriculum contextualisation in Eco-Schools, it is necessary to develop other alternative approaches to the existing curriculum orientation and practices and to adopt, adapt, or develop appropriate resource materials

Evidence in Chapter 6 indicated that, to strengthen issues-based approaches to curriculum contextualisation, it was necessary to work with the critical orientation to curriculum and to extend curriculum practices to include communities. Additionally, it is suggested that future curriculum reviews should provide for school-based integration of local contemporary environmental issues, risks and associated sustainable development challenges. This will enhance and strengthen issues-based curriculum contextualisation and also empower teachers to play a role in ongoing curriculum development with due regard to context as well as help bridge the long established tendency to separate curriculum development from instruction.

For Eco-Schools to further strengthen work with issues-based approaches, the findings from this study lead me to recommend ongoing explorations of alternative approaches to curriculum and curriculum practices as modelled in Eco-Schools case studies.

Further, given the identified deficiencies of the teaching and learning resource materials currently in use in schools (see 5.2.4.4), and given the process and products of resource materials development initiative in the Eco-Schools programme in Kenya, and the enhanced understanding of issues-based curriculum contextualisation, I propose deliberate ventures towards adopting, adapting or developing teaching and learning resources that could support and enhance issues-based approaches to curriculum contextualisation.

The findings of this study notwithstanding, I still see the need for further research into other ways of enhancing relevance and links of curriculum to contexts. The insights gained from issues-based approaches to curriculum contextualisation through this study could be considered as possibilities for further engagements with issues of curriculum relevance and links to contexts within and beyond issues-based approaches and technocratic orientations to curriculum.

8.3.2 To enable broader and holistic engagement with issues-based approaches to curriculum contextualisation, there is need to encourage teachers to deliberate meanings of ‘environment’ and ‘environmental education’ in relation to their contexts and practices so as to reconceptualise the terms ‘environment’ and ‘environmental education’ guided by foundational documents and the current contextual realities

Evidence from Chapter 6 (see 6.2) showed that deliberation of, and subsequent adoption of common understandings of the terms ‘environment’ and ‘environmental education’ at the start of the action research process in four case study schools helped to develop a broader and holistic understanding of the terms. This in turn enabled broader and holistic engagement with issues in the curriculum thus enhancing and improving engagement with issues-based approaches in curriculum contextualisation as shown by the process and results in the four case studies (see 6.3, 6.4, 6.5 and 6.6). For further success in enabling broader and holistic engagement with issues-based approaches to curriculum contextualisation in the context of Eco-Schools, it is recommended that strategies for deliberating common meanings of the terms ‘environment’ and ‘environmental education’ be developed and adopted by teachers with due consideration of contextual realities and influences in ecological, economic, socio-cultural and socio-political realms and guided by the definitions provided in the key foundational documents of environmental education , with due knowledge that these are also changing, as can be seen from recent contents of the Ahmedabhad Declaration and Recommendations (UNESCO, UNEP and GOI (Government of India), 2007:2-3).

8.3.3 Auditing should be encouraged and emphasised as the first step in issues-based or any other approaches to curriculum contextualisation

Evidence from case studies in Chapter 6 (see 6.3, 6.4, 6.5 and 6.6) indicated that auditing focuses attention on issues situates learning processes and enhances curriculum contextualization. To further strengthen and enhance issues-based approaches to curriculum contextualisation in the context of the Eco-Schools programme in Kenya, it is recommended that auditing should be encouraged and emphasised as a key step in the process of designing issues-based or alternative approaches to curriculum contextualisation. The auditing process should be holistic (include ecological, economic, socio-cultural and socio-political aspects) as well as be extended to include school, home and community environments all of which are part of the local context that situates and shapes curriculum.

To further consolidate the important role that auditing could play in curriculum processes, further research is recommended into how auditing shapes curriculum practice and pedagogies as well as how it could link into teaching and learning resource materials so as to support and enhance issues-based approaches to curriculum contextualisation.

8.3.4 To further enhance and strengthen curriculum contextualisation using issues-based approaches, it is necessary to emphasise engagement with issues in planning and whole-school development work

Evidence in Chapter 6 indicates that engagement with issues in planning and whole-school development work served to enhance and strengthen curriculum contextualisation using issues-based approaches in ways discussed in Chapter 7 (see 7.5). To successfully address real environmental issues, risks and associated sustainable development challenges in local contexts using issues-based approaches to curriculum contextualisation in the context of Eco-Schools, it would seem appropriate to put engagement with issues at the centre of planning and whole-school development work in schools as demonstrated in the case studies in this study (see 6.3, 6.4, 6.5 and 6.6). Additionally, to further increase the relevance and linkages of curriculum processes to local contexts, further research work on engagement with local issues of concern in curriculum processes is recommended.

8.3.5 The Eco-Schools framework and practices need to be widely adopted in Kenyan primary schools so as to support and enhance issues-based approaches to curriculum contextualisation and problem solving

Literature on Eco-Schools (see 3.5) and evidence from Chapter 6 shows that the Eco-Schools framework and practices can successfully support issues-based approaches to curriculum contextualisation. To realise the benefits associated with issues-based approaches to curriculum contextualisation at a national scale, it is recommended that the Eco-Schools framework and practices be widely adopted in Kenyan schools. Additionally, ongoing explorations through research is recommended amongst others in the following areas: curriculum links that are possible through Eco-Schools activities; alternative approaches to curriculum practice using the Eco-Schools framework and practices model; strengthening of school-community cooperation; socially critical environmental education and the theoretical underpinnings around

which Eco-Schools is modelled as well as professional development, with the view to enhancing problem solving in curriculum practice.

Further, it is recommended that the Eco-Schools programme in Kenya establishes a closer working relationship with the Ministry of Education, particularly the divisions of policy development and implementation, quality assurance and the Kenya Institute of Education (KIE) so as to seek ways of integrating the Eco-Schools approach and strategy into mainstream education policy. This could improve the practice of environmental education in Kenya given the transformative potential of Eco-Schools for environmental education practice, issues-based curriculum contextualisation, curriculum relevance to local contexts and communities as well as problem solving and action-orientation in context.

8.3.6 ‘Eco-Schools communities of practice’ need to be supported to emerge, in response to local environmental and sustainability issues

Evidence from Chapter 6 of this study and the subsequent discussion in Chapter 7 (see 7.7) indicates that, the Eco-Schools programme in Kenya provides opportunities for establishment of communities of practice, comprising members of the school as an institution and members of the surrounding community. The local environmental and sustainability issues formed the centre of negotiation of *‘joint enterprise’*. However, the study could not elaborately explore all the dynamics and characterising features and attributes of communities of practice as conceived by Lave and Wenger (1991; Wenger, 1998). More in-depth research into how these communities of practice emerge, how they learn, and how they are sustained could add valuable insights to those already gained through the four case studies in this study.

Given the evidence that the ‘Eco-Schools communities of practice’ that were emergent in the four case study schools (see 6.3, 6.4, 6.5 and 6.6), had the potential to develop into sustainable communities of practice and/or action, characterised by the concern for, desire and drive to address the environmental issues, risks and associated sustainable development challenges; it would be interesting to further pursue the establishment of such communities of practice.

8.3.7 Establishment of micro-projects in schools should be encouraged to facilitate contextualised curriculum processes, problem solving and school-community cooperation

Evidence from Chapter 6 and the subsequent discussion in Chapter 7 (see 7.8) indicated that micro-projects played a critical role in enhancing contextualised curriculum processes, problem solving and school community cooperation by among other roles - acting as teaching and learning resources. To further enhance socially critical environmental education processes and the associated benefits in context, it is recommended that the use of micro-projects as teaching and learning resources be strongly considered in curriculum practice. This is due to the many strengths and advantages with regard to curriculum contextualisation, problem solving and skills development that come with using micro-projects in teaching and learning.

8.3.8 To enhance curriculum contextualisation within a wider technocratic orientation to curriculum, it is necessary to adopt the issues-based enquiry approach to pedagogy

Results of the action research case studies in phase 2 of this study (see 6.3, 6.4, 6.5 and 6.6) indicated that it was possible to enhance curriculum contextualisation despite the limitations posed by the prevailing technocratic orientation of the Kenyan curriculum. This was made possible through some components of the Eco-Schools programme that served as useful context for enhancing detailed and sustained engagement with issues in the curriculum (see 7.5) thus supporting issues-based enquiry approach to pedagogy. The evidence from the results, which point at the possibility to address real environmental issues, risks and associated sustainable development challenges in context through contextualised curriculum processes, lead to the recommendation that issues-based enquiry approach to pedagogy needs to be strongly considered for use in schools given its potential in enhancing curriculum contextualisation and problem solving in context, even within a technocratic orientation to curriculum.

The findings of this study notwithstanding, I still see the need for, and therefore recommend ongoing explorations of alternative approaches to curriculum and curriculum practice in pursuit of enhancement of curriculum relevance and links to local contexts through problem solving.

8.4 CONCLUSION

Throughout this research process, I sought to explore several underlying factors influencing environmental education practice in Kenya and to make meaning and inferences out of key words, phrases, sentences, data and other phenomena that I encountered. Along the way, I read several pieces of literature which helped me to navigate and gain insights into the issues in context that I was studying. Based on insights gained from survey data, I sought to try out issues-based approaches to curriculum contextualisation through an action research process in four case study schools, with the hope that this would provide insight into whether issues based approaches could contribute towards improving the current environmental education practice in Kenya. All this was done in a search for understanding and better practice in environmental education in Kenya. When I look back to the start of this study, it is possible to imagine a different way of doing this research, but in retrospect, this would not change the experiences, perspectives, insights, skills and knowledge that I have gained through this research project. Valuable insights into the potential of the Eco-Schools project for fostering contextualised curriculum development have been gained in a developing country context. While the findings from this study cannot be generalized to all Eco-Schools projects, there may be some useful insights that others can draw from it.

The findings of this study tend to favour the argument that the current orientation to curriculum in Kenya, certain aspects of the current environmental education practice in Kenyan primary schools, and the teaching and learning resource materials, need to be rethought and reconsidered so as to support issues-based approaches to curriculum contextualisation within and beyond the Eco-Schools framework. The success and potential for enhancing curriculum relevance and links to contexts and communities, through addressing environmental issues, risks and associated sustainable development challenges in the process of teaching and learning, as unveiled through the action research case studies promises I believe, a better future for socially critical environmental education practice in Kenya, and possibly elsewhere.

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APPENDICES

APPENDIX A:

AN INVENTORY OF THE DATA SOURCES

DATA FILES

DF1	Policy documents and analyses.
DF2	Selected resource materials for critical review.
DF3	Critical review comments for the selected resource materials.
DF4	Field notes.
DF5	Questionnaire data.
DF6	Interview data.
DF7	Focus group discussion data.
DF8	Workshop reports.
DF9	Photographs.
DF10	Correspondence.
DF11	Eco-Schools pilot materials.
DF12	Published Eco-Schools materials.
DF13	Eco-Schools reports.

DF14	Diaries and schedules.
DF15	Eco-Schools project document and amendments.
DF15	Environmental education journals and an assortment of selected papers.
DF16	Rhodes University research design course materials.
DF17	Eco-Schools documentary video.
DF18	Eco-Schools TV programme interview video clip.
DF19	Eco-Schools radio programme interview audio tape.
DF20	Eco-Schools newspaper articles.
DF21	Research project outputs from teachers i.e. Integration and infusion plans, schemes of work and lesson plans.
DF22	Primary school syllabi.
DF23	Papers presented during Eco-Schools trainings and sensitisations.
DF24	International Eco-Schools materials.
DF25	Criteria for critical review of environmental education materials.
DF26	Case study school reports.
DF27	Eco-Schools criteria.
DF28	Research design and research proposal.
DF29	Assorted video clips from school visits, workshops, and reflection and progress review sessions

APPENDIX B:

AN INVENTORY OF THE CASE RECORD

CONTENTS (Volume 2)

The items in the case record have been ordered according to appearance in the main text.

CHAPTER 1

CR1.1 Research proposal.

CHAPTER 2

CR2.1 Criteria for critical review of resource materials.

CHAPTER 4

CR4.1 Questionnaires administered to groups of teachers during sensitisation sessions.

CR4.2 Standardised open-ended interview schedules used in the group interviews.

CR4.3 Focus group discussion questions administered to teachers.

CR4.4 A list of selected curriculum support resource materials reviewed.

CR4.5 Some of the policy documents of relevance to environmental education that were analysed during the study.

CR4.6 The open-ended questions administered to establish teachers' understandings of environmental education.

CR4.7	Group interview schedules conducted with teachers.
CR4.8	Focus group discussion questions with groups of teachers.
CR4.9	Some of the documents analysed in the light of the focus of this study.
CR4.10	Criteria for selection of case study schools in this study.
CR4.11	Environmental auditing guidelines used by the case study schools.
CR4.12	Schedule of workshops in the case study schools.
CR4.13	A sample of the research notes taken during school visits.
CR4.14	Guidelines for minute taking provided to the case study schools and a sample of minutes.
CR4.15	A sample of the notes made from the Eco-Schools committee meetings.
CR4.16	An example of a school environmental policy.
CR4.17	Guidelines for developing school environmental policies in case study schools.
CR4.18	Criteria developed for assessing feasibility of micro-projects in the case study schools.
CR4.19	A sample of data collected from case study schools on micro-projects establishment.
CR4.20	Schedule of monthly support visits to the case study schools.
CR4.21	Sample of case study school visit report.

CR4.22	Resource materials developed in the course of the study.
CR4.23	Sample field notes.
CR4.24	Sample case study school visit report.
CR4.25	Sample school environmental audit report.
CR4.26	Sample school environmental policy.
CR4.27	Sample interview data.
CR4.28	Sample questionnaire data.
CR4.29	Sample focus group discussion data.
CR4.30	Sample workshop report.
CR4.31	Sample lesson plan.
CR4.32	A sample of coded data.
CR4.33	Sample analytic memo.
CR4.34	Sample requests for ethical permissions.
CR4.35	Wrap up memo at the end of the research process and Eco-Schools pilot phase.

CHAPTER 5

CR5.1	Individual questionnaire administered to teachers.
CR5.2	Group interview schedule administered to teachers.
CR5.3	Questions asked during focus group discussion 1.

CR5.4 Questions asked during focus group discussion 2.

CHAPTER 6

CR6.1 Some definitions of the term ‘environment’ given by teachers during the workshop on reconceptualisation of terms.

CR6.2 A listing of the components of the environment provided by teachers during the workshop on reconceptualising terms.

CR6.3 Some common conceptions of ‘environmental education’ held by Kenyan teachers.

CR6.4 Some key words adopted by teachers as important in defining ‘environmental education’.

CR6.5 List of scholars and environmental education (EE) documents in which environmental education has been defined and used for comparison.

CR6.6 Goals, objectives and principles of Environmental Education.

CR6.7 Excerpt of notes from reconceptualisation environmental education workshop.

CR6.8 Guidelines used for environmental auditing in schools.

CR6.9 Summarised environmental audit report of Kosawo Primary School.

CR6.10 The action plan for Kosawo Primary School.

CR6.11 An example of an integration plan.

CR6.12 An example of an infusion plan.

CR6.13	Teacher Scheme of Work for class six Maths.
CR6.14	An example of a lesson plan.
CR6.15	Photocopied pages of lesson plans from the Teachers Guide for Upper Primary level.
CR6.16	An example of a learner's poem on the issue of poor waste management.
CR6.17	Business letter exercise given to class seven pupils.
CR6.18	The waste handling and sorting shed at Kosawo Primary School.
CR6.19	The vegetable gardens at Kosawo Primary School.
CR6.20	Some of the recyclable waste materials in Kosawo ready for the market.
CR6.21	Some of the photographs taken during the Eco-Schools exhibition day at Kosawo Primary School.
CR6.22	The improved and clean school grounds of Kosawo Primary school.
CR6.23	A photograph taken during one of the training sessions at Kosawo Primary School with a facilitator from K-CORE Community Based Organisation.
CR6.24	A photograph taken during one of the clean-up exercise at Kosawo.
CR6.25	The bare and eroded school grounds at St. Josephs Ombo Primary School.

CR6.26	The summarised environmental audit report of St. Joseph Ombo Primary School.
CR6.27	The action plan for St. Joseph's Ombo Primary School.
CR6.28	Infusion plan for class 7 Science developed at St. Joseph's Ombo primary school.
CR6.29	Infusion scheme of work for class 7 Science developed at St. Joseph's Ombo Primary School.
CR6.30	Exemplar lesson plans developed at St. Josephs Ombo Primary School and later included in the teachers' guide.
CR6.31	Guidelines on how various teaching and learning methods and approaches can be used effectively in teaching and learning processes.
CR6.32	Exemplar lesson plans with water scarcity, poor water management and conservation and soil degradation due to erosion as the issues of focus.
CR6.33	A copy of the record of water use in St. Joseph's Ombo Primary School.
CR6.34	A record of rainfall as kept by class seven learners at St. Joseph's Ombo Primary School.
CR6.35	Some of the investigation and research activities carried out by pupils at St. Joseph's Ombo Primary School.
CR6.36	Some creative writing exercises given to pupils at St. Joseph's Ombo Primary School.

CR6.37	Some photographs showing the transformation of the school grounds at St. Joseph's Ombo Primary School through erosion control.
CR6.38	Photographs of the roof rainwater harvesting micro-project at St. Joseph's Ombo Primary School.
CR6.39	Photograph of school – community cooperation in establishing the tree nursery micro-project at St. Josephs Ombo Primary school.
CR6.40	The summarised environmental audit report of Kandiege Primary School.
CR6.41	The action plan of Kandiege Primary School.
CR6.42	Lesson plan for unsustainable agricultural practices.
CR6.43	Lesson plan for unsustainable agricultural practices and poverty.
CR6.44	Excerpt of minutes from an Eco-school committee meeting at Kandiege Primary School.
CR6.45	A Mathematics exercise related to auditing given to class seven pupils as Kandiege Primary School.
CR6.46	Some of the research questions as used in the teaching and learning process at Kandiege Primary School.
CR6.47	A collection of some exercises given to the pupils to improve communication and interpretation skills at Kandiege Primary School.
CR6.48	Grammar exercise on sentence construction at Kandiege Primary School.
CR6.49	An activity developed by the Science teacher for class eight pupils.

CR6.50	Field notes taken during an informal discussion with the teachers of Kandiege Primary School.
CR6.51	Learners during a practical session in the farm at Kandiege Primary School.
CR6.52	An excerpt of field notes taken during a review and reflection session with the teachers of Kandiege Primary School.
CR6.53	Some photos taken during the open day at Kandiege Primary School.
CR6.54	Excerpt of field notes from a review and reflection session at Kandiege Primary School.
CR6.55	An excerpt of field notes taken during a review and reflection session on school – community cooperation at Kandiege Primary School.
CR6.56	Summarised school environmental audit report for Muhoroni Township Primary School.
CR6.57	The action plan for Muhoroni Township Primary School.
CR6.58	Some lesson extracts from Muhoroni Township Primary School.
CR6.59	Exemplar activities on the issue of energy developed from lesson plans at Muhoroni Township Primary School.
CR6.60	An activity developed by a maths teacher at Muhoroni Township Primary School.
CR6.61	Table designed for purposes of assessing energy use at Muhoroni Township Primary School.

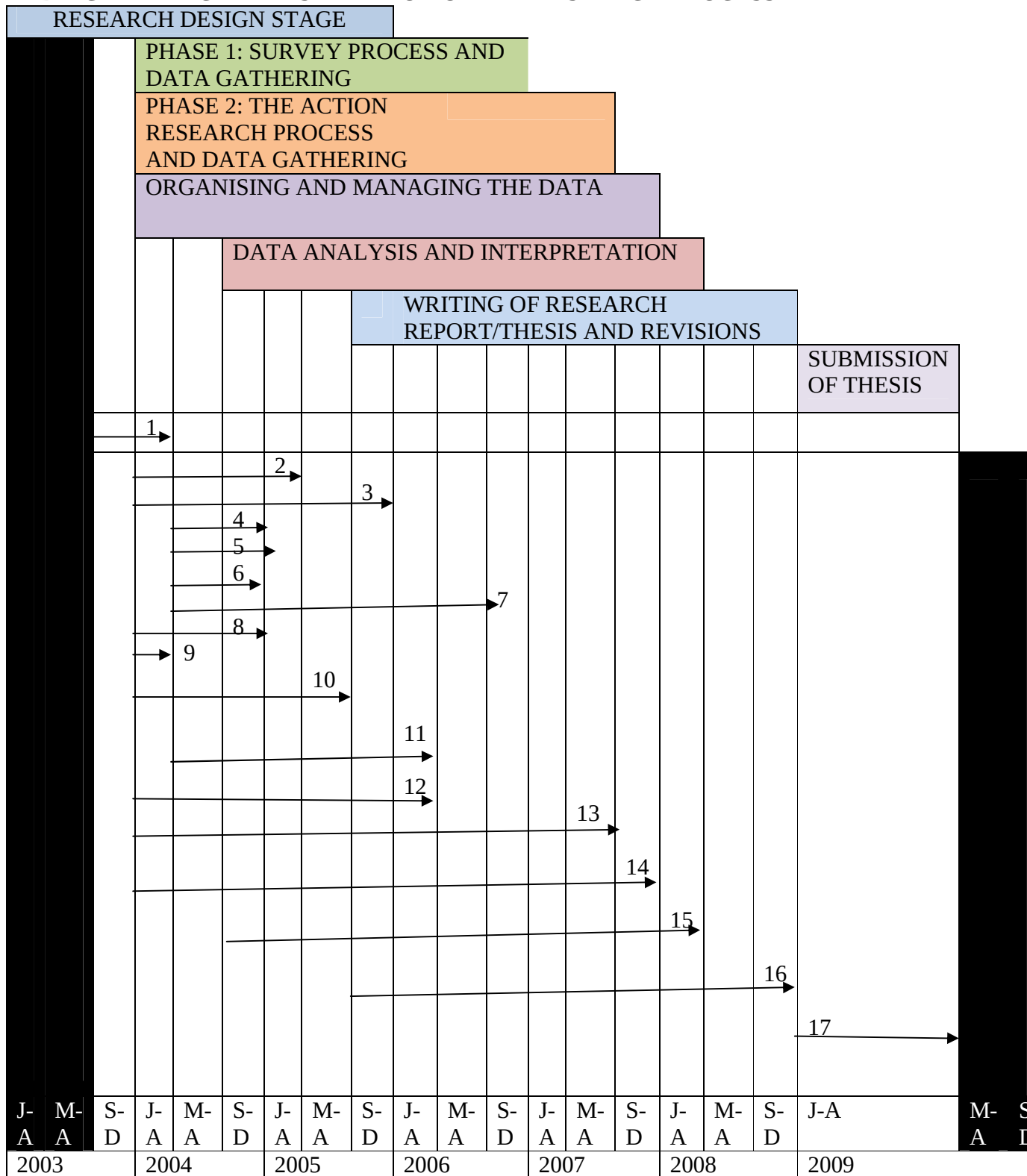
- CR6.62 Some investigation and research questions on energy developed at Muhoroni Township Primary School.
- CR6.63 Some creative writing activities on the issue of energy at Muhoroni Township Primary School.
- CR6.64 Photographs of some action taking pedagogies at Muhoroni Township Primary School.
- CR6.65 An excerpt of field notes from an informal evaluation of outcomes at Muhoroni Township Primary School.

CHAPTER 8

- CR8.1 The Eco-Schools Kenya project design log-frame.

APPENDIX C:

A DIAGRAMATIC REPRESENTATION OF THE RESAERCH PROCESS



KEY

- 1 - Conceptualisation of the research focus
- 2 - Proposal writing and revisions
- 3 - Development of methodologies, formulation of research methods, techniques and tools
- 4- Questionnaires
- 5- Interviews
- 6 - Focus group discussions
- 7 - Document analysis
- 8- Sensitisation meetings
- 9 - Selection of schools and negotiating access
- 10 - Environmental auditing; prioritisation of actions, issues to address; and action planning
- 11 - Workshopping; document analysis; participant observation; Eco-school committee meetings; development of school environmental policies; micro-project activities; school support.
- 12 - Observing outcomes
- 13- Critical reflection
- 14 - Organising and managing the data
- 15 - Data analysis and interpretation
- 16 - Writing of research report/thesis and revisions
- 17 - Submission of thesis