PERMACULTURE AS AN ASPECT OF ENVIRONMENTAL LEARNING: AN INVESTIGATION INTO SECONDARY SCHOOL COMMUNITIES IN ZIMBABWE

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PERMACULTURE AS AN ASPECT OF ENVIRONMENTAL LEARNING: *AN INVESTIGATION INTO SECONDARY SCHOOL COMMUNITIES IN ZIMBABWE*

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ABSTRACT

The Schools and Colleges Permaculture (SCOPE) Programme in Zimbabwe has developed a process for use by schools in planning for the sustainable management of their land. The process is called Integrated Land-Use Design (ILUD) and is based on Permaculture principles. The ILUD process has so far been implemented in 54 pilot schools where it has been used to facilitate the re-design of the school grounds through the active participation of the students, staff and parents.

The aim of this research was to investigate what environmental learning takes place during the implementation of the ILUD process and related activities, with a view to informing the improvement of the process.

The research was conducted within the interpretive paradigm with particular use being made of the Symbolic Interactionist theoretical framework to explore the social situations in which the ILUD process has been applied. A purposive sample of two schools and five form 4 (grade 11) pupils from each school was selected for the study. The main data collection method was the structured interview. Other data were collected from non-participant observations and the analysis of documents, particularly photographs. The data was analysed using the constant comparative method.

The findings point towards a significant contribution from the Permaculture activities to the environmental knowledge, environmental management skills and the positive environmental attitudes of the pupils. The work done at the two schools indicates the usefulness of the ILUD process as a tool for environmental action in the schools but its application in the communities was found to be limited by constraints such as lack of resources and the limited capacity of teachers to work in the field of adult education and training. It is recommended that Permaculture should be integrated into the secondary school curriculum if the momentum of the progress made so far is to be maintained. The SCOPE Programme itself needs to be strengthened for its work with communities. There is, for example, a need for adult education and training methods if the introduction of ILUD to the communities is to be successful.

DEDICATION

I dedicate this thesis to Mr. Shumbayaonda whose good teaching led me to the joys of trying to understand our complex environment and to my children, Simba and Cynthia who face the challenge of living in a troubled, impoverished and endangered world.

PREFACE

I conducted this research while I worked as National Co-ordinator for the SCOPE Programme. From the onset I realised that there was a danger of a conflict of interest arising from my position as the head of the organisation in which I was investigating an implementation process. This influenced my choice of research focus from a purely evaluative study to one that aimed at investigating the contribution of Permaculture to environmental learning at the two schools.

The study took place at a difficult time in the year 2000 when there were crippling fuel shortages, runaway inflation and the general instability that accompanied the general elections of June 2000. Other challenges included the long distances to the study sites and the demands on my time of doing the M.Ed. programme on a part-time basis while working in a severely short-staffed environment. The language difference between some of the respondents and myself was eventually less of a problem than I had anticipated because I found most of the respondents quite conversant in English.

In spite of these problems, I am proud of this research, which I think comes at an opportune time when the SCOPE Programme is expanding. The research highlights the importance of having methods that cover the broad spectrum of needs that Environmental Education (EE) programmes should try and address. The stakeholders in the SCOPE Programme should find the report particularly useful as well as anyone who has not had the opportunity to be familiar with Permaculture as it relates to schools.

I wish to acknowledge my indebtedness to the following people and institutions that contributed in various ways to make this study possible:

My supervisor, Prof. Pat Irwin, whose clear guidance always gave me hope that I would see this work through.

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The staff, parents and children at Mavela and Ntepe secondary schools and in particular Ms Siziba, Mr Mangazha, Mr. D Ndlovu, Mr. M. Ndlovu and all colleagues at institutions working with the SCOPE Programme for the unbridled support that I received from them.

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DESCRIPTOR WORDS AND TERMS

Permaculture in schools in Zimbabwe

Integrated land-use design in schools in Zimbabwe

Environmental Education in Zimbabwe

Environmental learning/Knowledge/Skills by/of Zimbabwean secondary school pupils

Environmental Action/Management by pupils in Zimbabwe

Sustainable land-use/Agriculture in schools in Zimbabwe

Make your own notes.
NEVER underline or
write in a book.

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CHAPTER ONE

The key to sustainable, self-reliant development is education – education that reaches out to all members of society through new modalities and new technologies in order to provide genuine lifelong learning opportunities for all ... We must be ready, in all countries, to reshape education so as to promote attitudes and behaviour conducive to a culture of sustainability.
UNESCO (1997:1)

1.0 ORIENTATION TO THE STUDY

1.1 BACKGROUND TO THE STUDY

The main motivation behind this research comes from my involvement with the Schools and Colleges Permaculture (SCOPE) Programme in Zimbabwe, which has been engaged in pioneering work in the area of Permaculture in the curriculum (see Appendices G, M and N). The SCOPE Programme is an environmental education programme that is using Permaculture as a tool for sustainable environmental management (SCOPE Programme 1997b). The Programme was started in 1994 with 18 pilot schools in nine provinces taking part, and now has 54 schools and 4 colleges participating countrywide (see Appendices I and K). The work of this programme needs to be subjected to scrutiny for the benefit of others who might want to utilise their methods.

Permaculture or *perma*nent agri*culture* is an approach to sustainable agriculture that was developed in Australia in the 1970's (Mollison 1988:1X). It is based on observations of natural systems and more information about the principles and practices of Permaculture will be given in chapter 2. In Zimbabwe some of the Permaculture techniques have been refined by the SCOPE Programme to develop a process for use by schools in planning for the sustainable management of their resources, particularly land (SCOPE Programme 1997a). This process or tool has been termed Integrated Land-Use Design (ILUD) and it is used by representatives of school communities, (parents, pupils, and staff) to produce plans for the sustainable utilisation of their land (PELUM Association 1995, SCOPE

Programme 1996). It is a step-by-step process facilitated by the Scope Programme, which the school communities can use to implement Permaculture (see Appendix L).

The ILUD process involves the participants in using several observation techniques to develop a common understanding of their environment. These techniques are based on practical rural appraisal (PRA) methodology in which the active involvement of the participants is of paramount importance (Murkhejee 1993). The drawing of simple sketch maps and transects of the area under consideration are some of the techniques that are used. The holistic resource management (HRM) model is then used to formulate a broad goal for the school (Savory 1988). The HRM model makes the proposition that sustainable resource management should be guided by a goal that takes in the following three aspirations of stakeholders on any given piece of land:

- The values that the people would like to promote
- The future landscape that the people would like to have
- The forms of production that would enable the people to produce the desired landscape (Savory 1988).

The principle of integration (see footnote) is thereafter used to produce a design for improving the management and utilisation of all the land and other resources at the school. Finally the participants draw up plans of action for implementing their design and also decide on tools for monitoring their work. Schools, to review progress in implementing their Permaculture designs every year, also use the ILUD process.

The stages in the ILUD process are:

1. Situational analysis - developing a common understanding among the participants of the existing situation using observation techniques.
2. Holistic goal formation - developing a broad picture of what the school community would like to achieve, in respect of the improvements that they would like to have on their land.
3. Integrated design - the use of Permaculture principles to produce a land-use plan.
4. Plans of action and monitoring - drawing up schemes of work and deciding on ways of checking progress (SCOPE Programme 1996).

[1] Integration is here used to refer to the relationships that can be established between two or more environmental elements such as the companion plants in an intercropping system.

The ILUD process is the main frame of reference for all training workshops that are run by the SCOPE Programme. The main training is given to two teachers from each participating school during two-week in-service workshops in Permaculture and ILUD run by the SCOPE Programme. Further training is given during the weeklong ILUD implementation workshops run at each participating school for representatives of the parents, staff and pupils. This training is aimed at giving the participants the following skills:

- Planning for sustainable land-use management
- Producing integrated designs for a given area
- Organic production
- Environmental management (including soil and water conservation)
- Monitoring progress

The participants are expected to apply these skills in their immediate local environment after having participated in setting up demonstrations of the techniques during the workshops that are held at the schools. The application of the skills by pupils and parents is done under the supervision of teachers who receive two week in service training in ILUD. Integration, zoning and sector planning are some of the techniques that are used and these are described in more detail in Section 2.5.

1.2 RESEARCH FOCUS AND AIMS

The main aim of this research was to contribute towards the improvement of the ILUD process and its implementation in schools in Zimbabwe. In order to achieve this goal, the subsidiary aims were:

- To investigate and critically examine the contribution of the Permaculture approach to the environmental learning of the pupils involved in the implementation of the ILUD process.
- To explore the extent to which Permaculture techniques such as integration of elements, zoning and sector planning are applied in the ILUD process in schools.
- To assess the levels of community participation in the implementation of Permaculture in schools.

This study focused on the contribution to the pupils' environmental learning of the ILUD process. Learning itself takes place in many contexts and also occurs when one is

involved in the act of doing something. In the context of this research, learning may be defined as a process of acquiring knowledge, skills and values in the context of socio-economic activities and then incorporating them into lifestyles. Following Karembu & Kinyanjui (1997:12) environmental learning includes the following three aspects:

- The acquisition and transmission of knowledge, skills, values and attitudes for sustainable environmental management and living.
- The processes, methods and approaches for the effective acquisition and transmission of knowledge, skills and values to individuals and communities; and
- The application and utilisation of what is learnt in dealing with environmental concerns by individuals, communities and society.

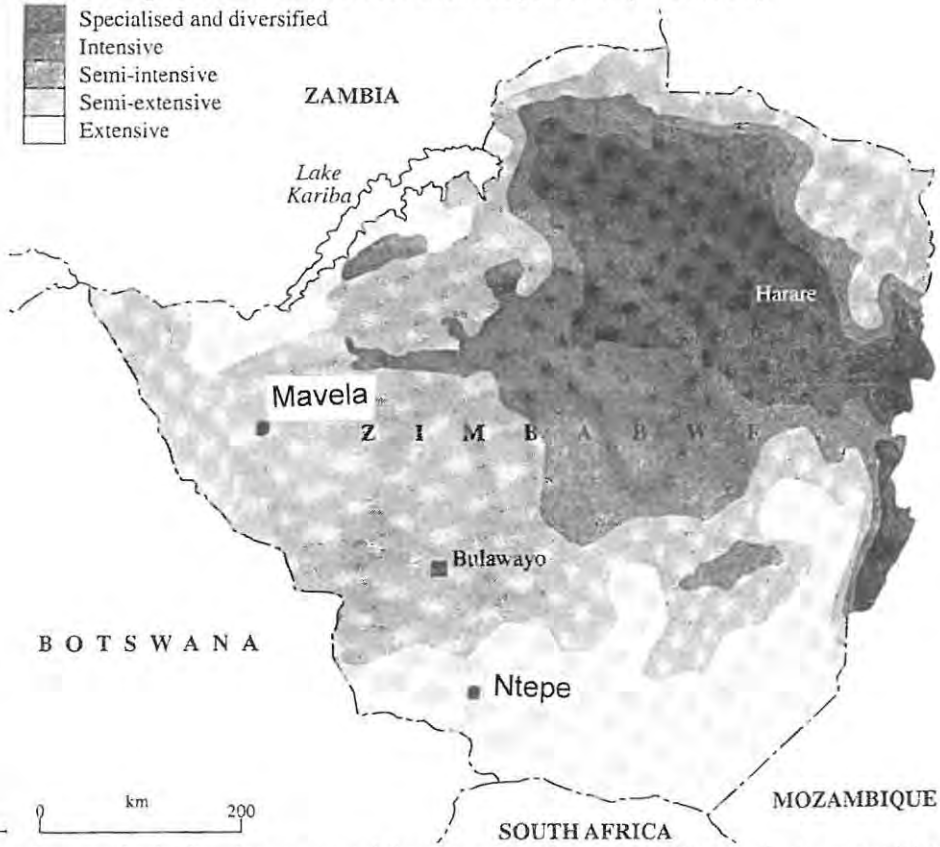
This is quite a broad interpretation of the process of environmental learning that includes contexts, which are beyond the focus of this study. The three elements of environmental learning listed above are a good description of what environmental education (EE) aims at accomplishing. However, the second aspect of methods, approaches and processes of transmission of knowledge, skills and values to individuals and communities may not be directly relevant to pupils. Many schools tend to focus on the aspect of transmitting knowledge in order to raise awareness of environmental issues. The schools participating in the SCOPE Programme are, however, also assisted to apply what is learnt by taking action to resolve local environmental issues. Given the wider context of environmental education, it is important for learning programmes to develop competencies in all three areas described above if they are to make a significant impact on the environment (Hammond 1994).

Thus, in the context of this research, learning may be defined as a process of acquiring knowledge, skills and values in the context of socio-economic activities and then incorporating them into lifestyles. Hammond (1994), and Karembu & Kinyanjui (1997) agree on the diverse nature of the contexts within which environmental learning takes place and that it can and should contribute to the development in learners of all three competencies listed above. It is the focus of this research to explore the contribution of the ILUD process to the environmental learning of the pupils in the schools participating in the SCOPE Programme.

1.3 THE STUDY SITES

This study is an investigation of the use of Permaculture in environmental management and curriculum development in two schools in western Zimbabwe that have been participating in the SCOPE Programme. The study took place during the period June to September 2000 at Mavela and Ntepe secondary schools in Matabeleland North and South provinces respectively. Both schools are rural day government schools located in communal areas. Although they are more than 200 km apart, the two schools are in the hot and dry extensive and semi-extensive [2]**agro-ecological regions** described as being only suitable for semi-extensive farming (Moyo *et al.* 1993). Zimbabwe has been divided into five such zones as shown on the map in figure 1.1.

Figure 1.1: The location of Mavela and Ntepe secondary schools in relation to the Agro-ecological regions of Zimbabwe. After Moyo *et al.* (1993:307).



[2] An agro-ecological region or natural farming region is an area with a particular potential to support agriculture. The potential is derived from an assessment of rainfall patterns. See Moyo *et al.* (1993) and Whitlow (1989). The extensive and semi-extensive agro-ecological regions receive a mean annual rainfall of 450 – 650 mm and are subject to seasonal drought.

Mavela secondary school is in the Tsholotsho communal area, Tsholotsho district while Ntepe secondary school is in the Garanyemba communal area, Gwanda District. Communal areas are state lands whose land use rights used to be vested in the chiefs but are increasingly under the control of local authorities, particularly rural district councils (Mpinga 1994). This means that the communities around the two schools consist of an agrarian population made up of small-scale peasant farmers. In communal areas each family has the right to till a piece of land as allocated by the local leadership but the pastures are a shared resource for the whole community. Farmers have no title to land, which they could use as security against loans drawn from lending institutions. The main livelihood for the peasants in this part of the country is from livestock farming although they also grow maize and millet on a small scale. The communal areas, formerly called Tribal Trust Lands, were created on arid and impoverished soils (McIvor 1997). The agrarian communities here are generally poor except for those families who have their breadwinners working in the cities or in neighbouring countries. In fact, secondary schools in these two provinces experience a high dropout rate as some of the youth are engaged in illegal emigration to the neighbouring countries in search of work (Ndlovu, pers. comm. 2000, Siziba, pers. comm. 2000).

In Zimbabwe, the macro political setting during the colonial period resulted in the majority of the country's farmers being concentrated on less than half of the country's agricultural land, most of which is agriculturally marginal (Moyo *et al.* 1991). This means that the communal farmers have been cultivating land that is not suitable for the purpose and in the process land degradation has resulted. In addition, high population densities resulted in increased pressure on the marginal land and this further compounded the problems of erosion and poverty. Land degradation is a serious problem in the communal areas of Zimbabwe (Whitlow 1989).

The pupil population at the 2 schools is made up of 13 to 17 year-old adolescent children doing form 1 to 4 (grades 8 to 11) leading to 'Ordinary' level examination. The responsible authority at both schools is the government. However, the communities play a central role in the running of the schools through their School Development Associations (SDAs). Decision-making power in the Ministry of Education, Sport and Culture is increasingly being decentralised (Nziramasanga 1999).

Mavela and Ntepe secondary schools have similar physical and socio-economic settings but there are a few differences. The first one is that Mavela is situated at a large rural district service centre while Ntepe is situated near a small rural service centre. Rural district service centres are the economic growth points and administrative centres for their respective districts while rural service centres are the smaller centres consisting of a few shops and sometimes a clinic or school (The Whitsun Foundation 1978). Districts are the largest administrative units in a province. Zimbabwe is divided into nine provinces and 63 districts giving an average of seven districts per province.

Another difference between the two schools is that of the length of time each has been participating in the SCOPE Programme. Mavela secondary school joined the SCOPE Programme at the launch of the first phase in mid-1994, while Ntepe secondary school joined phase three of the Programme in 1998. The two schools were selected by the Ministry of Education, Sport and Culture at the provincial level for the following reasons:

1. Potential to do well in the Programme as assessed from previous performance in related programmes.
2. A high sense of commitment to the Programme's ideals by the School Head.
3. Relatively easy access to the school by visitors and Programme managers (Bokma, pers. comm. 1999).

Mavela School was selected more for the second and third reasons while Ntepe was selected for the first and third reasons. The experiences in the Programme so far have indicated that the commitment of the Head is crucial for the successful implementation of ILUD (SCOPE Programme 1999). The two schools showed minor differences in their performance in public examinations over a five-year period (see Table 1.1). The average percentage pass rate for Mavela secondary school for the period 1994 to 1998 was 8.3 while that for Ntepe was 10.1 over the same period.

Table: 1.1 Summary of the Ordinary level results for Mavela and Ntepe secondary schools over a five year period.

YEAR	Total no. of candidates who sat the exam.		Overall % pass rate (pupils with 5 or more subjects		% pass rate for Geography		% pass rate for Science		% pass rate for Ndebele		% pass rate for English	
	M	N	M	N	M	N	M	N	M	N	M	N
1994	36	112	5.6	9.0	6	-	13	42	70	-	8	13
1995	46	95	4.3	8.4	10	18	14	18	74	64	17	6
1996	54	114	14.8	8.8	12	6	13	33	73	62	19	17
1997	54	113	9.2	8.9	24	20	7	37	93	67	11	14
1998	66	115	7.6	15.4	3	13	18	36	72	47	12	13

KEY

M- Mavela secondary school

N- Ntepe secondary school

Both schools are located in CAMPFIRE districts. CAMPFIRE is an acronym for the Communal Areas Management Programme For Indigenous Resources and is a community based natural resources management (CBNRM) project working in 22 districts in the country (McIvor 1997). The CAMPFIRE Programme seeks to place the custody of the resources with the resident communities and to produce a framework within which they can manage and benefit from them (Moyo *et al.*1993). Although the CAMPFIRE Programme has been presented as a success story in many fora (McIvor 1997), there are some problems that relate to the management of the Programme at district level. Although a full discussion on these is beyond the scope of this study, it might be noted that there are reports of disharmony between the communities and the local district councils particularly over the distribution of the benefits from the CAMPFIRE Programme (McIvor 1997).

1.4 STRUCTURE OF THE RESEARCH REPORT

This chapter has introduced the reader to the research study. In the next chapter, various concepts used in EE in Zimbabwe will be explored in the context of this study. Chapter 3 describes and explains the methodology used in the study in addition to providing a criticism of the design, methods and content of the research. Chapter 4 examines the knowledge base of the respondents as gauged by their understanding of key Permaculture and environmental concepts.

In chapter 5 the environmental actions that have been carried out by the respondents will be reported with a view to describing their environmental management practices and a critical analysis of the opportunities that are emerging in the schools is also presented. The final chapter brings the work to a conclusion by providing a summary of the findings and the recommendations of the research study.

CHAPTER TWO

The worst thing that we can do to our children is to convince them that ugliness is normal (Rene Dubos as quoted in Orr 1999:229)

2.0 CONCEPTUAL AND CONTEXTUAL FRAMEWORK OF THE RESEARCH

2.1 INTRODUCTION

The aim of this chapter is to locate this study within the context of the secondary school curriculum in Zimbabwe and the EE processes that are taking place there. Concepts that are relevant to the study are clarified. The chapter also describes and critically examines the environmental issues that led to the formation of the SCOPE Programme. The chapter closes with an overview of relevant research that has been conducted on related issues in Zimbabwe.

2.2 CURRICULUM AND CURRICULUM PROCESSES

This section traces the development of the concept of curriculum from the work of early curriculum theorists to the current situation. The processes of curriculum work in Zimbabwe will be described in relation to the theory of curriculum.

The traditional definition of the term 'curriculum' following its Latin origins and the work of early curriculum theorists like Franklin Bobitt (1918), was that it was "a course of study" (quoted in Taylor and Richards 1985, Sparg and Winberg 1999). This view of the curriculum reflects the bias towards content of the early work on curriculum theory. In this approach to the curriculum, subjects are the basic organising units. This limits learning to a selection of subjects and also poses the danger of the subjects ending up as an end in themselves rather as a means to an end.

In 1949 Ralph Tyler came up with what was to become a major shift in curriculum work when he outlined the need for clear objectives in curriculum planning (Sparg and Winberg 1999). In his book, *Basic Principles of Curriculum and Instruction,* Tyler laid the

foundations for outcomes based education and a shift to a product-based or objectives oriented curriculum planning. This approach is closely associated with behaviourist theory and has been criticised for assuming that all educational outcomes can be measured (Taylor and Richards 1985).

In present-day Zimbabwe the product-based curriculum perspective seems to be the dominant approach in the formal school system as much emphasis is put on the preparation of instructional objectives. The curriculum development process in Zimbabwe is centralised with most of the work being done by a central Curriculum Development Unit (CDU), that is part of the Research and Policy Development Division at the head office of the Ministry of Education, Sport and Culture (Mabvakure 2000, pers. comm.). The CDU, one of the stakeholders in SCOPE, works in consultation with a cascading system of subject panels that is designed to promote the participation of teachers and other key stakeholders such as teacher education officials in the curriculum process. The SCOPE Programme is housed within the CDU in order to facilitate collaboration between the two organisations (SCOPE Programme 1997b).

Criticism of the product-based models and the development of another approach to curriculum planning came in the 1960's and 70's from people such as Jerome Bruner and Lawrence Stenhouse (Sparg and Winberg 1999). They challenged the idea of absolute knowledge and suggested that the learning process was more important. It seems that both the product and the process-based theories of curriculum planning are inadequate because they both ignore some of the social processes that are at work in curriculum development. There are issues of power and control that tend to influence the pace and direction of curriculum development work.

Another perspective on the curriculum, informed by socially critical theory (Freire, et al in Sparg and Winberg 1999), rejects both the product and process based approaches and sees the curriculum as a political and social, as well as an educational and intellectual construct. The curriculum is here seen to be shaped by various factors such as the policies in commerce and industry, government regulations, and the availability of resources. It also includes both the intended and unintended outcomes of educational programmes. The curriculum is thus viewed from a socially critical orientation, which entails questioning

appearances and taken-for-granted practices, and probing assumptions and implications (Cornbleth 1990).

This approach is a useful tool in helping us understand the workings of the curriculum but it does not provide much in terms of clear guidelines for use by curriculum developers. I therefore think that all four approaches have something to offer the curriculum developer and the use of any one of them should depend on the specific needs of the context in which curriculum planning is taking place. Following on the work done by Cornbleth, Stiles (1999) suggests that common components of a curriculum include:

- Programmes and projects including syllabi
- Materials and resources
- Teaching methods and styles
- Views of the learners
- Interactions of learners and educators
- Assessment and evaluation processes

This list of components of the curriculum is useful in curriculum development work as it can be used as a guide or frame of reference. In this study it will be used as a framework in the critique of the EE curriculum at the schools involved in the study.

Following the developments in curriculum theory described above, the curriculum has been defined as "the aggregate of all that we impart to our learners, through the total experiences of the school system, in a deliberate design to achieve educational goals" (Cornbleth in Nziramasanga 1999:232). This broad view of the curriculum was also used in recent attempts to develop a regional curriculum framework for the Southern African Development Community (SADC-REEP 1999). The problem with this definition is that although it is broad, it does not specify what different kinds of experiences are involved in the learning. In this study the curriculum is taken to be the total intended and unintended experiences of learners and the intended and unintended aims of the teachers, which may occur both within and outside the formal education system.

2.3 ENVIRONMENTAL EDUCATION IN THE CURRICULUM

2.3.1 Clarifying environmental education

In this section, EE is placed within the overall framework of the concept of curriculum and an understanding of related concepts involved will be built up. The environment has long been seen as an important aspect of the Zimbabwean curriculum (Manjengwa 1995). The roles and methods in education that are used to tackle environmental issues have been termed EE and, in Zimbabwe, the term environmental education has been widely adopted (Stiles 1994, Manjengwa 1995, Manjengwa, Price & Stiles 1999, Nyika & Stiles 2001).

The recent Presidential Commission of Enquiry into Education and Training in Zimbabwe had this to say about environmental education:
Environmental Education enables learners to explore the environment, to investigate, identify concerns and to take action to make the world a place that sustains life. It promotes social, physical, spiritual, economic and political patterns of behaviour of individuals, groups and society as a whole. Environmental Education is flexible participatory, empowering, problem solving and action-oriented. It is holistic and covers such areas as development, population, health, peace, human rights, democracy, citizenship, hunger, and sustainable management of land, water, flora, fauna and air (Nziramasanga 1999:376).

Sometimes EE has been narrowly interpreted to mean only the scientific aspects of the environment so that it is seen as Environmental Science when in effect it is a transdisciplinary process (Hill 1999). The narrow view of EE also encompasses its interpretation as the environmental knowledge, skills and attitudes transmitted in the disciplines of Geography and Science, which in Zimbabwe are taught at the secondary level. Meadows (1989:5) notes that EE is "learning how to manage and improve the relationship between human society and the environment in an integrated and sustainable way". This wider perspective on EE is born out of a broader conception of the environment, which recognises that environmental problems are linked to political, social and economic processes and concerns (O'Donoghue & Janse van Rensburg 1995).

Increasing concern for sustainability over the last few decades has resulted in environmental issues being taken to be at the forefront of economic development. In this report EE is taken as a broad framework that brings together biophysical, social, economic and political issues in a search for a more sustainable pattern of life. Figure 2.1 shows the many interrelated processes in a broad view of the environment.

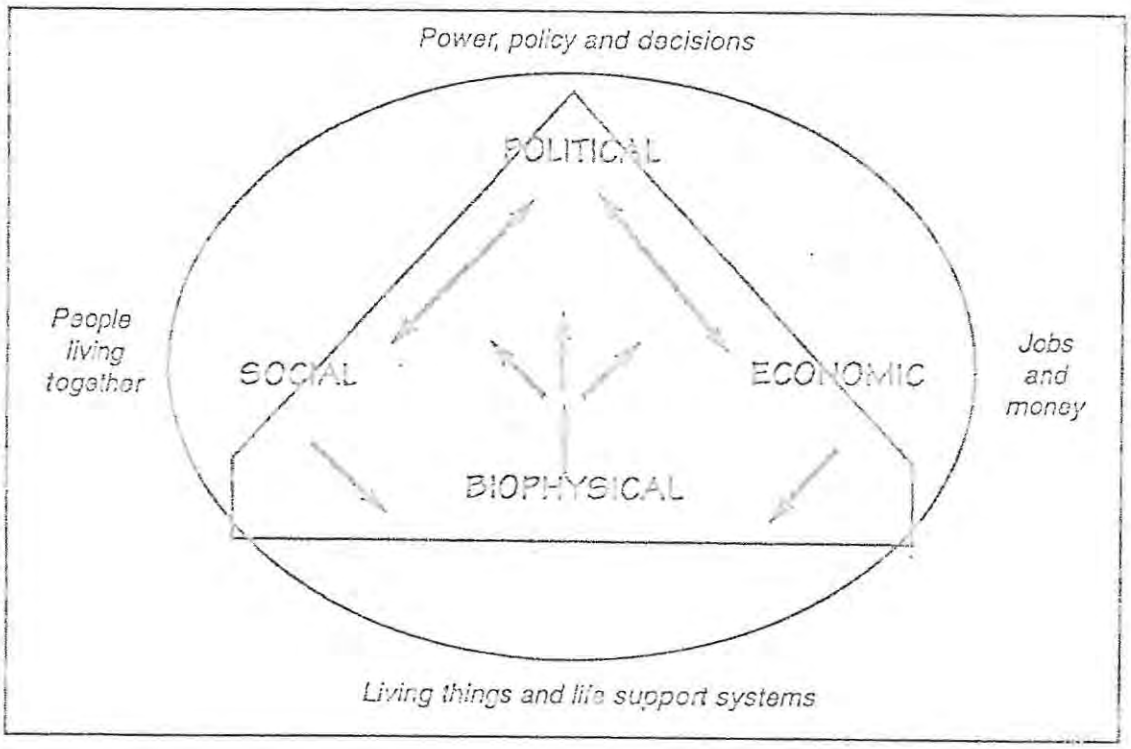


Figure 2.1 A conceptual illustration of the environment as a multifaceted and complex interaction of elements. After O'Donoghue & Janse van Rensburg (1995).

2.3.2 Integration of EE in the curriculum in Zimbabwe

In Zimbabwe there has been some consensus that EE is best integrated right across the curriculum although there may be some key career subjects[3] like Environmental Science and Agriculture (Nziramasanga 1999, Nyika & Stiles 2001). There are some problems related to this approach to EE in the curriculum. The curriculum in Zimbabwe is subject-centred, particularly at the secondary school level and teachers may see the incorporation of EE as a threat to the traditional set up in their respective disciplines to which they would be accustomed. Integration of new material into the curriculum may be slow and difficult, which may get stuck in the process. In Zimbabwe, where the curriculum development process is highly centralised, it may take something like 2 years to get any changes to an existing syllabus (Mabvakure, pers. comm. 2000).

2.3.3 Approaches to Environmental Education

Following Fein (1993), Lucas quoted in Jickling and Spork (1997) identifies the following three main approaches to Environmental Education:

- Education *about* the environment
- Education *in* the environment
- Education *for* the environment

The education *about* the environment approach is the more traditional approach to environmental education that lays emphasis on knowledge about natural systems and ecological processes. Fein (1993) sees in this approach, nature being treated as something separate from humans and that the knowledge about nature is treated as something out there waiting to be discovered.

In the education *in* or *through* the environment approach, the experiences of the learners in the environment are used as a medium for education (Fien 1993). In this learner-centred approach, the focus is on the appreciation of environment through contact with it in a

[3] A career subject in Zimbabwe is taken to be a discipline within which a substantial amount of other curricular material is or can be integrated. For example, Geography is seen as a career subject for EE and population education while Biology is considered a career subject for sex education.

process called experiential learning, which adds reality, relevance and practical experience to learning. An example of the application of this approach is when learners are taken on nature walks and bush excursions.

The contemporary and much debated approach to Environmental Education has been variously referred to as *education for the environment, education for sustainable development, environment and development education, education for environment and sustainability, education for sustainability and sustainability education* (Huckle 1996. Jickling 1997, UNESCO 1997, Smyth 1998, Lotz Sisitka *et al.* 2000). In this approach, values education and social change are brought to the fore and the aim is to engage learners in the exploration and resolution of environmental issues. The sustainability of responses to environmental problems also becomes an issue here. According to Huckle (1996:3) Education for sustainability aims to "...help people reflect and act on these meanings [of sustainability] and so realise alternative futures in more informed and democratic ways". Education for sustainability is informed by socially critical theory and promotes lifestyles that are compatible with the sustainable and equitable use of natural resources. (See box 2.1 below).

Box 2.1 Principles for sustainable living
Respect and care for the community of life
Improve the quality of human life
Conserve the earth's vitality and diversity
Minimise the depletion of non-renewable resources
Keep within the earth's carrying capacity
Change personal attitudes and practices
Enable communities to care for their own environments
Provide a national framework for integrating development and conservation
Create a global alliance
(After Smyth, 1998:3)

EE developed through a process of international consultation, which dates back to the 1960s and through a number of landmark conferences such as the 1977 Tbilisi inter-governmental conference. In 1980 it was stated in the World Conservation Strategy (quoted in Smyth 1998) in three basic principles thus:

- The maintenance of ecological life support
- The maintenance of biological diversity
- The sustainable use of renewable resources

The World Commission on Environment and Development (WCED), defined sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs"(WCED1987:43). Sustainability has been a key concept in EE since then and Tilbury (1995) describes seven features of education for sustainability, which she states as relevance, holism, values education, action orientation, issue-based education, critical education, and futures-based education. This principle was further adopted and refined at the Earth Summit in 1992 and at other international fora thereafter. The Southern African Development Community Environment and Land Management Sector (SADC-ELMS) aptly summed-up the concept of sustainability by saying that what we do can be taken to be sustainable "if it will still be good for our children" (SADC-ELMS 1999:6).

In spite of its strong support, the idea of education *for* sustainability is now being more widely debated and authors such as Jickling (1992) and Potter (1997) have subjected it to some criticism. According to Jickling (1992), the term itself is a conceptual muddle because the nature of education is such that one cannot and should not educate *for* something. He argues that environmental educators should employ the philosophical tools of inquiry to clarify EE concepts. I think that the education for sustainability approach tends to narrow down the field of EE. Sustainability could be the main focus of EE but that should not make it the *only* reason for engaging in EE. The education for sustainability approach also faces the danger of creating expectations that it may not be able to fulfil. One would expect that the outcome of education for sustainability would be a sustainable lifestyle but this could be much more difficult to achieve in reality.

EE is also seen as a life-long process, which takes place both within and outside the formal education system (Apel & Camozzi 1996, Hill 1999). The SCOPE Programme, by involving parents in the ILUD process, recognises the importance of this principle of EE. This principle of EE has relevance to the current study in that it also seeks to examine the impact of the SCOPE Programme on the communities as well (see the third subsidiary research aim in Section 1.2).

2.3.4 Other environmental education programmes in Zimbabwe

There are a number of active EE programmes in Zimbabwe and many of them network as members of the Environmental Liaison Forum (ELF) (Nyika & Stiles 2001). *Wildlife & Environment Zimbabwe* (WEZ) runs five EE programmes in five different districts in the country. These programmes aim at raising awareness about environmental issues in the schools in each district. Another major programme is *Action Magazine*, which produces a widely distributed EE magazine.

The *Tree Growing and Tree Care Programme* (TGTC) has been running an environmental management competition for both primary and secondary schools in the country. A major criticism of the TGTC Programme has been that it has been unable to, in reality, "look beyond the trees" (Forestry Commission 1998.1) through its failure to tackle broader environmental issues (Nziramasanga 1999). Some of the issues that have not been adequately dealt with in the TGTC Programme are the negative effects of the extensive cultivation of exotic species such as the eucalyptus, the jacaranda and the wattle. The destructive effects of monocultures have also not been adequately addressed. This has led to some disharmony where the two programmes have been running in the same schools (Ndlovu pers. comm. 2000). This is due to conflicting approaches to environmental management, where on one hand the TGTC Programme promotes conventional agricultural practices while the SCOPE Programme advocates for sustainable agriculture techniques.

The TGTC Programme has, however done well to prepare the groundwork for the SCOPE Programme by raising environmental awareness and a lot of the schools that have done well in this competition were selected to participate in the SCOPE Programme. A process

has started to try and harmonise the work of the two programmes through the networking efforts of the Curriculum Development Unit in the Ministry of Education, Sport and Culture.

The *Better Environmental Science Teaching* (BEST) Programme has been working to improve the teaching of Environmental Science in primary schools in the provinces of Midlands, Matabeleland South and Mashonaland West (Shumba *et al.*1994). The BEST Programme is expanding to cover the rest of the country after having conducted a successful evaluation of the pilot phase.

As these programmes are all members of ELF, there is some communication between them but there is need for more co-ordination and collaboration. The Ministry of Education, Sport and Culture's Curriculum Development Unit (CDU) has tried to host termly meetings that bring together all EE programmes in the country, but the meetings have been irregular.

In an attempt to improve this co-ordination, the Ministry of Environment and Tourism recently took the initiative to launch a network of EE organisations in Zimbabwe that has been called the *Zimbabwe Environmental Education Consultative Forum* (ZEECF). The ZEECF operates under the auspices of ELF.

Of particular relevance to this study is the *Action 21* Programme that was run by the Natural Farming Network in association with a Danish Development agency from 1998 to 1999. The Programme was run in 100 secondary schools that were paired with a similar number of Danish schools. The aim was to facilitate communication on environmental issues between the Zimbabwean schools and their Danish counterparts (Natural Farming Network 2000). Both Mavela and Ntepe secondary schools were part of this two-year information exchange programme.

There have been other EE initiatives in Zimbabwe that have not been mentioned in this study but many of these programmes have tended to focus on raising environmental awareness with little if any attention being given to actual environmental actions. This is evidenced by the nature of activities that the programmes have tended to concentrate on such as games, newsletters and competitions that are aimed at raising awareness. The SCOPE Programme has, on the other hand, aimed at participatory action towards

assisting schools to manage the environment around them in a sustainable manner (SCOPE Programme 1997a). A lot of the other EE programmes have also been highly localised while the SCOPE Programme has a national outlook (see Appendix H).

2.4 LAND DEGRADATION: A CRITICAL ENVIRONMENTAL ISSUE

The environment may be defined as a construct referring to the interactions between social and biophysical systems (Fien 1993). This means that the concept of environment is socially constructed and we make meanings of our experiences as a result of the social processes, which operate in our contexts or situations. This is one reason why different interpretations of environmental issues emerge in different parts of the world. An environmental issue is a perceived environmental problem together with the complex factors, which feed into it (Ekins *et al.*1993). This means that the causes of environmental problems are usually numerous although they may be related. The causes include biophysical, economic, social and political issues linked together (see Section 2.3.1 and Figure 2.1).

Land degradation is widely seen as an important environmental issue in Zimbabwe (Whitlow 1989, Mafunga 1997, Chinyamakobvu 1997 and Shaxson *et al.* 1999). A lot of soil is being lost through the processes of erosion and the remaining soils are impoverished due to leaching and other natural and human processes. Another reason why land degradation is an important environmental issue in Zimbabwe is that agriculture is seen as an important sector in the country's economy, which may not be true elsewhere in the world. For example, Steven Yearley, a British sociologist in his book on environmental issues does not include land degradation in his coverage of seven environmental issues in the United Kingdom (Yearley 1991). The point here is that what is seen as a serious environmental issue in one area is not necessarily perceived in the same way in another part of the world. The ILUD process that is investigated in this study is mainly a response to the problem of land degradation in Zimbabwe (see Section 1.1 above).

The United Nations Convention to Combat Desertification defined land degradation as the reduction or loss of biological or economic productivity on the land (Chinyamakobvu 1997). Land degradation therefore manifests itself not only in the damaged land itself but also in

the economic and life support systems that are supported by that land. In this report land degradation will be taken to mean the deterioration of land resources. This means that the issue of land degradation has to be viewed in relation to social systems as well as the biophysical environment.

Land degradation is a multi-faceted process. Although it is generally understood to mean *soil* degradation, other surface materials like rocks, sand dunes and colluvium are affected (School of Geography 1999). The term is also used to describe the loss of agricultural potential. According to the School of Geography (1999:2), apart from the physical degradation of the soil through particle detachment by wind or water, "land degradation takes several other forms under the influence of biological, chemical and human factors". Chemical degradation occurs through the alteration of the chemical components of a soil, which can take place under different influences such as salinization and acidification. These chemical influences allow for easier breakdown of soil aggregates and also lead to reduced ground cover, which exposes the land to the agents of erosion. Many of these chemical processes occur in areas of intense human impact such as irrigation schemes and landfill sites. There are therefore both natural and human processes involved in land degradation (Booth 1994, Bajracharya & Lal 1999, CIESIN 1999, School of Geography 1999). These numerous forms of land degradation show that the process is powerful and complex and the responses to it should therefore be comprehensive.

Human activities have the effect of accelerating naturally occurring land degradation (School of Geography 1999). Many human activities such as construction, mining and agriculture impact negatively on the land when they contribute to deforestation and desertification. Although rates of loss of forest cover are difficult to estimate, satellite data indicates continued expansion of large-scale deforestation (Malingreau & Tucker in School of Geography 1999). An analysis of the human and natural factors shows that they are all closely related and they influence each other resulting in a cumulative effect on rates of degradation. An example is when deforestation due to human activity contributes to biological degradation through loss of biodiversity and organic matter, and large-scale irrigation projects often lead to chemical degradation through salinization of soils (School of Geography 1999). It is therefore difficult to isolate and quantify the impact of any one factor. However human factors have the net effect of accelerating the degradation processes (Booth 1994).

Booth (1994:111) argues that the human factors are themselves complex as "there are historical, political, socio-economic and management factors that impact on soil degradation". The socio-economic system within which farming operations have taken place in Zimbabwe has not been conducive to environmental conservation. Farming in Zimbabwe has been characterised by inequitable land distribution contributing to uneven population densities and poverty (Moyo *et al.*1991, Booth 1994). Poverty seems to be intricately linked to land degradation as it may be both an effect and an underlying cause of land degradation. My observations are that the historical legacy of inequitable land distribution has not changed much since independence in 1980. This probably explains why some peasant farmers have continued to sink deeper into the vicious cycle of poverty and land degradation.

The profit motive has been the overriding principle behind the farming system that was taught to communal farmers in Zimbabwe, resulting in the implementation of management practices that have focused on short-term gains at the expense of long-term environmental health. For example farmers were encouraged by agricultural extension service (Agritex) officers to use fertilisers and other chemical inputs intensively and yet these are harmful to the land in the long term (Elwell & Maas 1995). These factors largely have not been within the control of the farmers and yet the blame for the degradation is often placed on them. Communal farmers could only get "Master Farmer" certificates if they followed a regime of chemically intensive farming. A farmer would not be eligible for this incentive if for example trees were left standing in a field for the purpose of utilising agro-forestry techniques.

In addition to the above macro political and socio-economic factors, the underlying cause of land degradation in the country seems to be the kind of land husbandry, which is practised (Shaxson *et al.* 1999). The conventional farming system being practised does not reflect an understanding of the sensitive environment in which the farming operations take place. Some of the practices, which contribute to degradation in these conditions are annual ploughing, burning of crop residues and veldt-fires. In addition, mono-cropping systems have been widely used resulting in the soil being exposed to the agents of erosion for long periods of time.

An analysis of the problem of land degradation reveals that it is complex and that, in addition to its physical causes, there are underlying social causes. One of the points that emerge from the analysis above is that although land-degradation involves some natural processes such as erosion, the fundamental problem is the acceleration of these processes by human action. An important part of the problem is that the set of practices being used by farmers in the region tends to fight against the natural processes of the land, thereby destabilising it and making it unable to withstand the erosion processes.

In the light of the assessment above it seems that a more sustainable form of agriculture is required to address the underlying causes of land degradation. CIESIN (1999) defined agricultural sustainability as the ability of the land to continue to produce indefinitely. In order to achieve sustainability in agriculture, land husbandry practices have to reinforce the natural order of the living systems on the land so that they continue to maintain their natural resilience and relative ecological stability. Resilience is important because it is the capacity of the land to resist degradation (CIESIN 1999). The philosophy behind sustainable agriculture is that farmers should co-operate with nature rather than fight against it. Section 2.5 below describes and explains Permaculture as one approach to sustainable agriculture that has been implemented in pilot programmes in Zimbabwe.

2.5 PERMACULTURE: IN RESPONSE TO LAND DEGRADATION

One approach to sustainable agriculture, which has been initiated in some parts of Zimbabwe, is Permaculture. The term Permaculture is an acronym for permanent agriculture and permanent culture, which has been defined by Mollison (1991:1) as "a design system for creating sustainable human environments". It strives for agriculture that is ecologically sound, economically viable and socially just (Paxton 1993). This means that it tries to be non-polluting, inherently efficient and it provides for its own needs. According to Morrow (1993) the social justice component of Permaculture is based on the following four ethical principles:

Care for the earth
Care for the people
Distribute surplus
Reduce consumption.

In contrast to modern conventional agriculture, which is based on the principle of maximization of profits, the Permaculture approach puts the health of the people and that of the environment first. Care for the people and care for the earth are interrelated. The health of the people is dependent on the maintenance of a healthy environment.

Permaculture is an approach to sustainable agriculture, which is based on ecological principles observed from nature. The Brundtland Report, discussed by Porritt (1990:120) defined sustainability as "meeting the needs of the present without compromising the ability of future generations to meet their own needs". In Permaculture the elements on the land are harmoniously integrated to provide for the long term material and non-material needs of both the people and the biophysical environment. Care for the people and for the earth are fundamental Permaculture ethics (Morrow 1993).

Permaculture is therefore a design and management tool for the sustainable utilisation of resources. Morrow (1993:9) describes it as "...a philosophy and an approach to land use which weaves together microclimate, annual and perennial plants, animals, soils, water management, and human needs into intricately connected, productive communities". Permaculture farmers use a number of techniques to maintain the health of the land and to protect it from degradation. This is where the "Education *about* the environment" approach is important (See section 2.3.3 above). The techniques are all based on observations of natural living systems or ecosystems (Savory 1988) and this is linked to the 'Education *in* the environment' approach that involves experiential learning (see Section 2.3.3).

In a Permaculture system there is no annual tillage thus preventing the exposure of the soil to agents of erosion. The land is only opened up to sow the seed. Efforts are made to maintain biodiversity by inter-cropping many species, which are companion plants (Elwell & Maas 1995). Once germination is achieved thick mulch is established and maximum ground cover is maintained in order to protect the soil from erosion, drying out and compaction.

Another important technique is the use of organic manure, which promotes the binding of soil particles. The manure increases the resistance of the soil to degradation and also helps to conserve moisture in the soil. This in turn promotes the growth of plant life and microbes both under the surface and on the soil surface, which also helps to hold soil particles together.

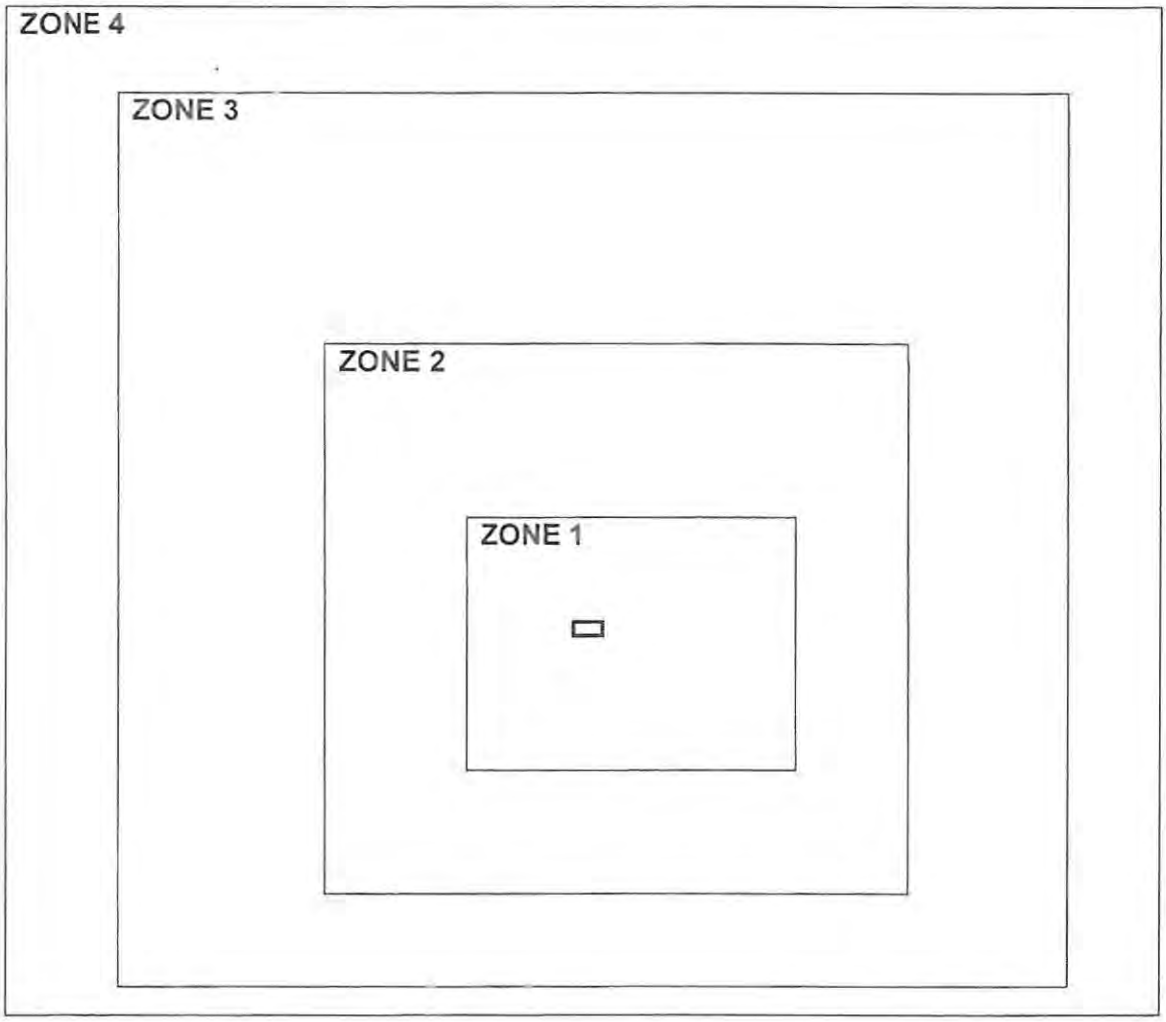
High species diversity on Permaculture farms helps to build ecosystems, which are fairly stable and resilient (Savory 1988).

Water harvesting is another element of Permaculture design. It involves the utilisation of as much rainwater as possible in the area where it is received. This is done by capturing the rainwater into tanks and or sinking it into the ground. Structures such as swales are constructed on the ground in order to slow down the flow of run off water. Swales are ridges that are dug truly on contour in order to spread and sink run–off water (Mollison1991). When rainwater flows on the ground and meets a swale it will be forced to spread and slow down so that it gets more time to sink into the ground. This will boost the amount of water stored underground resulting in a higher water table, which will provide more water to plants during the dry season. People can access the same water through springs, wells and boreholes.

Other key Permaculture concepts include ***zoning, sector planning*** and ***integration***. These three terms are central to the planning for sustainable land-use management (see Section 1.1). According to Morrow (1993), these are the principal design methods developed by Permaculturalists for using the information gathered from observations and site analyses to design sustainable and highly productive landscapes. The term zoning refers to the distribution of land-uses according to the amount of attention required by each land-use (Mollison 1991). The aims of zoning are to achieve minimum inputs, resource recycling, high yields and low maintenance.

Figure 2.2 below illustrates the possible distribution of land–uses over a given area. In zone 1 the land-use requires almost daily attention and it is located near the centre where the farmer lives. Zone 1 can also be designed to recycle grey-water and biodegradable waste from the house, and to produce the non-grain food requirements for the kitchen (Morrow 1993). The other zones show land-uses of decreasing intensity of labour with an increase in distance from a farmhouse.

Like zoning, sector analysis is one of the tools used in Permaculture design. It involves identifying the type and direction of external energies such as wind, rain, the movement of the sun, and bushfires that affect an entire property (Morrow 1993). The aim of examining them in land-use design is to try and either minimise or accentuate their impact for the benefit of the



KEY

ZONE O – The central point of the land-use operations such as the farmhouse

ZONE 1- The area of most intensive land-use. The crops that require a lot of attention are grown here

ZONE 2- The area of semi-intensive land-use

ZONE 3- The area of semi-extensive land-use

ZONE 4- The area of extensive land-use

Figure 2.2: Zoning of land-uses. Adapted from Mollison (1991)

people using the land. For example, planting fire retardant trees in the directions where the dangers of veldt-fires are present would reduce the impact of such fires on a piece of land.

Integration is a central concept in Permaculture. It is borrowed from ecological science. Mollison (1991) describes integration as the making of useful connections between elements in the environment. The connections or relationships between the environmental elements are for mutual benefit. On a small scale the inter-cropping of beans, tomatoes and marigolds on one vegetable bed is an example of integration while on a larger scale, the establishment of an orchard, rabbitry and a garden on the same piece of land is an example. Examples of mutual benefits here are that the beans improve the soil while the marigolds control pests. In the second example, the rabbits feed on the leaves of vegetables and, in return, manure from the rabbits helps to improve the soil for the fruits and vegetables.

In Zimbabwe, some communal farmers in the Chikukwa communal areas in the Chimanimani District, Manicaland Province, have put Permaculture into practice. These farmers in the Chikukwa communal area have adopted Permaculture practices such as water harvesting and inter-cropping (Westermann, pers. comm. 1998). As a result of the change in land husbandry a long dried - up spring has been resuscitated. This shows that surface run-off has been reduced as more infiltration takes place due to the increase in ground cover, which traps surface water and allows it to sink. The reduction in surface run-off means that there is less erosion because run-off is the underlying cause of soil erosion by water.

Similarly, in the Guruve District, 200km north of the capital, Harare, a large-scale coffee estate changed its land husbandry approach to one of Permaculture (Brazier 1996b). After this change the estate had a gradual upturn in profitability as a result of the more diverse production base and the use of internal low cost inputs in the new farming system. The farm is slowly becoming a self-sustaining system, which requires increasingly less human intervention. In the neighbouring communal area of Lower Guruve, the African Farmers Organic Research and Training (AfFOResT) Programme has assisted peasant farmers to grow organic cotton, which has been fetching a 20% premium on the market (Wilson, pers. comm. 2000).

In Zimbabwe, Permaculture has been promoted by a non-government organization that is known as the Zimbabwe Institute of Permaculture (ZIP). ZIP is a registered welfare organization promoting sustainable land-use and is at present constituted by five member units, which are the Fambidzanai Permaculture Centre (FPC), the Natural Farming Network (NFN), the Participatory Ecological Land-Use Management (PELUM) Association, the African Farmers Organic Research and Training (AfFOResT) organisation and the SCOPE Programme. Permaculture was first implemented in Zimbabwe in 1988 with the establishment of FPC as a centre for Permaculture training and demonstration (FPC 1999). The rest of the ZIP member units were set up over the next ten years as semi-autonomous units focusing on particular aspects of the work of promoting Permaculture.

In the SCOPE Programme, ZIP has worked with relevant government agencies in a joint partnership. The key government stakeholder in this joint venture has been the Ministry of Education, Sport and Culture, which now houses the SCOPE Programme in its Curriculum Development Unit (CDU). The other government agencies that are involved in the SCOPE Programme are the Ministries of Higher Education and Technology and the Ministry of Lands and Agriculture. These two ministries are responsible for, among other things, teacher education and agricultural education respectively.

Permaculture as an alternative to conventional agriculture in Zimbabwe has a number of drawbacks. It has elements of being a 'foreign' package because of its Australian origins, even though it is a low external inputs system of agriculture that has a lot in common with traditional farming practices in Africa. Farmers adopting Permaculture use some exotic species of plants at least initially. Some of these alien species may become invasive or they may not be adapted to the new areas. In Manicaland Province the wattle is an example of an alien problem tree because of its invasive properties. In addition the farmers have to receive training in Permaculture, which may result in the problems that are normally associated with top-down approaches to development (Mukherjee 1993). Such approaches do not help to cultivate the sense of ownership, which is useful for the successful implementation of environmental and agricultural initiatives. If farmers feel excluded from the decision-making processes of a project, they may not give it their best support as they may not feel that it is their project.

Many Permaculture techniques closely resemble the techniques used in traditional farming systems in Zimbabwe and this has resulted in many elderly farmers being very receptive to Permaculture. However, the fact that the farmers have to be trained in Permaculture means that it becomes an expert driven process, which might not achieve the sense of full ownership, by the farmers, for effective implementation. The training required also costs money so that the approach is prone to the influences of donor-driven development agendas. These influences, which are external to the communities, may not be helpful in building self-reliance.

Permaculture requires the co-operation of a whole community for it to have a meaningful impact on the preservation of the land against the threat of degradation. This might not be easy especially in the short-term as some members of the community may not be co-operative. This has been the experience in the Chikukwa case described above. The process of introducing Permaculture to the Chikukwa communal area has been led and facilitated by an expatriate from outside the community and this may be the cause of some of the resentment and slow responses from some members of the community (Westermann, pers.comm.1998).

Permaculture solutions are by nature slow processes because they feed into natural cycles and some people get impatient especially in the face of competition from the quick fix solutions offered by modern conventional agriculture. The slow realisation of the fruits of using Permaculture is also due to the labour intensive nature of the work involved especially in the early stages. This means that Permaculture is best implemented on small units of land at a time to produce best results (Morrow 1993). An example is the building up of soil fertility, which requires the planting of leguminous crops and trees, and the use of composts, animal manure and litter.

All in all, Permaculture offers hope for the reversal of the rampant land degradation, which is currently taking place as it has worked well in the few areas where it has been fully implemented. It is a holistic approach, which makes use of locally available resources and indigenous knowledge systems. Permaculture offers good opportunities for genuine participation by communities as has been experienced in Chikukwa. The principle of integration, which is used in Permaculture design, is a useful tool for building sustainable agricultural systems (Mollison 1991).

This study has taken place after the release to the public of the Presidential Report of the Commission of Enquiry into Education and Training (Nziramasanga 1999). Among the recommendations for EE that were made by the Commission are:

- Include this programme (EE) at all levels of the formal and non-formal education system.
- Develop a national policy on Environmental and Development Education
- Institute co-operation and co-ordinating strategies for different programmes and stakeholders.
- Extend the tree-planting programme to include other environmental issues

(Nziramasanga 1999:527)

The SCOPE Programme has already started to implement some of these recommendations. For example, on the recommendation that the tree-planting programme should include other environmental issues, the SCOPE Programme takes a holistic look at the environment to include issues such as water harvesting and land-use design. A recent evaluation of the Programme by Makoni (2000) showed that the staff and pupils of the schools participating in the SCOPE Programme have a broad understanding of environmental issues and that they have been involved in the management of their local environments. An extract of the Makoni report can be accessed in Appendix J.

2.6 AN OVERVIEW OF RELEVANT STUDIES

A very limited amount of research has so far been done in EE in Zimbabwe. Manjengwa (1995) carried out a study into *Environmental Education for Sustainable Development in Secondary Schools of Zimbabwe*. She found out that secondary school pupils had considerable environmental knowledge gained from the teaching of Geography and from the local environment. Manjengwa's study, however, was limited to the acquisition of environmental knowledge and did not consider the application of that knowledge in environmental management. It did establish, however, that deeper insights and understanding of the causes of environmental problems were lacking. The pupils were also found to be weak in problem-solving skills, which are crucial for sustainable environmental management. The usefulness of the study is limited by the fact that it looked only at Geography as a career subject for environmental learning. The processes of EE go

beyond the curriculum of a single subject (see Section 2.3.2 above) and the issue of environmental action should be investigated if EE is to make a direct contribution to a better environment. In its conclusion the study called for more research in EE in order to "...establish the present state, and future needs for environmental education in Zimbabwe, at national level" (Manjengwa 1995:84). This is particularly important in Zimbabwe because there is no overall policy on EE and more research would help to inform the policy development process.

A study by Mtetwa (1994) reviewed Zimbabwe's national action plans and policies relating to EE following the Rio Summit. He found out that there was a need to strengthen the capacity of Zimbabweans to implement EE programmes based on the country's agenda for sustainable resource utilisation and conservation.

In 1994 Kuiper carried out a survey of EE in Zimbabwe's formal education sector (Irwin 1998). The study highlighted the need for capacity building at all levels of institutions involved in EE. Stiles (1995) found a similar need when she investigated the process of, and inhibitions to, change from a traditional to a problem solving style of teaching in EE.

Some studies have been carried out specifically to look at environmental attitudes (Janse van Rensburg 1991 and Opie 1991). The most comprehensive of these is the one by Opie (1991), who carried out a study on the factors associated with the development of positive environmental attitudes. He developed an instrument for measuring these attitudes, which he used to screen the factors and scale them according to their influence on positive environmental attitudes. He found the most significant factors to be environmental sensitivity and environmental perception. In the study, an association was established between socio-economic deprivation and lower aesthetic responses across all cultural groups. In addition fieldwork was demonstrated to be a more effective way of enhancing environmental aesthetic responses when contrasted with television programmes. I think that Opie's study is not only useful for establishing an inventory of factors that influence positive environmental attitudes but also for scaling these factors and providing an instrument for identifying other factors that may not have been considered in this study.

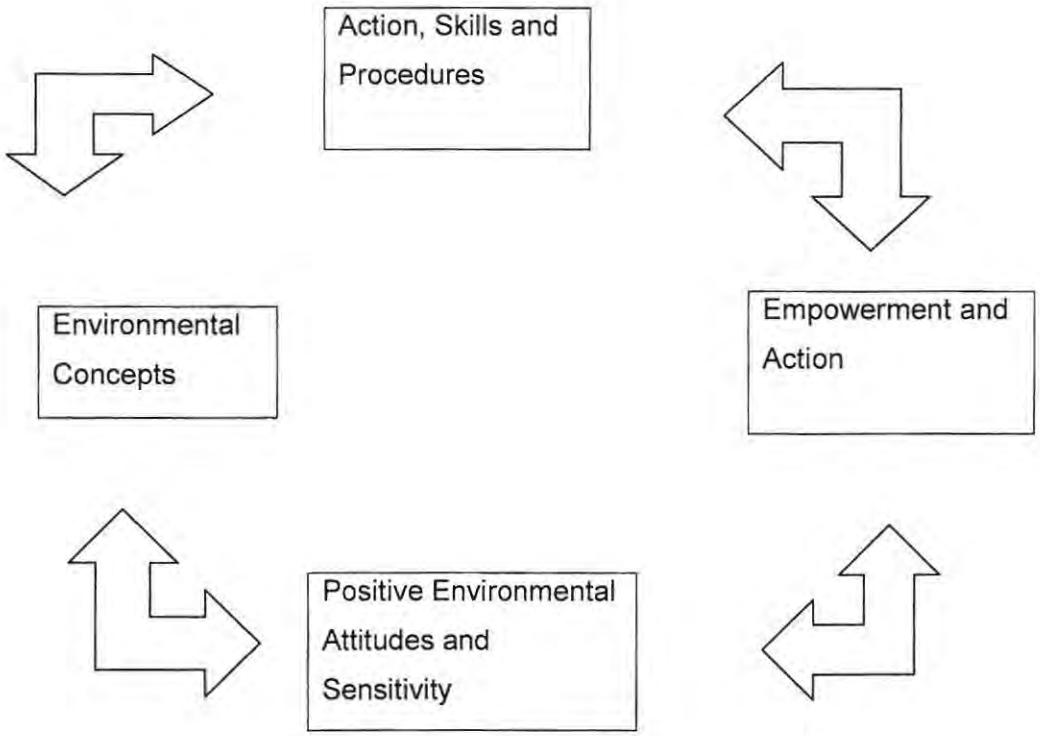
Janse van Rensburg (1991) carried out a study of the relationships between personality factors and attitudes towards perceived problem animals in white small stock farmers of

the Eastern Cape. She found out that there were indeed links between negative attitudes towards the animals and certain personality traits. For example, she describes a possible relationship between negative attitudes and 'tough mindedness', a trait described as a tendency to reject illusions, be unsentimental, self reliant, hard to the point of cynicism, keeping to the point and to act on practical logical evidence. In her sample of 17 farmers and from her literature review, she found that the respondents with protensive personality traits such as those suffering from high inner tensions characteristically made use of psychological defence mechanisms. This study is valuable in that it introduces another dimension to environmental attitudes, which in turn influences the environmental actions that are carried out.

Emmons (1997) went a step further by developing a model for explaining environmental action. Other environmental educators working in this field based her model, which she called 'a model of positive environmental action' on earlier work. This model differs from others before it by focusing specifically on positive action as compared to responsible environmental behaviour. She defines positive environmental action as "a deliberate strategy that involves decisions, planning, implementation, and reflection by an individual or a group" (Emmons 1997:35). Such action would be intended to achieve a specific positive environmental outcome. Figure 2.3 illustrates Emmons' model of positive environmental action.

Emmons applied the positive environmental action model in the context of a non-formal field EE programme for two small groups of high school students. She found out that positive environmental action cannot be easily explained by predictors of individual behaviours nor by the manipulation of these behaviours. Instead, the results of her research indicate that the relationship between learning and environmental action are interactive, dynamic, and are greatly influenced by the participants and the social situations within which they operate. Emmons' research is quite relevant to the present study because it tries to explain environmental action, which is also the focus of this study. The second aim of the research is to investigate the application of environmental knowledge in managing the local environment (see Section 1.2).

Figure 2.3 A model of positive environmental action, after Emmons (1997:35).



In Zimbabwe Nyika & Stiles (2001) carried out a survey of EE in Zimbabwe. The survey concluded that there were some good examples of EE in Zimbabwe but that there was no policy framework to ensure that more people could benefit from the EE programmes. The survey found out that there was little understanding of the meaning and issues of EE among the general public. The environmental knowledge tended to be limited to the participants and beneficiaries of the EE programmes. The study also made the following recommendations based on the findings of the survey:

- EE should be integrated into the syllabi of relevant existing subjects.
- Development of curriculum is complex and needs stakeholder representation from various sectors.
- There is need for increased communication within the region to share experiences.
- Teacher and extension officer training needs to be improved and enriched with EE processes.

- Methods of communication and teaching should be contextually relevant to the learners and their environment.
- Methods for disseminating scientific knowledge and indigenous knowledge systems (IKS) should be similar and give synergy to the sharing of technologies from both.
- There must be representation from traditional and gender specific stakeholders in curriculum and resource development to ensure that IKS and gender equity are an integral part of the curriculum.
- Resources that are appropriate and accessible to EE processes in different settings are too few (Nyika & Stiles 2001).

The extent to which the SCOPE Programme has been able to meet some of these recommendations is examined in chapters four and five.

My search for relevant studies has shown that research in EE in Zimbabwe has been limited both in terms of the number of studies carried out and the range of aspects of EE that have been investigated. Most of the studies carried out in Zimbabwe that have been reported in this overview have been in the form of surveys that sought to describe the general status of EE in the country. I could not find any specific studies on the role of Permaculture in EE nor any local studies on environmental action. In chapter 3 the form and structure that this study takes is described and an appraisal of the design, methods and content of the study is also given.

CHAPTER 3

Our thoughts and actions have a way of following where our words have led us.
O'Donoghue (1993:28).

3.0 RESEARCH METHODOLOGY

3.1 INTRODUCTION

My position as the National Programme Co-ordinator for SCOPE influenced the way this study was conducted. I decided not to carry out a purely evaluative study in order to reduce the conflict of interest between my involvement in the Programme as a management level employee and my research work on the Programme. As stated in Section 1.2, this study seeks to critically examine what environmental learning has taken place at the two schools involved in the study and then to interpret and critically examine the findings. The aim is to obtain an understanding of the nature and usefulness of Permaculture as it is used in EE at two schools, which are participating in the SCOPE Programme. Ultimately this will hopefully lead to improvements in the implementation of ILUD in other schools. The study was conducted after the pupils and all other respondents had already been introduced to the basic theory and practice of Permaculture.

The aim of this chapter is to describe and explain the research process and, in particular, the methods and techniques used to obtain information and data for the research. A combination of methods: document analysis, questionnaires, interviews and non-participant observations, were used in this research. The diary that I maintained during the period of the research has also been a source of data.

3.2 METHODOLOGICAL FRAMEWORK

Three methodological approaches intersected in the design of this study: the broad approach of the Interpretive paradigm, supplemented with insights from a socially critical perspective; the analytical tools of symbolic interactionism and the guidelines of case study research.

3.2.1 An interpretive study

Interpretivism was selected as the main theoretical perspective for this study. According to Cohen and Manion (1994:37), interpretivist researchers set out to understand their interpretations of the world around them. In doing so they focus on action as opposed to behaviour, which is the focus of normative approaches to research. Actions are only meaningful when we get to know the intentions of the actors by sharing their experiences with them. As Taylor and Bogdan (1998:3) point out, the interpretivist researcher is committed to understanding social phenomena from the actor's own perspective and examining how the world is experienced.

Although the interpretive paradigm will be used as the dominant approach for the study, some perspectives have been drawn from socially critical research. This is mainly because this case study would be poorer without applying the socially critical tools of analysis, which I found to be helpful in understanding the macro socio-economic setting of the study. It is also because, as pointed out by Stake (1995), a case study is expected to capture the complexity of a single case. This is not to suggest that the interpretive paradigm is inadequate per se but that the nature of the case that I looked at required a wider perspective.

The interpretive paradigm is suitable for this study because of the human dimension of this case study. According to Dilthey, (quoted in Cantrell 1993:82), the meaning of social objects and events can only be understood by examining them within their contexts. Interpretive research seeks to understand and interpret daily occurrences and social structures as well as the meanings people give to phenomena being investigated (Cohen and Manion 1994).

This study sought to understand the actions of students as they relate to environmental issues and, in addition, to attempt to explain the actions. Kuiper (1997) points out that the assumption in interpretive research is that humans are rational beings and so have reasons for their actions. These reasons were the object of this research, and understanding the reasons allows for the formulation of some prediction and explanation of human behaviour. I have therefore used the interpretive methodology with a socially critical orientation in an attempt to understand the environmental learning processes that the

participants in the SCOPE Programme have been involved in. This approach has enabled me to obtain a clearer link between the involvement of the participants in the ILUD process and their environmental actions.

3.2.2 Symbolic interactionism

The interpretive perspective is linked to a number of theoretical frameworks and schools of thought and one such framework is *symbolic interactionism* (Taylor & Bogdan 1998). This school of thought derives a lot from the work of Herbert Blumer, a student and follower of George Herbert Mead who argued that symbolic interactionism rests on the following three premises:

- Humans act toward the objects and people in their environment on the basis of the meanings these objects and people have for them.
- These meanings derive from the social interaction between and among individuals.
- Meanings are established and modified through an interpretive process undertaken by the individual actor (Schwandt 1997:148).

Communication is here seen as symbolic because we communicate through language and symbols and in communicating we create symbols (Taylor & Bogdan 1998). The meanings that an actor forms in interpreting the world are instruments for guiding and forming action. For example the information gathered in this study was not viewed as reactions by the pupils to their participation in the Permaculture Programme but rather as the constructions of pupils making meaning of their participation in the Permaculture Programme. Meaning is interpreted as a direct product of a social act or interaction (Perinbanayagam 1985). In this study particular care was taken to observe the particular circumstances in which the ILUD process was being implemented. This enabled me to understand the process of meaning making that the participants went through.

In symbolic interactionism the researcher looks for social perspectives, meanings and definitions (Taylor & Bogdan 1998). This influenced me to explore how the respondents understood the Permaculture ideas and the role and significance of this knowledge in their lives. According to Cohen & Manion (1994:26), symbolic interactionists "direct their attention on the nature of interaction, the dynamic activities that take place between people". It is therefore a useful methodology for understanding the dynamic relationships

between people involved in an activity. In this research, focus is on the interaction between the pupils, their teachers and their parents with particular reference to the meanings that they make of their environmental situations.

In the context of this study, Permaculture is being introduced in school communities that are in particular settings, which are complex and dynamic in themselves. Some of the influences on these settings may include poverty, literacy levels, examination pressures, community relations and personal relationships. I therefore think that symbolic interactionism provided me with the appropriate tools for analysing these complexities.

3.2.3 An interpretive case study

This study also adopts a case study approach. Withers (1994:22) defines a case study as a method of data production involving detailed examination of a particular example or instance. In this study it is the case of the ILUD process as the SCOPE Programme applied it in two secondary schools. Schwandt (1997) states that the case study is a strategy for doing social inquiry where the case itself is at centre stage and not the variable. The emphasis on the case as opposed to the variable ties in well with the interpretive methodology that has already been described (see Section 3.2.1).

One of the aims of this study is to generate insights into the application of the ILUD process in secondary schools. This can be conveniently done in a case study because the aim of case study research is to generate knowledge of the particular (Stake 1995). Schwandt (1997) argues that a case study strategy is preferred when the inquirer seeks answers to how and why questions, when the inquirer has little control over the events being studied, when the object of study is a contemporary phenomenon in a real life context, when boundaries between the phenomenon and the context are not clear, and when it is desirable to use multiple sources of evidence. The SCOPE Programme is a 'real life' phenomenon that is already in the schools and what is sought are lessons from its work.

3.3 SELECTION OF STUDY SITES

Since 1994, the SCOPE Programme has introduced Permaculture at 54 schools countrywide. Of these there are 3 primary and 3 secondary schools in each of the country's 9 provinces. I decided to look at secondary schools and form 4 classes in particular because this was where I could get pupils who would have had the maximum exposure to Permaculture. It is a reasonable assumption that the pupils at this level would be likely to have higher literacy levels in English and this might help them to complete the questionnaires more easily.

Only 2 schools and 10 pupils were selected because of the limited scope of the study itself. It was easy for me to gain entry into the schools because I had been working with the two schools prior to the study. The school heads, staff, pupils and some parents were all familiar with me and this made it easier for them to open up to me during the interviews. On the other hand this familiarity may have influenced the quality of the data collected as some of the participants may have been influenced by being interviewed by the person in charge of the SCOPE Programme whom they were also working with (see Section 3.7.1).

I first of all presented my proposal for the study to the Management Committee of the SCOPE Programme who gave their approval at their January 2000 meeting. This Management Committee draws its members mainly from the Ministry of Education, Sport and Culture and the Zimbabwe Institute of Permaculture (ZIP). I then visited the 2 schools in February to present my plans and request their permission to work with them.

3.4. SAMPLING

Cohen and Manion (1994) describe sampling as when the researcher endeavours to collect information from a smaller group or subset of the population in such a way that the knowledge gained is representative of the total population under study. The population of form 4 pupils at the 2 schools was 260 at the time of the study and, due to the practical limitations of the study, there was a need for sampling.

The sample chosen was not random for a number of reasons. There was limited time and other resources and so only those pupils whose homes and parents were easily accessible

were selected for the study. In this way the sample was a purposive one in that it was designed to meet the specific needs of the study. Another major constraint at this time was the limited availability of fuel in Zimbabwe, which meant that movement was severely curtailed. The visits that I made in June enabled me to get familiar with the population from which the sample was to be drawn. This was done by administering a questionnaire, (shown in Appendix A), to 20 pupils from each school that were considered suitable for this study by their teachers. The final sample of five pupils per school that was eventually used in the study was selected from the two initial groups of 20 pupils per school.

The sample of pupils that eventually took part in the study was purposive as non-probability sampling was used to select the respondents. A non-probability sample is one in which the probability of selection of each respondent is unknown (Cohen & Manion 1994). This type of sampling is used when sampling is carried out to select those who serve the purpose of the research (Neuman 1997).

A sample size of ten was decided on upon consideration of the purpose of the study (see Section 1.2) and the methods that I intended to use in data collection and analysis. The interview method was the main data collection method used in this study and for practical reasons it is more convenient to work with small samples when this method is used. Cohen and Manion (1994) point out that a recommended minimum sample size of 30 is used only when some form of statistical analysis of the data is to be carried out.

The pupils who were selected differed significantly in educational performance as illustrated in the summary of their results for the 2000 mid year examinations presented in Table 3.1. Pupil 5MM, for example, had an average score of 44% as compared to an average of 71.77% for pupil 4MM. Table 3.2 also gives additional background information on the respondents.

The families involved in the study are mainly subsistence farmers who use state land as a community without title to the land (see Section 1.3). Eight of the ten families interviewed rely solely on the land for their sustenance. One family runs a grocer shop at the service centre while the father who works at a local mission station supports the other pupil. The families are relatively large with the smallest one having five members and the majority having seven to nine members.

Table 3.1 A summary of the 2000 mid-year examination results for the pupils involved in the study.

		MARKS	IN %								
PUPIL	**GEOG.**	**AGRIC.**	**SCIENCE**	**BIO/COM**	**MATHS**	**F/N,F/F & W/W**	**NDEBELE**	**ENGLISH**	**R.E/HIST**	**AVE.**	**SCHOOL**
1FM	54	52	53	56	73	73	67	53	51	59.1	Mavela
2FM	49	-	55	52	46	52	64	55	58	53.9	Mavela
3MM	58	86	76	63	73	63	55	50	68	65.8	Mavela
4MM	60	82	86	77	76	72	74	50	69	71.8	Mavela
5MM	48	61	41	50	37	-	60	50	49	44.0	Mavela
6MN	76	-	60	56	78	59	60	65	63	64.6	Ntepe
7MN	88	-	58	56	53	50	50	55	57	58.5	Ntepe
8FN	76	-	56	40	77	50	40	64	60	58.0	Ntepe
9FN	72	-	59	60	76	69	58	59	69	65.2	Ntepe
10FN	80	-	47	52	42	56	50	60	40	53.4	Ntepe

KEY

FM- Female pupil at Mavela school

MM- Male pupil at Mavela school

MN- Male pupil at Ntepe school

FN- Female pupil at Ntepe school

BIO/COM- Biology/ Commerce: Results for pupils 1 to 5 are for Biology while those for pupils 6 to 10 are for Commerce

RE/HIST- Religious education results for 6 to 10 and History results for pupils 1 to 5

F/N, F/F & W/W-Food and Nutrition for 6MN; Fashion & Fabrics for 8,9&10FN; Woodwork for 7MN; Literature for pupils 1 to 5

AVE.- Average mark

Two of the households are single parent while in another household the children are living alone as the remaining parent is working away from home. A summary of the background information on the pupils and their families is presented in Table 3.2.

Although all the pupils come from a peasant background, there are some variations in the socio-economic status of the families. For example pupils 1MM and 9FN come from particularly disadvantaged single parent families where their mothers single-handedly try to eke out a living off the land for their respective families. Most of the families earn their livelihood from farming. The average family size is 5.9 and this has a bearing on their quality of life as the families struggle to look after the dependent family members.

Some of the pupils travel long distances to school with pupil 10FN covering the longest distance at 14 kilometres one way. Walking is the commonest means of getting from home to school and back. The normal school day is from 07.45 to 16.30 hours. On most days the academic lessons take place before lunch and in the afternoons there are usually practical activities like sport and grounds development. Each student does an average of eight subjects, which must include the languages and a practical subject.

Table 3.2: Summary of the information on the backgrounds of the pupils.

PUPIL	SEX	AGE	SCH	F. SIZE.	FEES	FA	MO	H. DIST.
1FM	F	18	Mavela	6	Cousin	Deceased	H. wife	7 km
2FM	F	16	Mavela	5	Father	Farmer	H. wife	1 km
3MM	M	17	Mavela	5	Father	Farmer	H. wife	8 km
4MM	M	17	Mavela	5	Mother	Farmer	H. wife	6 km
5MM	M	17	Mavela	4	Mother	N/A	Self-emp.	2 km
6MN	M	18	Ntepe	6	Father	Self-emp.	H. wife	7 km
7MN	M	17	Ntepe	6	Father	Farmer	H. wife	4 km
8FN	F	17	Ntepe	6	Mother	N/A	Self-emp.	2 km
9FN	F	16	Ntepe	7	Mother	Deceased	Farmer	10 km
10FN	F	16	Ntepe	9	Father	Farmer	H. wife	14 km

KEY

SCH-SCHOOL
F. SIZE-FAMILY SIZE
FA-FATHER
MO-MOTHER
H.wife- Housewife
N/A – not part of the family
H. DIST – distance from home to school
F. SIZE. – The total number of people living with the pupil
Self-emp.- Self-employed
FEES – The person responsible for paying the child's fees/ guardian

Note: All the pupils are in their fourth year (grade 11) of secondary education

3.5 DATA COLLECTION

My data collection proceeded in stages with document analysis preceding the questionnaire, interview and observation methods. Each method that was used is described and explained in turn below. The data collection process started with my first visit to the project sites for the purposes of this research which was undertaken in February 2 000 and lasted right through to the time when I was compiling the research report. My data collection instruments were questionnaires, interview schedules, and a land–use observation checklist and these are presented in the Appendices section of this report. The individual data collection methods are discussed in the sections that follow.

3.5.1 Document analysis

Document analysis or review is the gathering of data by studying documents (Stake 1995). Yin (1994) suggests that the most important use of documents is to corroborate evidence from other sources. Cohen and Manion (1994) point out that the purpose of analysing documents may be to prepare for the data collection, to acquaint the researcher with the topic of study or actually obtain data for the study. In this research, the document analysis was done for the latter reason. Cohen and Manion (1994) warn of the need to avoid using copies of the documents where the original ones can be obtained and Stake (1995) points out that the researcher needs to be well organised when carrying out a document review. In this study I had no problems in accessing the original documents because of my position within the SCOPE Programme.

Firstly documents about the SCOPE Programme, the ILUD process and the schools participating in the Programme were analysed. These included written work done by the students and the teachers. The actual documents that were analysed were:

- The constitution of the SCOPE Programme (Appendix H)
- The report of the evaluation of phase one of the SCOPE Programme (Appendix K)
- The report of the evaluation of phase three of the SCOPE Programme (Appendix J)
- The Integrated Land-Use Design handout (Appendix L)
- The 1999 Annual Report

- The photographs of the school grounds (Appendix P)
- Terms of reference between the Zimbabwe Institute of Permaculture and the Ministry of Education, Sport and Culture on the SCOPE Programme (Appendix M)

This documentary evidence was later compared with the verbal accounts from the interviewees. All evidence was examined and analysed in the critical and questioning attitude advocated by Kvale (1988). The fixed-point photographs of the school grounds were very useful in showing the sequence of the work that had been carried out in the implementation of ILUD. The problem that I found with the photographs was that some of them were not dated and I had to rely on verbal accounts of when the photographs had been taken.

3.5.2 The questionnaire method

A questionnaire is a research instrument from which the respondents read the questions themselves and mark answers (Neuman 1997). According to Irwin (1999b) it is a series of questions set out on paper that provide space for an answer or offer a number of fixed alternatives from which the respondent is requested to make a choice. Two closely related questionnaires were used in this study. I used the questionnaire shown in Appendix A for two reasons. Firstly I wanted to select the five pupils from each school who were to be the main participants in the study. Secondly I wanted to pilot the questionnaire so that I could refine it before I used it for the ten pupil participants that were eventually interviewed in the study.

The second questionnaire shown in Appendix B is the refined version of questionnaire A. Its purpose was to collect the basic geographic and demographic information about the pupils involved in the study. Irwin (1999b) points out that questionnaires are used to gather a large amount of data at a relatively superficial level. In addition, the responses to questionnaire B served the purpose of identifying the focus areas for the subsequent interviews. The use of questionnaires may overlap or be integrated with interviewing (Irwin 1999). Both questionnaires were completed individually but they were administered in group settings at the two schools.

3.5.3 Interviewing

The interview was the main data collection method used in this study. An interview is done with the conscious intent of obtaining particular information from the participants (Cantrell 1993). In this study the interview participants or interviewees totalled ten pupils, seven parents and four teachers at both schools involved in the study.

The interviews for the pupils were informed by the questionnaires (shown in Appendices A and B) in the sense that the factual or descriptive data that was gathered in the questionnaires formed the basis of the more probing questions which were asked in the interviews. The questionnaires mainly asked about what the children knew and what they had done. In the interviews there were questions that were designed to reveal the pupils' attitudes towards the environment, for example. The interview schedules (shown in Appendices C, D and E) were further adjusted after discussions with my supervisor. I eventually returned to the study sites in September to conduct the interviews although some informal interviews had been done during my earlier visits in June. The interviews that had been conducted in June also helped me to refine the main interviews in September.

Interviews require verbal interaction and therefore language is a very important factor. Most of my respondents were Ndebele speaking and my ability to converse in Ndebele is limited. However, all the pupils, schools staff and half of the parents in the sample could speak English and that is the language, which we used in the interviews. In the case of the other non-English speaking parents I was assisted by the teachers who acted as translators. The interviews were also recorded on tape but the recording turned out to be very poor due to some mechanical fault and had to be redone with field notes being taken.

The interviews with the pupils were aimed at investigating the environmental learning that they had experienced. As Seidman (1991:3) notes, "At the root of in-depth interviewing is an interest in understanding the experience of other people and the meaning they make of that experience". The interviews in this study were not carried out with the intention of testing hypotheses or corroborating opinions but the idea was to ask the respondents to reconstruct their experiences and to explore their meaning. Interviews are a useful way of

discovering what people think and how one's perceptions compare with another's. Such comparisons help to identify shared values and other patterns in groups of people.

Other people that were interviewed were the two teachers of each school who are in charge of the Permaculture Programme and the parents of some of the ten pupils involved in the study. The interviews were conducted according to the guidelines given by such authors as Witz (1988) and Seidman (1991). For example, the interviews where conducted in an exploratory rather than probing manner. The respondents were encouraged to tell their story and in order to encourage them to do this I sometimes shared my own experiences with them. Seidman (1991) points out that it would be all right for the researcher to share experiences with the participants on occasions.

3.5.3 Non-participant observations

Cohen and Manion (1994) asserted that, whatever the problem or the approach, at the heart of every case study lies a method of observation. They define a non-participant observer as one that stands aloof from the group activities being investigated. Yin (1994) points out that observational evidence is often useful in providing additional information about the topic being studied. This was particularly true in this study where some of the environmental learning took the form of managing the local environment. The observations focused on the practical work done to manage the environment, which is one important form of environmental action (Tilbury 1995). Stake (1995) points out that, during observation, the qualitative case study researcher keeps a good record of events to provide a relatively incontestable description for further analysis and ultimate reporting. In this research, an observation schedule (see Appendix F) was developed to record observations of the practical implementation of the ILUD designs and it included the following aspects of sustainable ecomanagement:

- Integration of environmental elements such as gardens and small animal production.
- Inter-cropping of crops that complement each other such as legumes, pest repellents and ground cover crops.
- Maintenance of ground cover and natural soil fertility (Mollison 1991).

The full observation checklist that was used in the study is given in Appendix F in this report. On site observations were carried out both at the schools and at the homes of some of the pupils. A few of the observations were captured on photographs (Appendix P).

3.6 DATA ANALYSIS

The aim of the data analysis that was carried out in this study was to develop rather than verify ideas about the substantive case of Permaculture in the participating schools. The constant comparative method was used to analyse the data. According to Glaser and Strauss (in Taylor and Bogdan 1998) in the constant comparative method the researcher simultaneously codes and analyses the data in order to develop concepts. The aim of using this procedure was to identify and interpret relationships between the various elements of the Integrated Land-Use Design (ILUD) process, which could help to strengthen the process. During this activity my understanding of the ILUD process has been refined. The actual steps followed in this analysis were:

- Reading the data several times over. This was done in conjunction with the next activity, which was
- Keeping track of ideas that come to mind and then looking for emerging themes. I used a small notebook for this purpose
- Developing tables and figures that illustrate the data. This helped to simplify the data and make it reader friendly
- Reading the literature. I found some insights from reading relevant literature.
- Comparing the data and sorting it again where necessary.
- Discounting data. This means interpreting the data in the context in which it was collected (Taylor and Bogdan 1998:156).

In conclusion, the data was qualitatively analysed by organising it into themes and categories, which are based on the different aspects of environmental learning, such as knowledge, skills and application. The presentation of data in chapters 4 and 5 is based on this categorisation. I will now evaluate the data gathering and data analysis processes described above.

3.7 EVALUATION OF THE STUDY

3.7.1 **Context**

The research was conducted at a time of considerable political and socio-economic instability that characterised the June 2000 election campaign in the country. There were incidences of violence and fuel was in short supply throughout the country. It was therefore difficult and unsafe to travel on many occasions. Unfortunately the study sites were some 570 and 620 kilometres respectively from Harare where I live. This placed severe constraints on the frequency of my visits and of the time I could spend in the area.

My position as the National Co-ordinator for the SCOPE Programme may have influenced my interaction with some of the respondents particularly the teachers who knew me well. I had visited these schools many times before on work assignments and so the teachers were quite familiar with me. They may have taken my research visits as an assessment of their performance in the Programme and this may have influenced the interviews that I had with them.

3.7.2 **Methods**

The sample of ten pupils that were the main respondents in the study is small and this was due to the limited time and other resources that were available. The sample was also a purposive one and may not be fully representative of the whole population of students at the two schools. In particular the sample of pupils that participated in the study does not represent well the pupils on the lower end of the academic performance scale.

During the data collection exercise, a tape recorder was used to record the interviews but on playing back the tapes I found out the quality of the recording was very poor. The recorder developed a technical fault. Some of the interviews had to be redone and the information was then recorded in writing during the interviews and this sometimes disturbed the flow of the interviews. Some of the parents were not fluent in English and I was not fluent in their Ndebele language and so some of the interviews were conducted through translators, who, in all cases were local teachers. Fortunately, there were only two parents who were not fluent in English. According to Neuman (1997), the level of

education can affect the interpretation of words used in questionnaires and interviews. The majority of the participants in this study had a generally low level of education.

3.7.3 **Content**

The findings may have been influenced by the differences in the vernacular language of the researcher and the respondents. Although most of the respondents were able to speak English, variations in the level of fluency affected the consistency of the interviews as well as the depth of the responses.

The descriptions of the land-use observations in Sections 5.2, 5.3 and 5.4 could have been supported by more precise measurements such as vegetation species density if there was more time for data collection. More photographic data (Appendix P) would also have improved the quality of data presented in this research because of the nature of the study that had a major focus on the physical environment.

In spite of these limitations, this study has significance in pioneering research into the role of Permaculture in environmental education. The data gathered in the study is presented in chapters 4 and 5 below and some conclusions that have been drawn from this data are presented in chapter 6. Further research is required into some of the issues that have been raised in this study as outlined in the chapters that follow.

CHAPTER 4

We must walk into the front of schools armed with carefully constructed curricula featuring focused, sequential, knowledge-based programmes.
Michael Weilbacher (quoted in Knapp 2000:34)

4.0 THE PARTICIPANTS' KNOWLEDGE BASE OF PERMACULTURE AND ENVIRONMENTAL CONCEPTS

4.1 INTRODUCTION

In this chapter the environmental knowledge base of the pupils, parents and teachers at the two schools participating in the SCOPE Programme will be presented and critically analyzed. The environmental knowledge of the pupils is based on their responses to the questionnaire (see Appendix B) and as expressed in their interview responses (see interview schedule in Appendix C). The chapter begins with a section on the participants' knowledge of Permaculture-related concepts and their understanding thereof. The following section considers some of the wider concepts of the environment. All the findings presented have been critically engaged in the light of the literature. The chapter closes with a discussion on the emerging patterns and constraints.

4.2 PERMACULTURE AND RELATED CONCEPTS

The idea of Permaculture is a fairly new one to most people in Zimbabwe although some of the techniques have been practiced in traditional agriculture and are part of the local indigenous knowledge system. What is new is the conceptualization of the ideas and their packaging as an approach to sustainable agriculture (see Section 2.5). In the school system the chances are that those who know about Permaculture have had exposure to the SCOPE Programme in one way or another. The parents were asked about their source of knowledge about Permaculture as follows "When and from whom did you first hear about Permaculture?" (see question 1 in Appendix E) and all of them indicated that they got to know about it from teachers who had received in-service training in Permaculture and ILUD from the SCOPE Programme.

Table 4.1 presents a summary of pupils' understanding of the concept of Permaculture. This was in response to the question, "In your view what is Permaculture all about?" (see question 1 in Section B of Appendix B).

All ten pupils gave answers that were 'in the right direction' but which varied in terms of the detail that they contained (see Table 4.1). Pupils 4MM and 5MM gave a textbook definition of the term Permaculture (see Section 2.5) while the most brief response was that the term means 'agriculture that lasts or permanent agriculture' (Pupil 9FN). A relatively vague description put it down as 'It is important for conserving natural resources and all what we use in the soil' (Pupil 7MN).

The key features of Permaculture as it is defined in Section 2.5, are that:

- it is a planning and management tool
- it aims at the long term capacity to produce, or sustainability
- it builds farming systems that are modeled on natural ecosystems in terms of resilience
- It is aimed at building human environments that have a balance between social equity and economic viability

None of the respondents really captured all the features of Permaculture that have been listed above but each one at least picked on one or more of the features. Quite impressive were pupils, 3MM, 4MM, 5MM, and 8FN who saw Permaculture as a tool for environmental management. These pupils were actually in the simple majority at forty percent and what is impressive about their definitions is that they related Permaculture to the environment and saw it as an approach rather than a new discipline.

Two respondents included the term sustainability in their responses (Pupils 4MM and 6MN). What is significant here is that the concept of sustainability is at the heart of both EE and the Permaculture approach to land-use (see Sections 2.3.3 and 2.5).

It also emerged from the questionnaires that the pupils did not seem to be simply regurgitating memorized definitions because some of them gave their answers at length. For example Pupil 3MM gave his answer in a substantial paragraph rather than a single statement (see Table 4.1) and the interviews showed that some of the pupils could talk

about the concept of Permaculture at length. Pupil 3 MM showed a reasonable understanding of environmental issues with both local and global perspectives being given.

Table: 4.1 The pupils' descriptions of the term 'Permaculture'.

PUPIL	RESPONSE
1FM	I think it is the taking care of the environment and the land cover
2FM	It is permanent agriculture. It teaches how to take care of environment
3MM	It is the 'balanced' way of managing or utilizing our land I think that Permaculture has targeted agriculture, the base of our country's economy with positivity by bringing ways of stopping the notorious soil erosion. In my understanding of Permaculture the land is maximised at the same time not abused. In Permaculture you learn the way to get more yields as you are taught of pest repellers like the rue, nutrient making plants like sesbania and many more. Permaculture beautifies our environment, reduces the likes of global warming. All in all I think it is the friendly utilisation of our resources.
4MM	It is the design system for creating sustainable human environments
5MM	The design system for creating suitable human environments
6MN	It is the use of land maximally to get maximum production but in a sustainable way
7MN	It is important for conserving natural resources and all what we use in the soil
8FN	It is important for reducing land degradation, siltation, raindrop compaction Reducing soil erosion, run off and also the rate of infiltration is high It teaches how to take care of the environment
9FN	It is the agriculture that lasts or permanent agriculture
10FN	It is the agriculture that lasts or permanent agriculture

The pupil also displayed knowledge of some of the Permaculture techniques by describing the use of pest control and nitrogen fixing plants. In spite of their limited

command of the English language, some of the pupils (Pupils 3MM and 4MM) were quite eloquent during the interviews and could defend their ideas.

It is also important to look at the language used in the definitions. A number of the definitions contained the relevant subject jargon such as resource utilization and management, conservation and sustainability but some struggled with the language. For example pupil 3MM described soil erosion as 'notorious'. Others added some incorrect or irrelevant statements to their responses after giving some semblance of correct answers. Pupil 2FM added that Permaculture was also 'a way of developing my knowledge of education'.

The confidence, fluency and motivation that characterized most of the pupils, parents and teachers as they talked about Permaculture were quite striking. This could have been influenced by the idea that the participants associated me with the SCOPE Programme even though they were aware that I was acting as a researcher during the interviews. The participants may also have been reading through my feelings as I talked about Permaculture. According to Stryker (1991) and Melia (1997), meanings are created through the interaction of symbolic gestures made during interaction. It is, however, significant that the pupils could talk so much about Permaculture when it has not yet been integrated into their curriculum.

It should also be pointed out that all the definitions of Permaculture that were given in the study were linked to the environment. The participants seemed to make meaning of the concept of Permaculture in terms of its relationships with the environment and or environmental issues. This means that the respondents interpret Permaculture as being relevant to environmental issues and this presents opportunities for its adoption as a tool for environmental management. In symbolic interactionism, action is seen to begin with the interpretive process of the individual (Blumer 1969).

Emmons (1997) points out that environmental learning should integrate both cognitive and affective learning in an interactive and reciprocal way. She argues that environmental educators should therefore treat students as 'feeling-thinking-acting' human beings with very thin boundaries between the different learning areas (see Section 2.6 for a fuller treatment of Emmons' model of environmental learning). The

learners at Mavela and Ntepe schools seem to have been exposed to the different learning areas described in Section 1.2 in their participation in the SCOPE Programme and this would help to explain their sensitivity to environmental issues.

The pupils were also asked to define two other relevant and related terms in the questionnaire and these are zoning and integration (see questions 3 and 4 in Appendix B). The two concepts are explained in detail in Section 2.5. Zoning is one of the techniques that are used when planning for sustainable land-use management as it helps the farmer to allocate appropriate functions to the different parts of the land. The respondents were generally able to give a reasonable description of the idea of zoning as shown in Table 4.2.

In this study the concept of integration is considered quite central to both Permacullture and environmental management. Knowledge of this concept gives an indication that the respondent at least has the relevant Permaculture knowledge for managing the local environment. In Permaculture, integration is used to describe the relationships that can be established between any two or more compatible elements in an environment (see Sections 1.1, and 2.5 for more details about the concept).

Table 4.2: The pupils' descriptions of the concept of zoning.

PUPIL	*RESPONSE*
1FM	The grading of crops according to how much water they require
	So that we know they should be sited whether near homesteads or a bit far
2FM	Growing of crops according to water management
3MM	Crops or plants are graded according to their necessities and management
	The plants that need more water are planted near a water source
	Put near a gate and water source for constant management and watering
	Plants that need certain soils are graded
	Basically it is the you lay of out your land
4MM	The division of the environment or land according to the number of times each place has to be visited
5MM	Whereby you put plants according to need of water
6MN	
7MN	
8FN	Placing the elements according to their importance in helping each other
9FN	Placing of elements according to their importance in use and working together
	Placing things according to their importance helping each other
10FN	

There was a mixed response to the question on integration as illustrated in Table 4.3 below. Two pupils did not respond to the question at all while another gave an incorrect response. The rest of the pupils gave quite accurate descriptions of the term integration as it is used in Permaculture. Pupil 6 said that integration in Permaculture means "to mix different things so that each benefit(s) from each other". There was no waffling on this question – those who knew the answer knew it well and those who did not know showed it clearly.

Table 4.3: The explanations of the idea of 'integration' given by the pupils.

PUPIL	RESPONSE
1FM	Variety of different ways in which the land is used or the interaction of different plants so as to obtain higher yields
2FM	Where different types of crops are mixed when planted for more benefit
3MM	Interaction of plants so as to obtain the best quality be it in terms of soil, fruits, herbs Mixing of different methods
4MM	The mixing and matching of different species for dependency situations
5MM	
6MN	To mix things together so that each benefit from each other
7MN	
8FN	How Permaculture is practiced and learnt
9FN	The mixing of different elements to work together on a small piece of land
10FN	Mixing things

4.3 INTEGRATED LAND-USE DESIGN

It was mentioned in Section 1.1 that the SCOPE Programme has developed the ILUD process for use by schools in planning for the sustainable use of their land. The pupils were also asked to say what they understood by this process. The responses to this question were generally incorrect, weak or vague as illustrated in Table 4.4. One respondent could not say anything in response to this question. Only four of the ten responses were on the right track. However most of the incorrect responses still had elements of the ILUD process but they were too far away from the full answer.

The limited knowledge of ILUD displayed by the pupils may be due, in part to the complexity of the process itself. The Thessaloniki Declaration pointed out that human and ecological systems are inherently complex and defy simplistic explanations, solutions and predictions (UNESCO 1997.18). The ILUD process is based on observations of natural systems and also draws on principles from human learning

theory such as participatory methodology. These inferences possibly make it more difficult for the pupils to create meanings out of their interactions on the ILUD process.

It is my considered opinion that the explanation for this low knowledge base of ILUD is that pupils may be more interested in the *content* of programmes rather than their *process*. The processes of a programme relate more to the underlying theory or philosophy of the programme than the content and therefore they are likely to be more complex. It takes much more to absorb both the content and process of a programme because the presenters or facilitators of the programme tend to concentrate on the content that they would like to pass on. The pupils are unable to create meaning of the ILUD process until they have fully grasped the relevant content. This is because interaction is viewed as a new situation in which old and new understandings occur (Stone and Farberman quoted in Brittan 1973). The pupils are thus unable to attribute much meaning to the ILUD process until they have fully understood the principles that go with it.

In the case of the SCOPE Programme it is important that the participants be familiar with the processes as well because they are expected to apply the same processes annually as they review the progress that they would be making or not making. Since the ILUD process is actually followed at workshops run by the SCOPE Programme at participating schools, it should be easier for the participants to follow and remember it. The facilitators of the ILUD process should provide a lot of opportunities for the participants to make meaning of the process itself in addition to the related content that goes with it.

Table 4.4: The pupils' responses to the question of what they understand by the term Integrated Land-Use Design (ILUD).

PUPIL	*RESPONSE*
1FM	When the land is practiced in different shapes Like when you are making beds you can make rectangular or any shape for the benefit of the plants which will be sown
2FM	plants are grown in integrated land for different purposes
3MM	The design where interrelationship(s) of the land is (are) carried out with a variety of land practices like different shaped beds like the half-moon I think the land practices will be benefiting each other Land is designed in a variety of ways
4MM	The utilization of land on dependent different species to flourish each other
5MM	Whereby we mix different crops in a land
6MN	The way by which land can be designed to prevent soil erosion e.g. making irregular beds in the garden
7MN	The way in which land is prepared for certain activities and used for many activities which are permanent
8FN	About how land is designed, used and cared (for)
9FN	The use of the land which is small to produce many and variety of products
10FN	Using land for different things

The teachers in charge of the Permaculture Programme at the two schools were confident that they could use the ILUD process to introduce Permaculture to members of staff, pupils and parents at schools that have not yet been introduced to the SCOPE Programme. Their confidence may stem from the fact that they have a background of Agriculture teaching and therefore find it relatively easier to understand Permaculture. Not all schools offer Agriculture in Zimbabwe and teachers from such schools may not have the same confidence about teaching Permaculture to other people. Stryker (1991) points out that the meanings we make or the way we portray ourselves are often influenced by the position(s) we hold within a certain societal context and the particular role(s) associated with these position(s).

4.4 THE CONCEPT OF SUSTAINABILITY

In order to determine their knowledge base the pupils were asked to state what they understood by the term: *sustainability* (see question 10 in Appendix B). The idea of sustainability is a central one in EE. In fact one of the main approaches to EE sees it as an attempt to educate *for sustainability*. The concept of sustainability has already been explored in Section 2.3.3.

In this study the pupils displayed, in my view, a reasonable level of understanding of the idea of sustainability as revealed in their responses from the questionnaire, which is presented in Table 4.5. When asked about sustainability, (see Appendix B) pupil 5MM said "Sustainability is whereby you use something conserving it for the next day but not use it all". Eight of the ten respondents expressed more or less similar sentiments about their knowledge of this concept. The idea of conserving for the future, the core issue of sustainability, came out in eight of the ten responses.

There were no two similar answers that were given in response to this question. This can be an indication that the responses were not the product of rote learning. Each pupil seemed to have created his or her own meaning of this key concept in environmental education. Even the wording in many of the answers was free of jargon. The pupils expressed what they knew in simple terms. This possibly shows a good understanding of the concept. Discussions around related issues during the interviews tended to support this conclusion. The pupils were clear that the knowledge of the environment should lead to a future in which the environment remains healthy and productive. The interactions in which the pupils had opportunities to make their own meaning of the idea of sustainability could have been rich and allowed for individuals to engage in the meaning making process creatively.

This level of understanding may be due to the continuous nature of the activities of the SCOPE Programme at each school. There are therefore many opportunities for the participants to engage in the process of meaning making. For example, Mavela secondary school has been participating in the SCOPE Programme since 1994 and this is unlike many other environmental programmes that tend to have hit and run engagements with the schools. Knapp (2000) points out that agencies and institutions

Table 4.5: The pupils' responses on the question on 'sustainability'

PUPIL	RESPONSE
1FM	
2FM	Whereby something is used and left for the next future
3MM	The utilization of our resources and not exhausting and disrupting the ecosystem
4MM	The use of the land in such a way that it wont be exhausted but would be used again
5MM	Sustainability is whereby you use something but conserving for the next day but not use it all
6MN	The use of a resource wisely and leaving it in a usable state for use by future generations
7MN	The time which something can last for
8FN	
9FN	Something that lasts you for a long period of time and playing an important role in your life while using it
10FN	The ability to last long

associated with environmental education have produced an amazing number of activity packs and curriculum guides resulting in the creation of an "activity–guide mentality". The problem with these numerous "short and sweet" strategies, Knapp continues, is that they do not represent a sequential learning order based on sound educational philosophy. The short term advantages of these resources result in the reduced use of more substantial models that encourage long term issue investment that builds responsible behaviour on the part of the students. Marcinkowski and Iozzi quoted in Knapp (2000) reported that the brief duration of the short-term EE activities accounted for small positive gains rather than the larger more significant gains associated with long-term experiences.

A study by Eagles and Demare (1999) found out that even a weeklong camping project did not produce any measurable increases in ecologistic attitude. Instead they found out that more long-term activities like watching nature films, reading about the environment

and talking about the environment at home were more effective. They cited similar studies that supported their surprising results.

The number of reasonably correct responses on the question of sustainability seems to mirror what is happening in the field of EE itself. Some commentators in the field of EE have been in disagreement over what to call the concept of sustainability in EE. Some of the terms that have been used include: *education for the environment, education for sustainable development, environment and development education, education for environment and sustainability, education for sustainability and sustainability education* (Smyth 1998, Lotz Sisitka *et al.* 2000, Nyika & Stiles 2001). Whatever term will be more dominantly used, the idea of sustainable management of the environment seems to have filtered to the pupils in the two schools involved in this study.

There are remarkable similarities in the levels of environmental knowledge that were expressed by the pupils from the two schools. When asked to define the terms 'sustainability' and 'integration', pupils 1FM and 8 FN and 5MM and 7MN had nothing to say on the respective concepts and the definitions that were given on sustainability were remarkably similar although the actual wording was different (see Tables 4.5 and 4.6 in Section 4.4 above). This in the background of average academic performance in the most recent examinations available that ranged from 44% for pupil 5MM to 71.77% for pupil 4MM.

It is difficult to attribute the pupils' environmental knowledge solely to their participation in the SCOPE Programme as there are other sources of influence on their environmental learning such as the subject of Geography and other environmental programmes such as Action 21 and the Tree Growing and Tree Care Competition (TGTC) that were described in Section 2.3.4. In her study of EE in secondary schools in Zimbabwe, Manjengwa (1995) found out that Geography contributed towards the environmental knowledge of the pupils (see Section 2.6).

The parents interviewed in the study showed awareness of local environmental issues and in addition saw Permaculture as providing strategies for tackling the issues. However, as reported in the next chapter, the parents had not done much to implement the Permaculture techniques that they had acquired. The study by Emmons (1997)

showed that there is no direct relationship between environmental knowledge and environmental action. She found that environmental action was influenced by the learners themselves and their social setting (see Section 4.2). This inaction on the part of teachers may also be due to inadequate exposure to the Permaculture activities.

4.5 ATTITUDES TOWARDS THE ENVIRONMENT

Question 6 in the questionnaire for pupils (Appendix B) asked the pupils, "How has Permaculture influenced your:
a) awareness of the environment?
b) ability to think about the environment?
c) ability to solve environmental problems?

All the candidates reflected positive attitudes towards the environment in their answers, with some doing so quite strongly. Pupils 6NN, 7MN and 8FN said that Permaculture had influenced them 'very much'. The rest of the pupils explained how they were influenced. In answer to part a), Pupil 3MM said, "It has influenced my awareness of the environment as when ever I am walking I seek to know various plants, and identify herbs". During the interviews pupil 9NF said that she felt Permaculture had taught her "to respect nature and come out with a better enjoyable surrounding".

Although there was no pretest on the pupils' attitudes before they started participating in the SCOPE Programme, it seems that the attitudes of the pupils had either become more positive or they had become more complex. This is because the interviews showed that the pupils were very conversant and passionate about environmental issues in a way that I would not expect to be typical of fourth form secondary school pupils in a setting such as theirs. All the pupils interviewed had participated in the Permaculture activities for at least two years and this is a long enough time for attitudes to change as Mangas *et al.* (1997) found in their study of Biology students.

Table 4.6 Comments portraying the pupils' attitudes towards the environment.

PUPIL	RESPONSE
1FM	It lead me in knowing the importance of the environment and improving the ways of preserving it
2FM	Permaculture has influenced my ability to manage the environment because I have done most of practical things in club
3MM	It has influenced my awareness of the environment as when ever I am walking I seek to know various plants, and identify herbs
4MM	I now know that to sustain the environment afforestation should practiced and deforestation abandoned
5MM	Permaculture has influenced my awareness of the environment
6MN	The influence of Permaculture on my awareness is very much
7MN	Very much
8FN	My ability to do something for the environment is very much
9FN	My awareness of the environment is much I think it teaches me to respect nature and come out with a better enjoyable surrounding
10FN	It makes to know more or even just exercising

4.6 EMERGING CONSTRAINTS

The main constraint that emerged from the study was the slow pace of integration of Permaculture into the formal curriculum at the secondary level. Although the SCOPE Programme has formal recognition by the Ministry of Education, Sport and Culture, and is allowed to operate in all schools in the country, Permaculture is yet to be formally integrated into the syllabi of the main career subjects. Integration of Permaculture into Agriculture, Science, Biology and Geography would make it examinable and less problematic to implement (Makoni 2000). At the moment, the teachers and pupils participating in the SCOPE Programme have to perform some sort of balancing act in order to meet the demands of the formal school curriculum while at the same time getting involved in the SCOPE Programme. In this situation, pressures to pass examinations tend to override everything else as people try to get qualifications. The problems resulting from lack of progress in mainstreaming Permaculture have included

the allocation of inadequate and marginal time at the end of the day to the Permaculture activities.

As an aspect of the curriculum, the SCOPE Programme has most of the components listed by Stiles in Section 2.2. It has developed the ILUD process, which schools can use as a framework for their environmental work. The ILUD process can be used by the teachers to draw up schemes of work and to evaluate them as well. The process is supported by a range of written materials that can be used for reference by both teachers and pupils but there is no comprehensive manual for ease of reference. There are also books on Permaculture but most of these are foreign publications that may not be directly relevant to the learning needs of local pupils. The SCOPE Programme has still to publish two books that have been in progress since 1995. Lack of funds to cover the minimum print run of the books has been cited as the reason for the delays in publishing the books. The curriculum materials in the SCOPE Programme are also available in English only and this makes them relatively inaccessible to some of the parents and children with low levels of literacy in English.

The pupils did not mention a wide range of problems in connection with their participation in the SCOPE Programme. When presented with the question, "What problems have you faced in your Permaculture work?" (Question 7 in appendix B) pupil 9FN summed up what the other pupils had said when she said, "The problems I have faced in work in Permaculture are negative attitudes from other fellow students before understanding and lack of capital to buy tools for using in Permaculture practicals and money to visit other people to gain more knowledge and teach other people who are unaware about Permaculture". It is interesting that the pupil sees the attitudes of other pupils as a problem and this probably reflects some positive concern about the implementation of Permaculture at her school.

One of the teachers and two parents also cited negative attitudes during the interviews (Question 7 in Appendix D and question 9 in Appendix E). Further questioning of the teachers revealed that they believed that showing the people with negative attitudes some working examples of Permaculture on the ground helped to change the attitudes. The practical implementation of Permaculture at the schools that is described in the next chapter is therefore of added significance.

Table 4.7 The problems faced by the pupils in their Permaculture work.

PUPIL	RESPONSE
1FM	The problem that we face in our club is the problem of money. We do not have enough money to go for trips to see what other schools do
2FM	The problem I have faced in my involvement in Permaculture is to know or have a wide variety of herbs and I did like to exchange views with other students from other schools
3MM	I have face problems of some tools especially at home
4MM	Lack of money to go out and assist people in villages and even raise some crops
5MM	The problems which have faced in my involvement in Permaculture is that there were buck which came from bush and broke the fence so they eat all our plants that were planted
6MN	In my work in Permaculture I have faced a problem of that some people still have difficulties in appreciating things about Permaculture
7MN	Lack of materials and high technology in Permaculture
8FN	Problems I have faced in my work in Permaculture are the shortage of tools, somebody to help with impossible activities such as digging swales since I am female I don't have much power that I can dig more than I want
9FN	The problems I have faced in work in Permaculture are negative attitudes from other fellow students before understanding and lack of capital to buy tools for using in Permaculture practicals and capital to visit other people to gain more knowledge and teach other people who are unaware of Permaculture
10FN	Problems on how to reclaim land around the school

This chapter has presented a description of the environmental knowledge recalled by some of the pupil participants in the SCOPE Programme at the two schools during the study. The knowledge base described has been mirrored against the background of related studies and the relevant literature. It has emerged that the respondents display substantial knowledge of relevant environmental concepts. In addition, many of them

displayed positive attitudes towards Permaculture and even a high level of motivation to work for a better environment. The next chapter examines the practical application of this knowledge in the management of the local environment in order to give a fuller description of the environmental learning that has taken place at the two schools.

CHAPTER 5

An important goal of environmental education is to make individuals aware of actions necessary to resolve environmental problems
Knapp (2000:34)

5.0 ENVIRONMENTAL MANAGEMENT PRACTICE

5.1 INTRODUCTION

A major area of focus for the SCOPE Programme is environmental management. The schools participating in the SCOPE Programme are assisted to take environmental action by receiving training in Permaculture and ILUD (see Sections 1.1 and 2.5). It is during this training that the transmission of the Permaculture and environmental knowledge and skills that were described in chapter 4 begins. After these workshops the participants have the task of using the knowledge and skills acquired to translate theory into practice.

This chapter presents the observations that were made both at the 2 schools and at the 5 homesteads that were visited. The findings of the analysis of photographic documents (see Section 3.5.1) are also incorporated into this presentation. Some of the photographs illustrating elements of the environmental action are reproduced in Appendix P. The observations of the environmental actions are critically reflected upon with reference to related studies and literature. The order of presentation follows the Permaculture techniques that were expected to have been implemented and were investigated in this study. The main Permaculture techniques for environmental management are sector planning, zoning and integration (Mollison 1988). See Section 2.5 for a discussion of these terms.

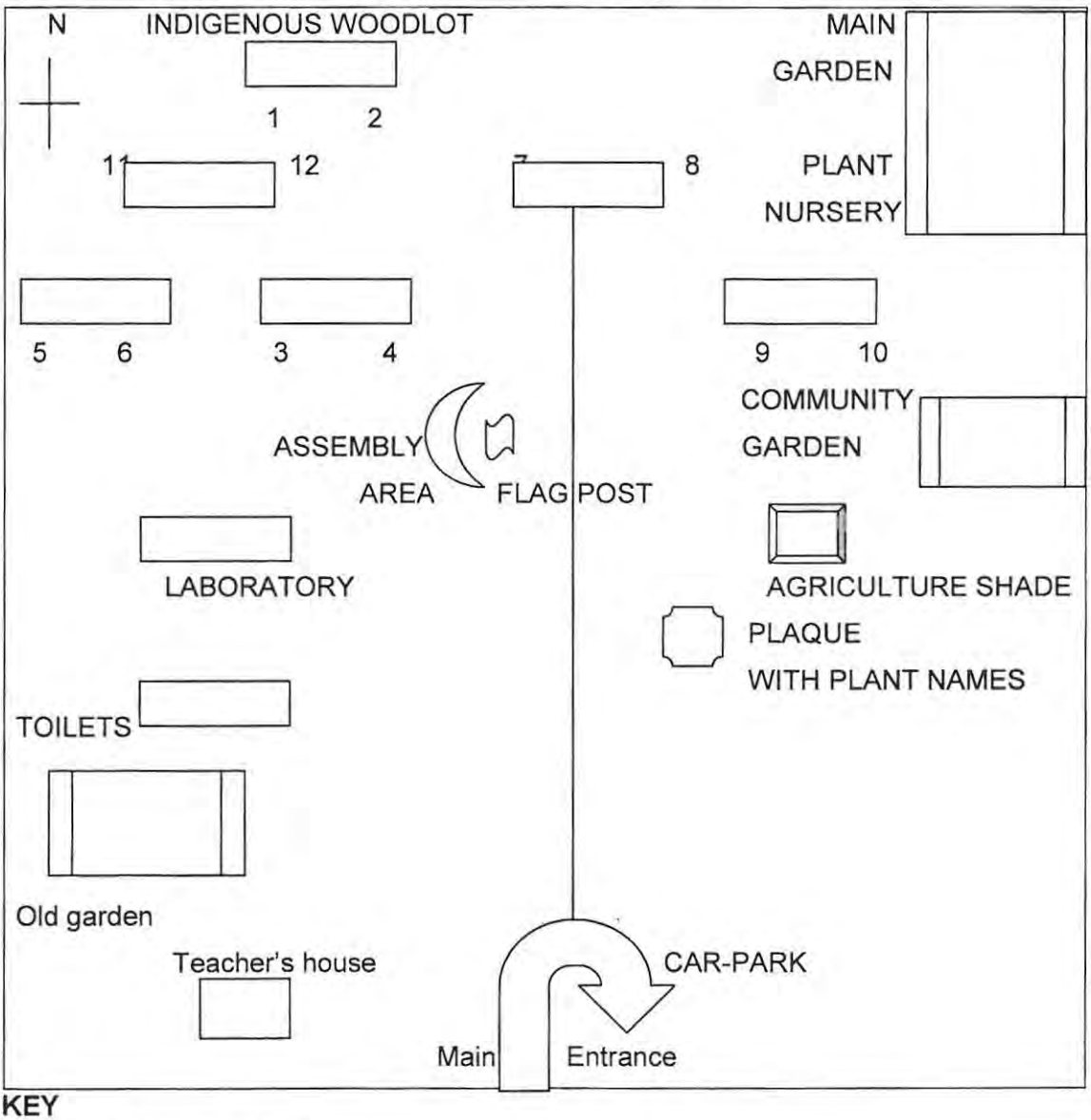
5.2 SECTOR PLANNING

5.2.1 **Water**

Mavela secondary school (see sketch map of the school in Figure 5.1) has established an almost continuous cover of lawns, flowers, herbs, shrubs and trees on its grounds.

Part of the reason for doing this is to reduce the potential erosion caused by water run-off (Shumba 2000, pers. comm.). When the soil surface is covered, the speed of flow of water run-off is reduced and this allows it time to sink into the ground. Booth (1994) reports on a study that showed rates of erosion increasing twenty times in areas that do not have much vegetation.

Figure 5.1 a sketch map to show the land-use at Mavela secondary school.



KEY

1 2 Numbered classrooms

Main walk way from the car-park to the school office

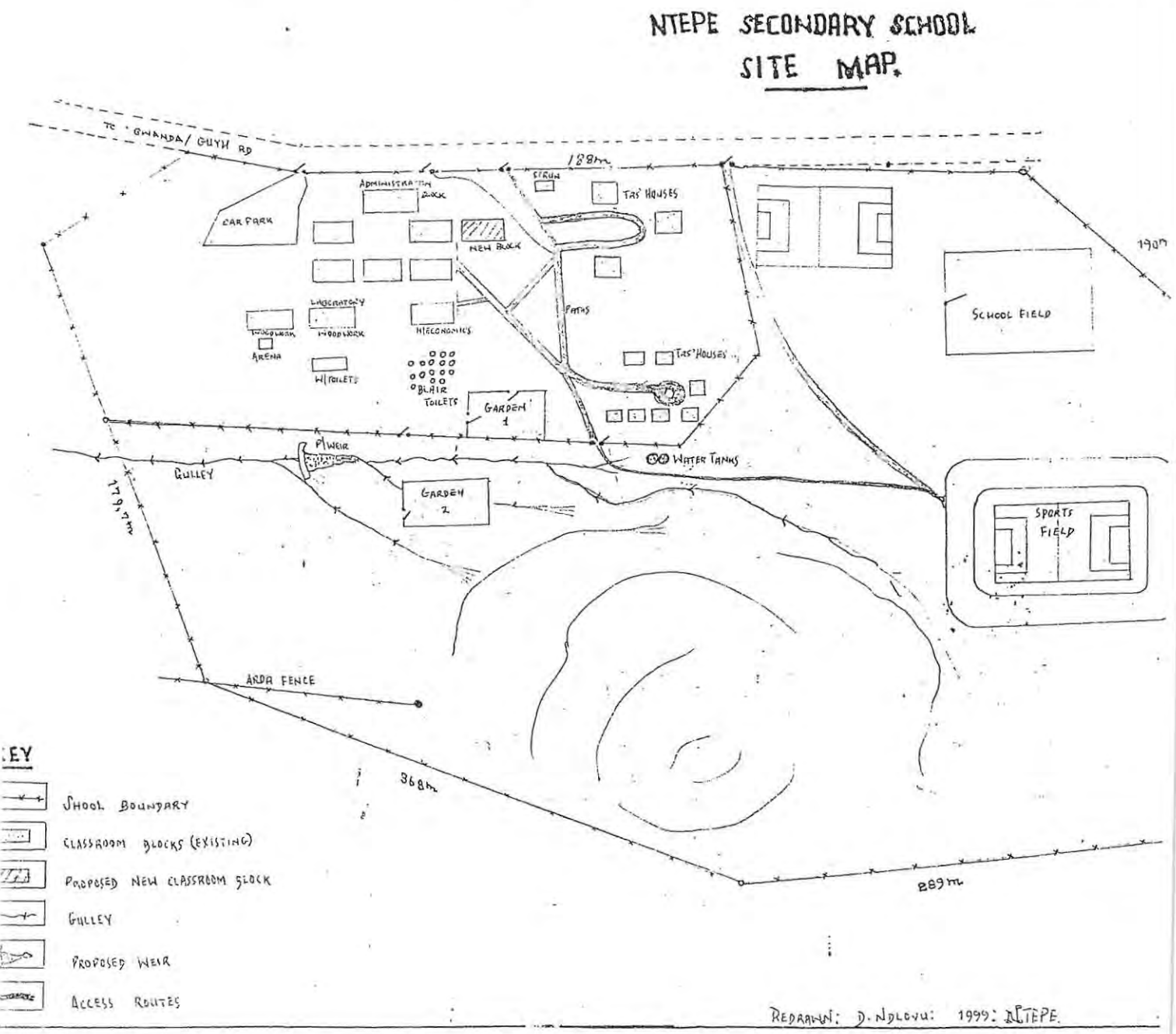
In spite of the semi-arid conditions of the area, it was difficult to find patches of bare ground at Mavela. The footpaths and aprons around the buildings are paved in concrete and demarcated by hedgerows and flowerbeds. The pupils at this school seem to respect the designated footpaths as no undesignated paths were observed. Siziba (2000, pers. comm.) reported that the previous year the school had harvested a pumpkin crop from around the car park! This kind of land-use and grounds management is very unconventional in schools in Zimbabwe. The typical practice is to grow flowers around the classroom blocks and to weed the rest of the grounds and keep them well swept.

In the garden erosion control is not so thorough. The agro-forestry techniques that were used in the garden provided some ground cover. However the ground cover was inadequate as there remained pockets of bare land. Ground cover is important for soil and water conservation and various types of materials can be used to make this cover (Bell 1992). The materials include crop residues, green or live mulch, stones and all kinds of plant and animal litter. At Mavela secondary school, there is a lot of tall grass to the north of the school that could be cut and used for mulching (See the sketch map of the school in Figure 5.1).

At Ntepe secondary school (see Figure 5.2) most of the grounds were now covered with one material or other but there were some bare patches mainly around the two car parks. The materials that had been used for ground cover ranged from gravel stones to dead grass mulch and live mulches provided by ground cover plants such as lawns, pumpkins and herbs.

A fixed-point photographic monitoring system is being used to keep track of progress at Ntepe secondary school by taking photographs of selected points at the same time every year. I was shown photographs of the school grounds, which were taken just before the implementation of Permaculture in 1998. The scenery was very different from what I was now seeing. The density of vegetation and the ground cover in general had increased dramatically. An amazing transformation of land-use had taken place at the school. Appendix P shows some of the landscape transformations that have taken place.

Figure 5.2: A sketch map to show the main land-uses at Ntepe secondary school.



Another new feature of the school grounds that emerged from both land-use observations and from discussions with the staff, parents and pupils at the school was

that of water harvesting. There were now rainwater harvesting structures such as swales and pits all over the school grounds. Pits were dug at regular intervals along the swales in order to increase the water harvesting effect of the swales. The pits were planted with water loving plants such as bananas and water berry trees. Some of the swales at Ntepe are quite unique in that they do not have any visible depressions because they are filled up with loose stone so that people can walk across easily while the water harvesting is taking place.

At Mavela secondary school, on the other hand, there were too few ground structures like swales in both the garden and the rest of the grounds for harvesting run-off water when it rains. In an integrated land-use design, water from roofs, roads and other less permeable surfaces should be channeled towards pits planted with water loving plants such as paw paws and bananas (Brazier 1996a). Even though the school is situated in a low rainfall region (see Section 1.1), the little rainfall that is received can be channeled underground and boost the ground water store for use by plants. The water harvesting structures slow down the flow of run-off water and allow it to sink into the ground (see Section 2.5).

5.2.2 **The wind**

Mavela School has preserved the natural woodland to the west and north and this acts as a windbreak for the school. The dominant species in the woodland are a variety of acacias but the tree species density is not very high as the area is partly grassland as well. In the built-up area, some trees have been planted but they are still young and more need to be planted in order to provide a more effective windbreak. Bush clearing for house construction is taking place to the south and west of the school and therefore the school needs to have adequate windbreaks on its own premises. Care also needs to be taken at the school to plant tree species that are tall enough to provide an effective barrier for the buildings against the strong winds.

The re-greening efforts at Ntepe secondary school have gone a long way in mitigating the potentially damaging effects of any strong winds that may blow across the school almost from any direction. To the west of the school there is a woodlot of indigenous trees that stretches into natural mopane woodland. Within the mopane woodland there is

an eroded area that is being reclaimed through a re-forestation programme that will further reinforce the windbreak in that direction. See Appendix P for a photograph of the area and Figure 5.2 for a sketch map of the school.

In the southern direction there is a well-vegetated area that also serves to screen the teachers' houses from the classrooms area. The eastern and northern areas have hedges and a variety of trees but the windbreak here is rather thin. In between the buildings there are more hedges, trees and shrubs that have the effect of further weakening any strong winds blowing across the area.

The two schools have done quite well in managing their wind sectors but Mavela has to increase the vegetation density in the area between the car park and the classroom blocks (see Figure 5.1).

5.2.3 **The sun**

Mavela secondary school is in a fairly hot area as described in Section 1.1. The north facing walls of the buildings can get quite hot in the afternoon sun. Apart from some low hedgerows of lavender and other flowers and a few indigenous trees scattered around buildings, there are no effective sunscreens for most buildings.

At Ntepe on the other hand, particular efforts have been made to screen off the sun from certain areas in the school grounds. Sunscreens in the form of trees have been established along all the buildings. Trellises of bougainvillea have been established on the northern sides of the two assembly points in the school.

Both schools need to invest in the establishment of live fencing for the long-term and permanent protection of the vegetation and other assets in their grounds. At Ntepe, Ndlovu (2000, pers.comm.) reports the problem of protecting the planted areas from goats and other animals. In the communal areas of Zimbabwe, the pastures are a shared resource and livestock like cattle, goats and donkeys roam the area especially from late April to November when there are no crops in the fields (see also Section 1.3).

Botha and Botha (1995) and Brazier (1995) list many plant species that are suitable for planting as live fences around a property. The fence should be at least three rows wide and integrate different species of plants. The actual species used and the design of the live fence should take into consideration the nature of the external threats to be kept out of the grounds. Use should, however, be made of the vertical stacking technique, which allows the fence to serve several functions including keeping out different types of animals. According to Morrow (1993), stacking involves planting species of different height that allows each species to exploit the surrounding resources of water, light, nutrients, space and others.

A typical live fence may consist of vetiver grass, sisal, bougainvillea and jatropha species (see Appendix O). Such a fence, if properly designed, would keep out most of the problem animals cheaply and permanently but would need to be managed so that it does not encroach over too wide an area. Ntepe secondary school has already made a start on establishing a live fence but they need to incorporate the stacking element into their design.

Sector planning at the two schools should also take into consideration the threat of veldt fires, which may be very real in future with the increase in vegetation in the area. A design for fire protection should include fire retardant plants, fire resistant species, water bodies and access roads (Morrow 1993). Smooth barked, deciduous and succulent species are some of the plants that can be included in the fire sector.

Another sector that needs further work at the two schools is waste management. Firstly waste collection needs to be improved by adopting a system of waste separation at the point of collection. Separate and labeled waste collection points for such categories of waste as glass, scrap metal, bones, plastic and others need to be set up. The waste can then be integrated into land-use through a technique known as trench bed farming. Wastes like bones and scrap metal gradually release nutrients like calcium, phosphorus and iron into the soil.

The two schools are no longer sweeping the school grounds. Ndlovu (2000 pers. comm.) and Siziba (2000 pers. comm.) reported that the grounds are no longer swept as this has been seen as an environmental and people's health hazard due to the dust that is raised

into the air. Instead pupils now cover the grounds with various materials in order to keep the dust down and to protect the soil. This aspect of environmental management has also been reported to be practiced at the homes of the pupils that were interviewed.

5.3 ZONING

5.3.1 **Nursery**

The care of seedlings is a zone one activity that is located not far from the central area of a farm or school (Mollison 1991). The nursery at Mavela is conveniently situated between the garden and the school office. Some trees at the nursery provide shade for the seedlings but this seems inadequate. The nursery has a wide range of herb seedlings and a few varieties of tree seedlings. Some of the seedlings showed signs of moisture stress due to both under-watering and inadequate shade. There were some plants in the nearby garden like jatropha and vetiver that were ready for multiplication into seedlings through cuttings and shoots respectively but had not yet been propagated.

Raising seedlings at Ntepe is now a more enhanced activity since the introduction of Permaculture in 1998. Productivity at the school nursery has risen significantly as well as the range of seedlings that are produced (Ndlovu 2 000, pers. comm.). The nursery is conveniently situated near the administration block under a shady tree. The focus of production at the nursery is on indigenous trees particularly fruit trees. When the observations were made the stock of seedlings at the nursery was low. A number of reasons were given for this. The nursery has been the source of most of the seedlings that have been used in the school's extensive re-greening programme. Some of the seedlings were either bought or given out to individuals and institutions in the local area. The SCOPE Programme had itself bought some of the seedlings for use at workshops for the new schools.

5.3.2 **Garden**

The garden at MAVELA secondary school is located to the east of the main school buildings and it is being developed into an orchard-garden. It had a variety of plants including herbs, shrubs and trees. Some of the trees were leguminous like the leucaena.

There was evidence of recycling of organic matter through composting and the use of plant litter to improve soil fertility.

A few metres from the school garden was a community garden that was managed and worked exclusively by interested parents. This garden mainly had vegetables and they were reported to have been produced organically. The vegetable crop was quite healthy and the yield was better than that in the school garden. The school garden seemed to be managed more as a demonstration unit than a production unit.

The garden at Ntepe secondary school is all over the schoolyard. The traditional garden has been largely abandoned for a series of units of land around the classroom blocks that are being intensively farmed but with a different focus for each unit of land. For example the land around the Home Economics block is being used for the production of vegetables and culinary herbs. All the units of land are, however, farmed using the Agro-forestry practices that characterize Permaculture land-use. These include the inter-cropping of leguminous trees with the vegetables and other crops such as herbs.

5.3.3 **Car park**

The car park at Mavela is right at the main entrance to the school and is clearly demarcated by a concrete apron. Its surface has been tarmacadamised throughout. A few trees of shrub size are providing some shade. The parking area is big enough to accommodate over 20 cars. There is, however, need for more shade trees with some of them being planted in the middle of the tarmac.

At Ntepe the car park has been situated near the administration block. It is screened off from the classrooms by a series of hedges that all serve to provide shade and to screen dust and vehicle emissions that come from both the car park and the road, which goes past the school. The car park has a gravel surface and the run-off water that is generated there is channeled to nearby planted pits.

5.3.4 **Other zones**

The school assembly area at Mavela secondary has been clearly marked with bricks and plants but there is inadequate shade at the moment. The assembly area is in the centre of the grounds and it is well linked with all other zones with a network of footpaths that are surfaced with concrete. In the outermost zone, the indigenous woodlot dominates and medium height trees, thorny bushes and tall grass characterize it. The tall grass should be periodically harvested and utilized as mulch and composting material on the arable land. When this is not done snakes pose a perceived danger to the pupils and the potential inputs for organic farming are wasted. Even the trees need to be pruned and thinned and utilized for firewood and timber.

At Ntepe secondary school there are mainly mopane and acacia woodlands to the North and West of the built-up area. The woodlands are being enriched with the addition of indigenous fruit trees like the snot apple. The woodlands are also being used as a source of organic manure in the form of litter. Between the woodlands and the classroom blocks is a ring of open, outdoor classrooms, each of which consists of one shade tree and some seats.

There is need to further break the monotony of the landscape especially at Mavela where the land is generally flat. Introducing guilds into the design of the grounds across the zones could do this. According to Mollison (1991), a guild is a set of plants of different heights that are planted around a central object such as a tree. Guilds may also be useful for illustrating the varieties of species that are at the school for the benefit of the learners and visitors but the species would then need to be labeled. Guilds also easily illustrate the concept of integration with techniques such as inter-cropping and companion planting that are central to an understanding of Permaculture. Section 5.4 that follows presents the application of these concepts at the two schools

5.4 INTEGRATION

Generally the grounds at Mavela show substantial diversity of different plant species but many of them are part of the preserved natural vegetation of the area. The dominant species are the acacias, which are part of the indigenous woodlands surrounding the

school. A variety of flowers, herbs and trees were introduced into the area and this has increased biological diversity. However the diversity was limited to plant communities and this makes it incomplete for a Permaculture system (Mollison 1991). Animals have several roles to play in a Permaculture system and these include pest control and manure production. For example selective introduction of chickens into the garden through the use of the 'chicken tractor' results in the cutting of the labour required for manuring, tilling and pest control (Vukasin 1995). The chickens (traditional varieties), when introduced onto harvested beds, would eat the insect pests, scratch the earth around and at the same time fertilize the soil through their droppings.

At Ntepe secondary school, differences observed between the vegetation on the photographs taken 3 years ago and the current scenery were that there were now more species of plants growing on the school grounds. Some of the new species include herbs and multi-purpose species of trees like the leucaena. Herb species that have been introduced include marigold, thyme and numerous others that are on the list of plant names in Appendix O. There is now a lot of respect for indigenous plant species at the school and this will help to preserve the biodiversity of the area. As pointed out in Section 5.2.1 the school is planting more indigenous trees within their grounds

5.5 PRODUCTION

Ntepe secondary school has a limited production of herb and tree seedlings, vegetables and fruits. Although the soils are poor, potential exists for the production of small livestock such as rabbits, chickens and goats. The manure from these would in turn be used to improve the soils. The small livestock could be marketed at the nearby Tsholotsho District Service Centre, which has a substantial number of civil servants who lead a semi-urban lifestyle.

As regards the commodities that are already in production, the school has to look into the issue of raising productivity so that good examples would be set for the pupils and the community.

The situation at Ntepe in terms of production was characterized by the following two elements:

- Food production. There were now vegetables, herbs and fruit trees growing around the classroom blocks. Fruit trees used to grow in the orchard only while vegetables were grown in the garden only. Herbs were a new crop introduced as a result of participation in the Permaculture programme.

- Organic production; the respondents reported during interviews that they are no longer using any artificial chemicals in their farming activities. Instead they are using composts, animal manure, leaf litter, crop residues and other organic inputs. According to Blake (1990:11), organic farming does not use artificial fertilizers or chemical pesticides and it minimizes the use of non-renewable forms of energy.

5.6 HOMESTEADS IN THE TWO COMMUNITIES

Table 5.1 below presents a summary of the observations that were made at all the sites visited. Four homesteads were visited in the area that is served by Mavela secondary school. Three of the homesteads belonged to parents with children at the school while the fourth homestead belonged to one of the Agriculture teachers at the school. This homestead was situated outside the school grounds in the residential area for Tsholotsho Growth Point. The teacher did not hold title to the house as it was rented from the government.

At the teacher's homestead there was a variety of fruit and vegetables in production despite the fact that the visit was done during the dry season. The soil improvement and water conservation techniques used in Permaculture systems were evident all over the planted areas at the homestead. The fruit and vegetable plants themselves were remarkably healthy. The garden here was in stark contrast to the dry and scorched earth in the open area in front of the house. The neighbouring houses had some patches of green around them but the productivity did not seem as high as it was in the teacher's homestead.

The level of productivity here was much higher than that observed in the school garden. The reasons for this difference seem to lie in the management systems of demonstration units as compared to production units. Production units tend to be driven by the profit

motive and they place more focus on improving efficiency and minimizing waste. There tends to be less comparable motivation to raise productivity in demonstration units.

Table 5.1 Summary of observations made.

SITE	INTERC	MANUR	RECYC	LEGUM	IPM	COVER	WATER	ZONES
MAVEL	YES	NO	YES	YES	YES	85%	YES	YES
NTEPE	YES	NO	YES	YES	YES	75%	YES	YES
1 MFT	YES	YES	YES	YES	YES	60%	YES	YES
2 MMP	YES	YES	YES	YES	YES	15%	YES	YES
3 MMP	YES	YES	YES	YES	YES	25%	NO	YES
4 MMP	YES	YES	YES	YES	YES	20%	NO	YES
5 NMT	YES	YES	YES	YES	YES	90%	YES	YES
6 NFP	YES	YES	YES	YES	YES	40%	YES	YES
7 NMP	YES	YES	YES	YES	YES	30%	YES	YES

KEY

SITE	The site where the observations were made
MAVEL	Mavela secondary school
NTEPE	Ntepe secondary school
MFT	Mavela female teacher
MMP	Mavela male parent
NMT	Ntepe male teacher
NFP	Ntepe female parent
NMP	Ntepe male parent
INTERC	intercropping of plants
MANUR	use of animal manure
RECYC	recycling of organic matter
LEGUM	planting nitrogen fixing plants
IPM	integrated pest management
COVER	Percentage of the ground covered by mulch
WATER	Presence of water harvesting structures
ZONES	Division of land uses into zones and/or sectors

The first of the three other homesteads that were visited was also at the Growth Point [1](see footnote). The head of the household is a bricklayer who was greatly involved in the construction of the school. Apart from that he is a keen gardener who shows a lot of interest in sustainable agriculture. He feels that he needs more training and literature in Permaculture. The homestead has a small kitchen garden that has a diverse range of elements including herbs and chickens. As a parent he has exchanged some of his herbs with the school in order to increase his range.

Homestead 3 MMP is located in a village that is just next to Tsholotsho centre. The head of the household is running a thriving poultry rearing project. He produces a lot of the feeds for the fowls himself. He has implemented some of the skills that he has acquired from the school's Permaculture activities. Some of the herbs that were obtained from the school like the Russian Comfrey are being used as supplementary fodder for the chickens. The farmer is keen to learn how to use herbs for the control of diseases that affect chickens.

Homestead 4 MMP is situated about 5 kilometres west of the school. The head of the household is a member of the Mavela School Development Association (SDA). He is making an effort to start a kitchen garden but the goats are his biggest problem. Another problem is the water supply that is not close enough to the homestead. As a result of these problems much of the land at the homestead is bare. There is not much growing except for some hardy species of herbs that are non palatable to livestock such as the rose periwinkle, *vinca rosea*.

Some of the parents in the Mavela community are struggling to adopt Permaculture practices. Attempts to implement the techniques are isolated and have not had much impact on the community as a whole. Those who have been made aware of the alternative techniques to land-use seem to have the awareness and the interest but these do not seem to be enough to lead to changes in the farming system. Emmons (1997), in her study of high school students, found out that there was not necessarily a direct link between environmental knowledge and environmental action. She concluded

[1] A Growth Point in Zimbabwe is a settlement that has been selected by government to offer special incentives in order to encourage economic growth.

that environmental action is influenced by the participants and the social situations within which they operate (see Sections 2.6 and 4.2).

In the Ntepe community only two homesteads were visited mainly because it was difficult to get appointments with the heads of household. Accessibility, fuel shortages and unavailability of time were also limiting factors. A third visit (5 NMT in Table 5.1 above) was made to the homestead of one of the teachers trained in Permaculture and who lives in the village that is between the school and the rural service centre.

The most striking feature at the teacher's homestead was a thriving nursery whose main market is the community at large. The nursery was well stocked with a wide variety of seedlings including herbs and fruit trees. I counted 43 species of herbs and 11 species of fruit trees. The teacher reported that there were brisk sales particularly of fruit tree seedlings to members of the community. The market for herb seedlings could develop in future as more people become aware of the uses of the herbs. Many of the herbs available were exotic and new to the community and therefore a more proactive approach to marketing is required in order to conscientise the consumers about the herbs.

Ground cover was well maintained at the homestead including the use of quarry stone to cover the approaches to the home. The flowerbeds around the house were being used to grow vegetables and flowering herbs. The vegetables that were in the beds at the time of the observation looked healthy and the teacher reported that no artificial chemicals has been used at the homestead since the introduction of Permaculture in 1998.

A number of other Permaculture techniques were observed at this homestead which also had a cool microclimate as a result of the integrated land-use implemented there. There was inter-cropping of companion plants such as marigold and tomatoes and these were produced in areas where one would normally expect to see flowers only. Some typical Permaculture could be seen around the buildings. For example, there was the use of airbeds to increase the surface area of productive land. The airbeds were made of old pipes that were cur in half, filled with compost soil, planted and then suspended above a planted area. All in all this homestead was an exemplary demonstration of

Permaculture design and land-use. The teacher at Ntepe can easily be a role model not only for his school but also for the whole community and other schools if his efforts are reinforced.

Homestead 6 NFP belongs to a woman single parent who is a local representative of a national women's organization. The homestead is quite close to the school and the family there has done very well in adopting some of the sustainable agriculture techniques that are practiced at the school. There are a lot of the multi-functional plant elements that have been used in Permaculture design in Zimbabwe such as bananas, pigeon pea and leucaena (Brazier 1995). Very healthy plants were observed at the homestead and these were attributed to the use of water harvesting techniques, inter-cropping and mulching.

The last homestead that was visited is about 4 kilometres north of the school and it belongs to a couple that are highly motivated and innovative farmers. The husband (7 NMP) was the one who was interviewed. Much of the land around the homestead is being turned into an orchard garden with a wide variety of fruits including the mango, which was reported to be difficult to raise in that area. The two farmers here were raising their vegetable seedlings in old pots and they were using bottles to irrigate their fruit trees. Most interesting of all was that they built a symbolic grave for their old axes and put the inscription: R.I.P.D.A. (REST IN PEACE DESTRUCTIVE AXE)! This symbol to me illustrated a high level of awareness of environmental issues that also indicates that the children who are raised in this home will be exposed to considerable environmental education as they grow up in this family.

In the present study it has been observed that the social setting at the school and the personal qualities of the teachers leading the programme have a bearing on the success of the implementation of the Permaculture Programme.

5.7 COMMUNITY INVOLVEMENT

In addition, the schools have, to varying degrees managed to take the environmental message to at least some members of the communities around them. All the parents

interviewed were quite conscious of their local environmental issues but it was not clear whether this awareness was due to exposure to the Permaculture programme or it may have been a result of experiences from other programmes. What was clearer was the adoption of some Permaculture techniques by some of the parents. Examples are parents who were practicing the growing of herbs and the bottle irrigation method and stated that they learnt about these techniques from the Permaculture programme at their respective schools (see questions 4, 5 and 7 in Appendix D and Sections 5.2.5 and 5.3.6).

The efforts to introduce Permaculture into the communities have generally been patchy, and limited to a few individuals scattered in the villages. This fragmentation results in any improvements in environmental management not having any significant on the environment for the community as a whole. The attempt to get communities to participate in the Permaculture Programme while at the same time trying to introduce Permaculture at the school does not seem to work well. The aspect of implementing Permaculture in the community is a big responsibility on its own and therefore schools tend to lose focus by having two goals competing for attention. The SCOPE Programme may be too ambitious in expecting the schools to excel in both directions. In addition schools tend to lack the capacity to work with parents. Special adult education skills are required for effective training of the parents (Apel and Cammozzi 1996). Secondary school teachers are trained to work with adolescent children and the methods used with this age group are different from those required in adult education. Apel and Cammozzi (1996) describe adult education as a contextual process, which needs to incorporate the culture and living world of the learners.

Adults as learners, Apel and Cammozzi (1996) argue:

- Need to know why they are learning something.
- Have a concept of being responsible for their decisions and their own lives
- Have a readiness to learn things that they want to learn
- Have a life-centred orientation to learning
- Are motivated by internal pressures
- Want their experiences to have a strong bearing on what they learn.

The challenge of transmitting Permaculture principles and techniques to the community is faced with a number of constraints. Adults tend to have attitudinal problems to new

ideas. The teachers interviewed in this study reported that the pupils were much more responsive to the Permaculture than the parents. They suggested that adults tend to think that what they have already learnt in their many years of life experience is the best there is to be learnt and it will take a lot of effort to change this prejudice. Other constraints are that neither the SCOPE Programme nor the schools have enough resources and capacity to adequately assist the parents to adopt Permaculture practices. The parents and school staff compete for scarce resources in attempts to implement Permaculture. The communities that are involved here have a background of widespread poverty as described in Section 1.1.

A study of the influence of children on their parents found out that they did not influence their parents significantly (Kruger 1992). However, the study established that where some degree of influence was evident, it was usually related to EE projects that had been addressed practically in the formal school environment (Kruger 1992:111). Kruger also concludes that children should continue to be used as catalysts for change. The SCOPE Programme should therefore emphasize the practical implementation of the Permaculture techniques at the participating schools but it should not be assumed that the pupils will influence the land-use management practices of their parents after learning about them at school.

5.8 EMERGING PATTERNS

It emerges from this chapter and the previous one that there may be patterns in the environmental learning that has taken place in the two schools that are participating in the SCOPE Programme. The patterns emerge from a comparison of both the individual learners and the two schools involved in this study. The purpose of this section is to bring together some of the threads to form patterns and then to engage in a critical discussion of these findings. Initially the two schools will be compared and this is then followed by a discussion on the learners.

There is no more sweeping of the schoolyard at both schools and production of vegetables and other farming outputs is now done without the use of artificial chemical inputs. These two changes are substantial points of departure from conventional land-use practices at schools in Zimbabwe. Some of the pupils reported that they had also

adopted the former practice at their own homes. These pupils were quite eloquent about the health risks associated with the two land-use management practices. Deci quoted in Emmons (1997) describes this kind of behavioural response as 'self-determined' because it requires foresight and planning and is voluntary and non-automatic. Such behaviour is unlikely to be a result of manipulation of behaviour because it involves deciding, planning, implementing and evaluating. The pupils displayed intrinsic motivation in our discussions on environmental action during the interviews.

Mavela secondary school has implemented the changes described above over a longer period of time than Ntepe secondary school, which joined the SCOPE Programme four years later in 1998. Mavela School is ahead in terms of maintenance of ground cover but Ntepe has had greater success in the areas of water harvesting, sector planning, zone development, increasing productivity and the range of products that are produced.

These differences seem to be linked to variations in intensity of efforts put into the implementation of the Permaculture Programme by the staff. The performance at Ntepe may be linked to, for example, the establishment of a well-equipped specialist environmental classroom and the formation of a vibrant Permaculture club that has attracted membership from one fifth of the school. Thus these differences can be traced to the motivation of the teachers taking a leading role in the implementation of the Programme. It should also be noted that the outstanding teachers in the SCOPE Programme seem to have taken Permaculture beyond the professional call of duty by having a personal interest in the sustainable land-use management approach. For example, the more successful implementation of Permaculture has occurred where the teachers are also implementing it at their own homes.

Some teachers seemed to also have taken Permaculture as something more than just a land-use management tool. They seemed to have experienced a possible paradigm shift by adopting a worldview in which there was more value placed on indigenous knowledge systems, environmental ethics and community responsibility. The highly motivated teachers reported that even their diets and approach to personal health have changed (see question 4 in Appendix D). This motivation of the teachers is significant because as May (2000:7) observes, "...the teacher's enthusiasm is infectious and needs to be reinforced by administrative recognition and praise". She identifies teacher conditions,

competencies and teaching practices as important and interrelated factors in successful EE. The enthusiasm of the teachers in charge of Permaculture at the two schools seems to be influencing their pupils and this makes them important role models for the youth in their communities. The teacher in charge of Permaculture at Ntepe secondary school has written articles on environmental management for the SCOPE Programme newsletter and for a local publication (SCOPE Programme 2000, Ndlovu 2000 pers. comm.).

It can be seen from the presentations in this chapter and from the photographs in Appendix P that the two schools have gone a long way in adopting the Permaculture environmental management techniques that were introduced to them by the SCOPE Programme. Both have made inroads in the implementation of the following techniques:

- Maintenance of ground cover
- Inter-cropping of crops that help each other to grow
- Harvesting rain water and making it available to plants in the dry season
- Increasing biodiversity within the school grounds
- Establishing windbreaks
- Reducing dependence on land-use inputs that are sourced from elsewhere such as seedlings and chemicals
- Recycling organic matter by composting and mulching
- Increased production of plants that have several functions such as providing food, shade, windbreak, herbal remedies and pest control in addition to their aesthetic value.

As a result of the implementation of these ILUD techniques, there seems to have been some attitudinal changes in the participants in the way they relate to their local environments. The participants displayed a surprisingly high level of respect for the environment. Pupil 9FN summed up the new attitudes when she said that Permaculture had taught her "...to respect nature and come out with a better enjoyable surrounding" (see Table 4.6). The pupils at both schools were reported to take pleasure in their improved grounds (Ndlovu 2000 pers. comm., Siziba 2000 pers. comm.). The pride that the pupils had in their surroundings further reinforced their respect for the plants and other elements in the environment. A sense of ownership of the local resources was

therefore developing in the pupils and this is important for sustainable utilization and management of resources (see Section 2.5).

However, constraints have been encountered that have limited the implementation of the ILUD process in the two schools as explained in Section 4. 6. Chapter six that follows draws some conclusions from the findings on environmental knowledge, skills, attitudes and actions that have been the presented in chapters 4 and 5.

CHAPTER SIX

The schools, too, at all levels, should be actively involved in both discussions about and action to achieve sustainable development
(UNESCO 1997:40)

6.0 CONCLUSIONS

6.1 CONCLUDING REMARKS

This study has established that considerable environmental learning has taken place at the two schools. In chapter four it has emerged that the learners who have been participating in the SCOPE Programme have some knowledge and understanding of environmental concepts. Part of this knowledge base includes some environmental management skills like integration, zoning and sector planning (see Sections 4.2 and 4.3). In Section 4.5 we have seen the positive environmental attitudes that may have been shaped during the implementation of the ILUD process. Some of this knowledge and relevant skills have been applied especially in the school grounds (see Sections 5.2, 5.3, 5.4 and 5.8).

The pupils, however, struggled to make meaning of the ILUD process itself (see Section 4.4) even though they seemed to have gained some knowledge and understanding from its implementation. A major strength of the ILUD process that seems to be emerging is its integration of all three elements of environmental learning discussed in Section 1.2. It can be used to expose learners to relevant environmental knowledge, skills and attitudes and the application of these in taking local environmental action.

Environmental action seems to motivate the learners to the extent that they take pride in their school environment and this may further reinforce the positive environmental attitudes (see Sections 4.5 and 5.8 and also Appendix J). The ILUD process seems to have the potential to prepare learners for fuller environmental participation within the

context of Permaculture in Zimbabwe. The involvement of learners in decision-making about land-use in their school (Section 1.1) is another strength of the ILUD process that may help to explain the high levels of motivation displayed by the pupils at the two schools (see Section 4.2).

The establishment of reasonable demonstrations of Permaculture on the ground at the two schools presents the SCOPE Programme and other interested parties with a number of opportunities. The two schools have become examples from which the SCOPE Programme and schools that are new to the Programme can learn. The successful demonstrations can be used as launching pads for taking the Permaculture methods of environmental management to surrounding schools.

The knowledge, motivation and confidence in some of the teachers who have been introduced to Permaculture presents an opportunity for introducing Permaculture to other schools more quickly and with less resources (see Section 5.6). Such teachers could be assisted to work with a number of schools in their neighbourhood. The same teachers could also become important role models for their communities.

The recognition by the Ministry of Education, Sport and Culture (see Section 2.5) that all schools should benefit from this environmental management programme is an opportunity for working more rapidly towards the integration of Permaculture into the relevant subjects. The integration may make it possible for the Ministry to take responsibility for the whole Permaculture Programme in the long run.

The major constraints limiting the implementation of ILUD seem to be in the area of curriculum integration (see Section 4.6). The mainstreaming of Permaculture and the provision of adequate support materials would go a long way in strengthening the work of the SCOPE Programme. It is quite amazing that the pupils interviewed were able to show so much understanding about Permaculture and related issues before its integration into the curriculum because this problem was reported to be quite limiting by the teachers interviewed (see Section 4.6).

The SCOPE Programme also needs to strengthen itself in the area of adult education and community development if it is to make an impact on the environmental

management practice in the communities. Additional resources would be needed to support this aspect of the SCOPE programme. Although the ILUD process is based on participatory methodology (Section1.1), the teachers who are implementing it tend to focus on their work with the pupils and not the community at large.

In Section 3.6 the major limitations of the study in terms of the context, methods and content have been outlined. In spite of these limitations, the study has made a contribution towards the improvement of the ILUD process by coming up with the suggested recommendations in Section 6.2. This was the main focus of the research (see Section 1.2) and to arrive at these suggestions the study presents discussions on the knowledge base of the learners (Chapter 4) and on the practical application of Permaculture both at the schools and in the communities (Chapter 5). The conclusions from these discussions have been fed into the recommendations in Section 6.2 as outlined in the subsidiary aims in Section 1.2.

The study has also pioneered research into the contribution of Permaculture to EE in Zimbabwe. Further research needs to be conducted to investigate the implementation of Permaculture in the primary schools and in informal and non-formal education. Since the two schools involved in this study are located in the hot and dry extensive and semi-extensive agro-ecological regions (Section 1.3), research is required to explore the relevance and application of Permaculture as a management tool in other agro-ecological regions.

6.2 SUGGESTIONS FOR IMPROVING THE ILUD PROCESS

In conclusion, I recommend that in the light of this research and its findings, the following issues might be considered for the purpose of improving the implementation of the ILUD process in the schools. The recommendations are tentative ones in the light of the small sample used in the study and other limitations presented in Section 3.6

6.3.1 The parents are struggling to make meaning of their participation in the ILUD process at present (Section 5.6). It is suggested that schools implement ILUD in phases with the first phase focusing on developing demonstrations of Permaculture techniques at the schools and the second phase focusing on extension work with communities. The

demonstrations of Permaculture developed at the school in the first phase would be used to show the parents what Permaculture was all about. Some of the parents would still be involved in the school ILUD workshops as at present. The SCOPE Programme will need to allocate substantial resources to that second phase so that interested parents can be assisted to start off Permaculture at their homesteads. These resources would include workshops for the parents, time and travel and subsistence for making follow-up and monitoring visits to individual homesteads. Teachers and other facilitators working with parents need in-service training in ***adult education and training*** methods

6.3.2 It is recommended that the integration of Permaculture into Agriculture, Science and Geography at secondary level be given top priority. This could pave the way for easier implementation of the ILUD process. Schools will be able to allocate more time and other resources to Permaculture once this is done.

6.3.3 It is recommended that the content of the ILUD process be reviewed with particular reference to the component on the broader environmental issues. The learners who are exposed to this process need to have some balance between their ability to tackle local environmental issues and their understanding of the links between the local and global environments. The adage, ***think globally and act locally*** (UNESCO, 1997) could be a guiding principle here.

6.3.4 Some teachers participating in the SCOPE Programme are doing some illustrious work. It is suggested that the teachers who are well motivated and are outstanding in the implementation of ILUD should have their commitment reinforced. This should help them to act as role models for the rest of the community and for other teachers.

6.3.5 Most of the pupils showed a good understanding of the Permaculture concepts and techniques (see Sections 4.2 to 4.4). It is suggested that the teachers facilitating the ILUD process should continue to marry the theory with the practice.

6.3.6 The pupils in the two schools participating in the SCOPE Programme displayed substantial knowledge of and appreciation of their environments (Chapter 4). They seemed to have successfully used the ILUD process to make meaning of their environments. It is suggested that the SCOPE Programme should continue to offer its

long-term Permaculture experiences to schools for the benefits described in Sections 4. 2 to 5.7.

6.3.7 Some pupils are struggling to make meaning of the ILUD process although they are they may be quite comfortable with its content. It is suggested that the SCOPE Programme continues to facilitate the use of the ILUD process to promote environmental learning by the pupils without expecting the pupils to be able to use the ILUD on their own.

6.3.8 It is suggested that research be carried out to determine how best the pilot schools can pass on the knowledge, skills and techniques that they have acquired in ILUD to neighbouring schools. Chapters 4 and 5 describe the gains that have been made by the two schools but very little was observed that could point to the spread of these gains to other schools. There is need for more exchanges between schools.

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Ndlovu, M. Parent, Ntepe secondary school, Gwanda

Siziba, J.J. Head, Mavela secondary school, Tsholotsho, Matabeleland North.

Vela, S. Parent, Ntepe secondary school, Gwanda

Westermann, A. Director, Chikukwa Ecological Land-Use Community Trust (CELUCT), Chimanimani, Manicaland.

Wilson, J. Founder member and former chairman of the Zimbabwe Institute of Permaculture, Harare.

LIST OF ABBREVIATIONS AND ACRONYMS USED IN THE TEXT

AfFOResT---------- African Farmers Organic Research and Training
BEST---------- Better Environmental Science Teaching Programme
BSPZ---------- Better Schools Programme Zimbabwe
CAMPFIRE---------- Communal Areas Management Programme For Indigenous Resources
CBNRM---------- Community Based Natural Resource Management
CCD---------- Convention to Combat Desertification (of the United Nations)
CDU---------- Curriculum Development Unit
CIESIN---------- Centre for International Earth Science Information
CTA---------- Technical Centre for Agricultural and Rural Cooperation
E 2000---------- Environment 2000
EEASA---------- Environmental Education Association of Southern Africa
EE---------- Environmental Education
EfS---------- Education for Sustainability
ELF---------- Environment Liaison Forum
ESD---------- Education for Sustainable Development
FAO---------- Food and Agricultural Organisation of the United Nations
FPC---------- Fambidzanai Permaculture Centre
HRM---------- Holistic Resource Management Model
ILUD---------- Integrated Land-Use Design
IUCN---------- International Union for the Conservation of Nature
NFN---------- Natural Farming Network
PELUM---------- Participatory Ecological Land-Use Management
Pers. comm.---------- Personal Communications
SADC---------- Southern African Development Co-ordination
SADC-ELMS---------- SADC Environment and Land Management Sector
SADC-REEP---------- SADC Regional Environment Education Programme
SARDC---------- Southern African Research and Documentation Centre
SCOPE---------- Schools and Colleges Permaculture
SDA---------- School Development Association
TGTC---------- Tree Growing and Tree Care Programme
UNEP---------- United Nations Environment Programme

UNESCO----------United Nations Educational & Scientific Council

WCED----------World Commission on Environment and Development

WSZ---------- Wildlife Society of Zimbabwe

ZIP---------- Zimbabwe Institute of Permaculture

GLOSSARY OF TERMS USED IN THE TEXT

For the purposes of this study the following definitions of terms have been adopted.

Agro-ecological region	an area that has more or less the same potential for farming
Agro-forestry	growing trees together with other crops
Container gardening	growing garden crops in containers e.g. grow bags-see next entry
Grow bag	any bag that is filled with compost soil and planted
Growth Point	a settlement in Zimbabwe that has been selected by government to offer special incentives to investors in order to encourage economic growth.
Guild	a planting design that is centred around an object e.g. a tree
Holistic goal	a three-part goal that describes the future landscape, forms of production and the values for a group of people.
Integrated Land-Use Design	a four step planning process for sustainable management of the land
Integration	linking two or more elements in the environment through mutually beneficial relationships
Inter-cropping	growing two or more compatible/companion crops together
Live-fence	a vegetation barrier made up of carefully selected species
Mulching	covering the spaces between planted areas
Orchard-garden	a piece of land with vegetable and fruit crops growing together
Organic foods	food that has been certified to have been produced without the use of artificial chemicals
Permaculture	a design system for creating sustainable human environments
Sector analysis	identifying the external forces affecting a given piece of land

Sector planning	designing measures that reduce the impact of external forces
Swale	a ridge dug across the land truly on contour
Water harvesting	reducing run-off water by using it
Zero tillage	sowing seed without first ploughing the land
Zoning	separating land uses according to the amount of attention they need

APPENDIX A

Research into the value of permaculture as a tool for environmental education in secondary schools participating in the SCOPE Programme in Zimbabwe.

Questionnaire for form four students at Ntepe and Mavela secondary schools

You are kindly asked to complete the form below and to answer the questions below to the best of your ability. The information that you record here will only be used for the purposes of this study and will be treated in strict confidence.

SECTION A: PERSONAL DETAILS

NAMES:.....CLASS:.....SEX:.....
DATE OF BIRTH:.....SCHOOL:.....
VILLAGE:..... DISTANCE FROM HOME:.....
FATHER'S OCCUPATION:.....MOTHER'S OCCUPATION:.....
WHO PAYS YOUR SCHOOL FEES?.....
RELATIONSHIP:.....OCCUPATION:.....
WRITE THE FOLLOWING ABOUT THE PEOPLE WHOM YOU LIVE WITH:

NAME	AGE	RELATIONSHIP	OCCUPATION
1.....	.....	.....	.....
2.....	.....	.....	.....
3.....	.....	.....	.....
4.....	.....	.....	.....
5.....	.....	.....	.....
6.....	.....	.....	.....

SECTION B: PERMACULTURE AND ENVIRONMENTAL EDUCATION

1.In your view what is permaculture all about?
.....

2.What do you understand by the term Integrated Land-Use Design (ILUD)?
.....

3.Describe zoning in permaculture.
.....

4.Describe integration in permaculture.
.....

5.Explain how permaculture is relevant or important to:
a) your parents
.....

b) your home

.....

c) your studies in general

.....

d) your studies of Geography

.....

e) your studies of Agriculture

.....

f) your language studies

.....

g) your studies of Science

.....

h) your health

.....

i) your career

.....

6. How has permaculture influenced your
a) awareness of the environment

.....

b) ability to think about the environment

.....

c) ability to solve environmental problem

.....

7. What problems have you faced in your permaculture work?

.....

8.What do you think are the weaknesses of the permaculture approach?

.....

9. Have you taken any of the following home from your school permaculture project?
a) seeds

.....

b) vegetables

.....

c) seedlings

.....

d) fruits

.....

e) herbs

.....

10. What is sustainability?

.....

11. To what extent are you able to use ILUD techniques?

.....

12. If permaculture is important to you why do you think that it is important?

.....

APPENDIX B

Research into the value of permaculture as a tool for environmental education in secondary schools participating in the SCOPE Programme in Zimbabwe.

Questionnaire for form four students at Ntepe and Mavela secondary schools

You are kindly asked to complete the form below and to answer the questions below to the best of your ability. The information that you record here will only be used for the purposes of this study and will be treated in strict confidence.

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DATE OF BIRTH:.....SCHOOL:.....
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FATHER'S OCCUPATION:.....MOTHER'S OCCUPATION:.....
WHO PAYS YOUR SCHOOL FEES?.....
RELATIONSHIP:.....OCCUPATION:.....
WRITE THE FOLLOWING ABOUT THE PEOPLE WHOM YOU LIVE WITH:

NAME	AGE	RELATIONSHIP	OCCUPATION
1.....	.....	.....	.....
2.....	.....	.....	.....
3.....	.....	.....	.....
4.....	.....	.....	.....
5.....	.....	.....	.....
6.....	.....	.....	.....
7.....	.....	.....	.....
8.....	.....	.....	.....

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1.In your view what is Permaculture all about?.....
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.....
.....

3.Describe zoning in Permaculture.....
.....
.....

4.Describe integration in Permaculture.....
.....
.....

5.Explain how Permaculture is relevant or important to:

a) your parents.....
.....
.....
b) your home.....
.....
.....
c) your studies in general.....
.....
.....
d) your studies of Geography.....
.....
.....
e) your studies of Agriculture.....
.....
.....
f) your language studies.....
.....
.....
g) your health.....
.....
.....
i) your career.....
.....
.....

6. How has permaculture influenced your:
a) awareness of the environment.....
.....
.....
b) ability to think about the environment.....
.....
.....
c) ability to solve environmental problems.....
.....
.....

7. What problems have you faced in your Permaculture work?.....
.....
.....

8.What do you think are the weaknesses of the permaculture approach?.....
.....
.....

9. Have you taken any of the following home from your school permaculture project?
a) seeds.....

b) vegetables.....

c) seedlings.....

d) fruits.....

e) herbs.....

10. What do you understand by the term ' sustainability'? .....
.....
.....

11. If Permaculture is important to you why do you think that it is important?.....
.....
.....

APPENDIX C

Research into the value of permaculture in EE

Interview schedule for form four pupils

A. INVOLVEMENT AT SCHOOL

1. On a typical school day how do you participate in the permaculture programme?
2. What actually do you do?
3. At what time of the day and for how long are you involved?
4. Would you say that most of what you do is theoretical, practical or more or less balanced?
5. Have you learnt anything about permaculture in any of your subjects?
6. If so in which subject was this and did this help you at all to do better in that subject?

B. ENVIRONMENTAL LEARNING

1. Can you tell me the aspects of the environment, which you have learnt about in the permaculture programme?
2. Please describe to me one such environmental issue
3. What do you think are the root causes of this problem?
4. What have you done about any one of the environmental problems that you have learnt about in permaculture?
5. In what ways has your school environment improved as a result of the permaculture programme
6. Has your exposure to permaculture made any difference to the way you think about the environment? What are these differences?

C. APPLICATION AND ATTITUDES

1. How do you feel when you are doing permaculture practical work?

   Why do you feel the way you do?

2. Have you talked about permaculture to your parents and other relatives at home?

3. What has been their response?

4. Have you implemented any permaculture techniques at home?

   If so which ones?

5. How has your overall situation at home changed ever since you started learning about permaculture?

6. Have your parents or other relatives changed any of their land-use practices as a result of the permaculture programme?

APPENDIX D

Research into the value of permaculture in EE

Interview schedule for teachers

1.What have been your roles in the planning and implementation of the permaculture programme at this school?

2.How do you think you fared in fulfilling these roles?

3.What could have been done better?

4.How has the permaculture programme influenced your personal and professional life?

5.What is your teaching subject and can you comment about the integration of permaculture into your subject area?

6.How has the involvement of your students in the permaculture programme affected their overall performance?

Why do you think this has been so?

7.What problems have you faced in your permaculture work?

8.What do you think are the weaknesses of the permaculture approach to environmental education?

9. Are you able to use the Integrated Land-Use Design (ILUD) process to facilitate sustainable land-use management?

10.If not, why not?

11.Do you think that the permaculture programme should be extended to other schools?

Why?

APPENDIX E

Research into the value of permaculture in EE

Interview schedule for parents

1. When and from who did you hear about permaculture?

2. What, in your view, is permaculture all about?

3. What has been your reaction to the permaculture approach?

4. Describe one permaculture technique, if any, which you have tried at your own home or in your agricultural lands.

5. How has it worked or fared?

6. Would you like your children too be taught more about permaculture? Why?

7. What has your school done to give you and other parents the information and skills of permaculture? Has this been enough?

8. Are you prepared to have your son or daughter teach you about permaculture?

9. What do your neighbours and other relatives who have been exposed to permaculture think about it?

10. Personally what do you think are the chances of permaculture being used to solve your local environmental problems? Why?

8. What do you think can be done to improve the permaculture programme?

APPENDIX F

Research into the use of permaculture as a tool for EE

OBSERVATION CHECKLIST FOR LAND-USE

DATE.....PLACE.....NAME OF PERSON RESPONSIBLE.....POSITION.....

Evidence of integration of environmental elements

Intercropping of companion plants

Use of animal manures

Recycling of biomass

Use of nitrogen fixing plants

Use of pest controlling plants

Amount of ground cover

Presence of water harvesting structures

Zoning of land-uses

Control of external forces

APPENDIX G

THE SCHOOLS' AND COLLEGES' PERMACULTURE (SCOPE) PROGRAMME RESUME

1. THE PROGRAMME

The Schools and Colleges Permaculture (SCOPE) Programme is a unit of the Zimbabwe Institute of Permaculture(ZIP) which works closely with the Ministry of Education, Sport and Culture in the area of Environmental Education. The Programme seeks to provide educational institutions with a design tool and process to develop integrated land use management systems on their grounds. In addition, it works to develop an Environmental Education curriculum that is centred on building an understanding of, and application of the ecological principles on which sound land use practices are based.

The Programme is housed in the Ministry of Education, Sport and Culture's Curriculum Development Unit in Mount Pleasant and is managed by a committee whose members are drawn for the Ministries of Education, Sport and Culture, Higher Education and Technology, Land and Agriculture, other environmental organisations and the Zimbabwe Institute of Permaculture. The committee meets at least bi-monthly and draws the policy guidelines for the programme. A full time Co-ordinator reports to the committee and implements policy.

2. AIMS

The Scope Programme aims at:

i) Promoting sustainable land use of school and college grounds and homesteads in the surrounding communities[1]

ii) Promoting the integration of ecological principles into the curriculum

3. OBJECTIVES[2]

The SCOPE Programme is mainly a training programme which also has a component of community outreach. Its key result areas relate to the following combination of programme and operational objectives.

- To lobby and advocate for inclusion of principles of integrated land-use design in school syllabi.
- To spearhead the development of an integrated process for application in the design of school, college and homesteads within the wider community.
- To assist schools, colleges and the wider community to implement, monitor and evaluate their land use design plans through tailored training at all strata.
- To provide institutional capacity building by way of production of curriculum materials and training of key personnel in such institutions in support of Permaculture.

Note [1] Community in this resume means parents, staff of both schools and colleges and , the pupils and students who work together.

Note [2] The objectives here are broad. For specific objectives please see our phase 4 strategic plan and annual action plans.

- To promote co-operation and rapport with all players (Government, Quasi Government, Non-government Organisations, Community Based Organisations in the field of Permaculture at all levels.

4. APPROACH

Schools and Colleges

The programme uses a participatory approach where the school or college institution and the larger community[1] are integrated in the planning for and sustainable management of resources particularly land. There is much emphasis on the community deriving benefits from their land and in the process improve their grounds through creation of holistic resource management designs. In this way, permaculture is applied and used as a tool for developing and maintaining environments that are diverse, productive, stable and resilient like natural systems.

Curriculum Development

In the area of curriculum development, the Programme seeks to incorporate elements of the integrated land use design process into the curriculum at both primary and secondary levels. At the primary school level, some relevant concepts have already been introduced in the Environmental Science syllabus. In the secondary school curriculum, it is intended to integrate Permaculture ideas and practices across the curriculum but with more emphasis on into the subjects of Agriculture, Geography and Science. Parallel to these efforts will be work to produce relevant materials like books to be used in support of the developments in the curriculum joint venture. The Programme is proud of the strong partnership between the government and Zimbabwe Institute of Permaculture (ZIP) that has characterized its work so far.

Partnership with Other Players

The SCOPE Programme strongly cherishes networking and capacities derived from working closely with other entities, among them:

The Ministries of :
- Higher Education and Technology
- Lands and Agriculture
- Environment and Tourism

Environment 2000
The World Conservation Union (IUCN)
Environmental Liaison Forum (ELF)
Environmental Education Association of Southern Africa (EEASA)

4. BACKGROUND

In 1989 Fambidzanai Training Centre, another unit of ZIP, started working with 2 schools to introduce a basic land use design process. Two years later the then Minister of Education visited one of these schools and requested that a pilot programme be carried out. The Ministry of Education recognized that schools had no systematic process to design and manage their land in an integrated way in which there could be involvement of staff, parent and pupils/students.

The programme was then endorsed through a letter of formal support to the programme written by the then permanent secretary in the Ministry of Education in August 1992.

The programme is now in its 4th phase, and major highlights of the stages are:

Phase 1 (1994 – 1996)

- One primary and one secondary school per region (Ministry of Education) participated through seminars and workshops held for Regional, Directors, Deputy Regional Directors, selected Education Officers, and District Education Officers, Heads, selected Teachers and some pupils from the participating schools.
- Implementation workshops were held at the 18 schools and a process to produce a facilitator's book on the integrated land use design process was initiated.
- An evaluation of the programme indicated that it was very successful with most of the schools experiencing marked positive changes in the productivity and stability of their grounds, and was therefore continuing in an expanded form covering a school in every district.

Phase 2(January 1997- July 1997)

- The programme became an independent unit of ZIP and a full time Co-ordinator was appointed and carried out work through the partner schools and relevant institutions.
- The main focus and activities for Phase 2 strengthened approach and strategic planning for this and the ensuing phase.
- Review seminars for Regional Directors and Deputy Regional Directors, and specific workshops for all stakeholders were held with an additional 36 schools and 3 colleges being lined for the next phase.

Phase 3(August 1997- July 2000)

- The programme further expanded its targets and worked with 54 schools, an Agricultural and Teacher's Training Colleges. More work was done to integrate permaculture principles into the curricula and to produce relevant materials.

Phase 4(August 2000 - July 2005)

- This is the current phase and the programme has grown in leaps and bounds and now commands a much bigger constituency than before:
  - 126 schools are now participating in the programme, that is an additional 72 upon the previous 54. This means that we now have 1 primary and 1 secondary school in each of the country's 63 districts.
  - At least 21 tertiary institutions are participating, namely: 6 Colleges of Agriculture, 13 Teacher Training Colleges and 2 Universities. In addition, there is provision for encompassing 1 Vocational Training College from each of the 9 provinces in the country.

5. IMPACT AND CONCLUSION

Many positive happenings have come out of SCOPE's activities with partner institutions and communities, including:

- Mutual sharing and positive encouragement between the programme and Ministry of Education officials who include Regional Directors, Deputy Regional Directors, Education Officers and District Education Officers on the Programme.
- Training at all levels of key personnel in the Ministry of Education as well as pupils and students in carrying out Permaculture design and implementation processes.

- Implementation of the integrated land use design process with varying degrees of success at the participating schools.
- Working towards production of remarkable documentation that will further facilitate the dissemination of Permaculture at school level and beyond.

An evaluation of phase one of the Programme carried out in 1995 concluded that the programme had in a short space of time had a profound and beneficial effect on most schools and people actively participating and that it should definitely be continued.

A recent evaluation (April 2000) of the Programme's third phase concluded that the SCOPE Programme is a necessary initiative that needs to be retained with some refinements that require increased funding and this expansion was to become a major nationwide initiative that transforms the country's physical environment using schools and colleges as nuclei from which to start.

On the whole, the programme has impacted well on the participating schools and institutions, and has enjoyed a fervent partnership especially with the Ministry of Education. The majority of the schools participating in the programme have transformed their grounds from bare patches of land to productive and diverse systems within a few years. Institutions of higher learning are also taking an active part in carrying out research and projects linked to Permaculture. The involvement of a diverse range of interested parties (multi-sectoral approach) SCOPE believes will spread the concepts and practices of Permaculture far and wide and contribute in a big way to sustainable management of resources, and impacting well on the curriculum development.

CONTACT INFORMATION

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APPENDIX H

CONSTITUTION OF THE SCHOOLS' AND COLLEGES' PERMACULTURE (SCOPE) PROGRAMME

JANUARY 1997

CONTACT ADDRESS: **The National Coordinator**
SCOPE Programme
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Causeway
HARARE
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Tel/Fax: **263 - 4 - 726911**

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(SCOPE) PROGRAMME

0.0 PREAMBLE

WHEREAS there exists in Zimbabwean schools and colleges a need to design and utilise the grounds in a sustainable way with the participation of the pupils, staff and the local community and to integrate the principles of permaculture into the curricula of schools and colleges.

AND WHEREAS it is desirable to establish a programme to promote this endeavour.

AND WHEREAS it is desirable that the aims of the programme be set forth and the powers and duties of the Advisory Council and the Management Committee be defined.

AND WHEREAS it is desirable that the programme should be able to collect monies and have a personality of its own.

AND WHEREAS it is proper that all funds raised and assets held shall be available for the aforesaid purpose and should be vested in the Management Committee on behalf of the Advisory Council and shall be administered by it in terms of the Constitution.

1.0 ESTABLISHMENT

There shall be established a programme to be known as the SCHOOLS' AND COLLEGES' PERMACULTURE (SCOPE] PROGRAMME hereinafter referred to as the "Programme".

2.0 INTERPRETATION

The Management Committee has binding and final interpretation over this constitution.

3.0 DEFINITIONS

In this Constitution, unless inconsistent with the content:

3.1 "Programme" shall mean the SCHOOLS' AND COLLEGES' PERMACULTURE PROGRAMME

3.2 "Committee" shall collectively mean the Management Committee as described in clause 9 on page 4.

3.3 "Council" shall collectively mean the Advisory Council of the Programme as outlined in clause 5 on page 2.

3.4 "Members" shall mean the participating organisations and individuals of the advisory council recognised by the Annual General Meeting as stated in clause on page 3.

3.5 "Coordinator" shall mean the National Coordinator of the Programme as defined in his/her job description.

3.6 " The Constitution" is this constitution. It is the supreme policy document of the Programme.

3.7 "Financial Year" shall mean the period of twelve months from 1st January to 31st December.

4. OBJECTS

The OBJECTS of the Programme shall be as stated below:

4.1 To assist the Ministries of Education and Higher Education and Agriculture in the introduction of Permaculture in schools and colleges.

4.2 To initiate the integrated land use design and management process in pilot schools and colleges.

4.3 To assist the Curriculum Development Unit in the integration of permaculture principles in school syllabi.

4.4 To encourage the participation of pupils, staff and the community in holistic planning and ecologically sound use of school and college grounds.

4.5 To facilitate the training of Ministry officials, teachers and lecturers in participatory ecological land use management.

4.6 To process and disseminate appropriate information.

4.7 To liaise with other organasations working in Environmental Eduation.

5. MEMBERSHIP OF THE ADVISORY COUNCIL

The Advisory Council of the Programme shall be made up of the following members:

5.1 Zimbabwe Institute of Permaculture (ZIP) Trustees (2).

5.2 The Ministry of Education Head Office (1 member-STDS Control Unit).

5.3 The Curriculum Development Unit (CDU) and Audio Visual Services (AVS) of the Ministry of education (4 members) .

 5.4 The Ministry of Higher Education (1)

5.5 Zimbabwe Schools Examinations Council (ZIMSEC)

5.6 The Ministry of Agriculture (1)

5.7 The Management Committee may coopt any other organisations or individuals up to a maximum of 30.

5.8 The National Coordinator shall be an ex officio member.

6.0 OBLIGATION AND POWERS OF THE ADVISORY COUNCIL

6.1 The council shall be the Advisory body to the programme.

7.0 ANNUAL GENERAL MEETINGS OF THE ADVISORY COUNCIL

7.1 The Annual General Meeting of the Council shall be held annually at a time which is not longer than 2 months after the appropriate year end audit has been completed and at a place to be determined by the management Committee.

7.2 Notice of the date, time, and place of the Annual General Meeting shall be despatched to all members at least 30 days before the date of such meeting.

7.3 The business of the Annual General Meeting shall be:

7.3.1 To read and confirm the minutes of the previous General meeting, and of any special General meeting held during the interim.

7.3.2 To receive and adopt the report of the chairperson of the Management Committee for the intervening period.

7.3.3 To review and adopt a statement of the financial position of the Programme, including audited balance sheets for the interim period.

7.3.4 To consider and advise upon any alteration or additions to the constitution of which due notice has been given as stated in clause 18 on page 12.

7.3.5 To advise on budget and plans of action for the next year.

7.3.6 To transact such other business as presented by the Management Committee.

7.3.7 To receive and discuss issues and recommendations

brought forward by member organisations.

7.4 The rules of conduct of the Annual General Meeting shall be as follows:

7.4.1 The Annual General Meeting shall be chaired by the Chairperson of the Management Committee.

7.4.2 The quorum for the Annual General Meeting shall be 50% of the Council Members.

7.4.3 Should the requisite number of members to comprise a quorum not be present, the meeting in question shall stand adjourned until a date to be agreed at that meeting. At the re-convened meeting, the members present shall constitute a quorum.

7.4.4 Should any Annual General Meeting stand adjourned by virtue of clause 7.5.3 the adjourned meeting shall be held not more than 90 days after the date of the original Annual General Meeting. Notice of the date, time, and place of such adjourned meeting shall be despatched to all members not more than 20 days after the date of the original Annual General Meeting and not less than 30 days in advance of the date on which the meeting is to be resumed.

8.0 SPECIAL GENERAL MEETINGS OF THE ADVISORY COUNCIL

8.1 A Special General Meeting may be called by the Management Committee whenever it may deem fit: but it must call one within 60 days of the receipt of a request in writing signed by one half or more of the Committee Members or of the Council Members.

8.2 Notice of the time, date, place and business of such a Special General Meeting shall be dispatched to all members at least 30 days before the Meeting .

8.3 A special General Meeting shall be competent to transact business as presented by the Management committee.

8.4 The Rules for the conduct of Special General Meetings shall be the same as in clause 7.4 on page 4.

9.0 COMPOSITION OF THE PROGRAMME MANAGEMENT COMMITTEE

9.1 The Committee shall consist of:

9.1.1 The chief Education Officer (CDU + AVS)or his/her appointee.

9.1.2 2 trustees of the Zimbabwe Institute of Permaculture.

9.1.3 A representative of Natural Farming Network

9.1.4 2 representatives of the Ministry of Education's Curriculum Development Unit.

9.1.5 1 representative of the Audio Visual Services (AVS)

9.1.6 Up to five members co-opted by the Committee who shall be eligible to vote but may not serve as office-bearers.

9.2 The Chairperson will be the C.E.O or his/her appointee. The vice Chairperson and treasurer are elected. The National Co-ordinator will be an ex officio member and Secretary.

9.3 Committee Members shall hold office unless having resigned or, been disqualified by committee Members as outlined in clause 10 on page 5.
All elected Committee Members shall be eligible for re-election.

9.4 Any vacancy on the Management Committee shall be filled by the respective organisation represented.

9.5 For the election of Office bearers successive rounds of voting shall take place, with the least successful candidates being eliminated in each round until such time as one candidate obtains not less than 51% of the vote.

10.0 **RESIGNATION,DISQUALIFICATION AND VACANCIES ON THE COMMITTEE.**

10.1 Committee Members may resign by giving 30 days notice in writing of their intention to do so. All effects from the Programme must be returned to the programme through the National Coordinator. Debts owed to the programme must be settled and a proper handover executed prior to effective date of resignation or otherwise as deemed appropriate by the committee.

10.2 Membership of the Committee shall be automatically terminated:

10.2.1 If the representative of an organisation leaves that organisation.

10.2.2 Upon death of a committee member.

10.2.3 By declaration of an authority of competent jurisdiction that the Member is insane or of unsound mind or judgement.

10.2.4 Upon declaration of a court of competent

jurisdiction that (s)he is insolvent.

10.2.5 Upon being convicted of a criminal offence or misdemeanour involving dishonesty, violence or a crime which in the opinion of the Committee may affect adversely the reputation of the Programme provided that such a disqualification not apply to persons whom the Committee may consider to have been convicted of a political offence in a just cause such as liberation.

10.2.6 Upon failure to attend three consecutive Committee Meetings without apology or without reasonable grounds for such absence having been given to and accepted by the Committee.

10.2.7 Upon finding by at least two thirds of the Committee present at a duly convened meeting that there has been gross impropriety in the conduct of the Committee member which conduct would include. but not be limited to a failure of disclosure of interest, mis management of programme assets, conduct detrimental to the general purpose and interests of the programme,or the engagement by the Committee Members in any trade or pursuit which in the opinion of the Committee is of such a nature as to bring the name of the Programme into disrepute.

10.3 No employee of the programme may be a Committee member, the sole exception being the National Co -ordinator.

10.4 In the event of a vacancy occurring on the Committee, the relevant organisation will elect or appoint a new representative. In the event of a vacancy being an Office-bearer on the Committee , the Committee Members shall elect a new office-bearer among themselves.

RESPONSIBILITIES OF THE PROGRAMME MANAGEMENT COMMITTEE.

11.1 The committee shall manage the programme The Committee may appoint competent full time personnel to provide for the sound management of the Programme and shall ensure that such officers report regularly to the Committee on the operational and financial activities of the programme.

11.2 Committee members shall attend meetings of the Committee and endeavour to keep informed on the activities of the Programme.

11.3 Committee Members shall protect the interests of the Programme to the best of their abilities. They shall at all times disclose any interest whether it be financial, direct, or indirect, which they may have in any Company or juristic persona which may deal with the Programme,or with any Company or other juristic persona owned, operated or controlled by the Programme. Provided that such disclosure is in full, and providing the committee approve of same, a committee member shall not be disqualified thereafter for possession of such interest or in respect of profit there from, provided that where a member has an interest in any matter (s)he shall not be entitled to vote on any decision concerning such matter.

11.4 Committee members shall receive, consider and review financial and operating reports of the Programme.

11.5 Committee members shall ensure that adequate books and records of the financial and operational activities of the Programme are maintained.

11.6 Committee Members shall ensure all cheques, promissory notes, bills of exchange, and other documents which may be required in connection with any bank accounts opened by the Programme, or for the financial administration of the programme, are signed by a minimum of two out of a maximum of four empowered signatories on behalf of the Programme by such persons as may from time to time be appointed under resolutions of the Committee.

11.7 Committee members shall cause to be made in books provided for the purpose, or kept on file, minutes recording all activities pertaining to the programme.

11.8 Committee members shall cause to be circulated to all members of the Committee copies of minutes and resolutions or recommendations of the committee.

11.9 Committee members shall on occasion give direct support to the Co-ordinator.

11.10 The Committee shall ensure that the objects of this Constitution are achieved.

12.0 POWERS OF THE PROGRAMME COMMITTEE

12.0 The Committee shall have the power to:

12.1 Select, appoint or dismiss the Co-ordinator

12.2 Direct staff on all matters of policy.

12.3 Entrust or confer upon executive personnel from time to time, such of the powers and authorities vested in them as they may deem fit.

12.4 Appoint sub-committees either from amongst their members exclusively, or including non members.

12.5 Convene General Meetings.

12.6 Suspend members who have behaved in a manner deemed contrary to the interests of the Programme.

12.7 Employ management staff, consultants or agents, whether full-time, part-time, paid or unpaid.

12.8 Represent the programme at various fora.

12.9 Act as a lobby group to achieve the objects of the programme.

12.10 Act as arbitrator in management disputes after mediation has failed.

12.11 Institute, conduct, defend,compound or abandon any legal proceedings by or against the programme or its staff.

12.12 Solicit and or generate funds through the Zimbabwe Institute of Permaculture to ensure the financial sustainability of the Programme.

12.13 Organise campaigns, educational programmes or competitions, issue press releases and take other steps to promote public awareness of the Programme, its aims and activities.

12,14 Purchase, take on lease or in exchange, hire, or otherwise acquire any movable and immovable property which may be deemed necessary or convenient for any of the purposes of the Programme, and to sell, exchange, mortgage, change, turn on account, dispose of and deal with property and rights of all kinds.

12.15 Accept on behalf of the Programme any gift, or otherwise acquire and hold, any funds or property whatsoever whether movable or immovable, and whether or not subject to any

special trust for one or more of the aims of the Programme.

12.16 Invest the funds of the Programme from time to time in such investments or assets or other securities bearing in mind the desirability of investing such funds within the country and the desirability of adhering to the principles of ethical investment.

12.17 Change and vary from time to time any investments and to reinvest in any other asset or investment.

12.18 Open bank accounts in the name of the Programme and to operate such accounts by way of deposits and withdrawals as may be necessary for the proper conduct of the financial affairs of the Programme.

12.19 Borrow by way of overdraft or loan, and utilise the Programme assets as security for such loans.

12.20 Perform any acts, make any such payments, and enter into any other such arrangements as may be required to benefit the aims of the Programme.

13.0 ROLES OF THE NATIONAL PROGRAMME CO-ORDINATOR

13.1 The Roles of the National Co-ordinator are to

13.1.1 Effect policy

13.1.2 Co-ordinate the day to day activities of the Programme.

13.1.3 Raise funds

13.1.4 Keep the committee informed

13.1.5 Organise workshops and training for the Programme.

13.1.6 Promote and uphold the good name of the Programme.

14.0 FINANCIAL MANAGEMENT

14.1 The Committee shall cause proper books of accounts to be kept in accordance with accepted accounting procedures.

14.2 The books of accounts shall be kept at the Office of the Programme or at such place or places as the Committee deem fit, and shall

always be open to inspection by any Committee member and by any other person or persons delegated from time to time by the Committee.

14.3 The Financial year of the Programme shall end on 31st December and balance sheets shall be drawn annually on that date.

14.4 Programme accounts will be audited annually by recognised auditors appointed by the Committee The annually audited accounts and an accompanying narrative report shall be received by all members of the management Committee and Advisory Council no later than March 31st.

14.5 The income and assets of the Programme wheresoever derived, shall be applied solely towards the promotion of the aims of the Programme and no portion thereof shall be paid or transferred directly or indirectly by way of payment, bonus, dividend, or otherwise howsoever to the members of the Advisory council or of the Management Committee.

14.6 Committee Members cannot under any circumstances act as consultants to the Programme.

14.7 Membership of the Management Committee or of the Advisory Council does not and shall not give any Member any right, title, interest, claim or demand on or to any of the monies,property, or assets of the Programme.

14.8 Every Committee Member shall be indemnified by the Programme against, and it shall be the duty of the Programme to pay, all costs, losses, and expenses which any Committee Member may incur or become liable by reason of any contract entered into or deed done by him/her in any way in the discharge in good faith of his/her duties as a committee Member of the Programme.

15.0 LIMITATION OF LIABILITY

15.1 No Committee Member or Staff shall be liable for the acts, receipts,neglects, or defaults of any other Committee Members or Staff or Member of the Programme or for joining in any receipt or other act for conformity or for any loss or expense happening to the programme through the insufficiency or deficiency of title to any property acquired by order of the Committee for or on behalf of the Programme, or for the insufficiency or deficiency of any security in or upon which any of the monies of the Programme shall be invested for loss or damage arising from the insolvency with whom any monies

securities or effects shall be deposited, or damage occasioned by any error of judgement or oversight on his/her part or for any other loss damage or misfortune whatsoever which shall happen in the execution in good faith of the duties of his/her office or in relation thereto unless the same happens through his/her own fraud, dishonesty or gross negligence for which the Member or staff will be held responsible.

16.0 **RULES OF PROCEDURE FOR THE MANAGEMENT COMMITTEE**

16.1 The chairperson, or in his/her absence the Vice Chairperson shall preside as Chairperson of every meeting of the committee or if neither is present, the Members of the Committee shall choose one of their number, the Co-ordinator and the Co-opts excluded, to act as chairperson for that meeting.

16.2 The chairperson shall ensure that at least six Committee meetings occur per year.

16.3 A quorum shall constitute half of all Committee members.

16.4 Decision-making, where possible shall be by discussion and resolution rather than by vote. Should,in the judgement of the chairperson consensus prove elusive, the Chairperson may direct that a decision be put to a vote.

16.5 The Co-ordinator excepted, each member of the Committee and the co-opted Members shall have one vote. The Co-ordinator as an ex-officio Member may participate in discussion but cannot vote.
All issues put to the meeting by the Chairperson will be decided by a simple majority show of hands raised or ballot at the discretion of the chairperson, unless a ballot is demanded by not less than one third of those present and entitled to vote. In the event of an equality of votes the chairperson shall be entitled to a second casting vote.

16.6 The chairperson shall be responsible for ensuring that all Committee Members receive a written invitation to all meetings at least 14 days before the meeting, except that emergency meetings called at seven days notice may be permissible.

17.0 AMENDMENT OF CONSTITUTION

17.1 Proposed amendments must be received 60 days before the Annual General Meeting by the Committee.

17.2 Ammendments may be made by the Committee after discussion at an Annual General Meeting or Special Meeting.

18.0 TERMINATION OF THE PROGRAMME

18.1 In the event that the members decide to terminate the Programme, and provided that they are satisfied that it is just and equitable that the activities of the Programme shall cease, any funds or assets standing to the credit of the Programme shall be paid to the Zimbabwe Institute of Permaculture.

18.2 Before any decision to terminate the Programme can be made:

18.2.1 It should be discussed at an Annual General Meeting or Special General Meeting.

18.2.2 At least a two-thirds majority of the Management Committee must agree on such a termination at a duly convened Management Committee Meeting.

20.0 SIGNATORIES

NAME	SIGNATURE	ORGANISATION
J.P.W. WILSON		ZIMBABWE INSTITUTE OF PERMACULTURE
C.A. MUPANDE		CURRICULUM DEVELOPMENT UNIT
R. Mpofu		Curriculum Development Unit
N.S. Muzuva		N.F.N.
R. Mukwedeni		CDU.
A.R. MUKWIRIMBA		BEST

THE SCOPE PROGRAMME

LIST OF PARTICIPATING SCHOOLS AND COLLEGES

A. PHASE ONE SCHOOLS

1. HARARE REGION, BOX CY 1343, CAUSEWAY, HARARE, TEL: 04:792671-9

(x) Glen View 6 Primary
P O Box GV 50
Glen View
Harare
Tel: 04-694223

2. MANICALAND REGION, P O BOX 146, MUTARE, TEL: 020-64216

(x) Shundure Primary
P/A Bazely Bridge
Mutare

(y) Nyahode Union L.c
P O Box 9
Chimanimani
Tel: 026-22451

3. MASHONALAND CENTRAL REGION, BOX 340, BINDURA, TEL: 071-6992-4

(x) Chireka Primary (Musana)
P O Box 203
Bindura

(y) Bare Secondary (Chiweshe)
P O Box 2042
Glendale

4. MASHONALAND EAST REGION, BOX 374, MARONDERA, TEL: 079-24811/4 OR 24791/2

(x) St Margarets Chigodora Primary
P Bag 2115
Hwedza
Tel: 022-3892

(y) St Vincent Secondary
P O Box 155
Ruwa
Tel: 073-2334

5. MASHONALAND WEST REGION, BOX 328, CHINHOYI, TEL: 067-23083/5

(x) Mupumbu Primary (Zvimba)
P Bag 2003
Murombedzi

(y) Kawondera Secondary (Zvimba)
P O Box 10 2034
Murombedzi

(z) Nyavira Secondary
P Bag 914B
Harare
Tel: 04-307694

6. MASVINGO REGION, BOX 89, MASVINGO, TEL: 039-62258/62419/62537

(x) Nyamandi Primary
P Bag 907
Gutu

(y) Fashu Bikita Secondary
P Bag 9070
Masvingo
Tel: 038-2206

3. MASHONALAND CENTRAL REGION – NEW GOVERNMENT BUILDING, HARARE ROAD

(a) Chiwashira Primary
P O Box 9016
Centenary
Tel: 057-284 (Centenary Govt. School)

(b) Mudzinge Primary
P Bag 2080
Shamva
Tel: 0718-2857

(c) Chifamba Secondary
P Bag 2033
Guruve
Tel: 058-3557

(d) Nyarukunda Secondary
(Madziva Area)
P Bag 914
Bindura

4. MASHONALAND EAST REGION – BISSET HOUSE, FOURTH STREET

(a) Mushangwe Primary
P O Box 587
Marondera
Tel: 079-20083

(b) Chemhanza Secondary
P O Box 58
Wedza
Tel: 022-279

(c) Nyazvidzi Primary
P O Box 191
Chivhu
Tel: 056-23304

(d) Nyahuni Secondary
P Bag 623
Murehwa
Tel: 078-2276

5. MASHONALAND EAST REGION – BEHIND 7 HEROES BUILDING

(a) Sadzi Primary
P O Box 198
Magunje
(Tengwe Area)
Tel: 064-640323

(b) St James Musena Primary
P O Mamina
Via Kadoma

(c) Dandawa Secondary
P O Box 594
Karoi
(Hurungwe District)

(d) Munyaradzi Government Secondary
P O Box 120
Kadoma

6. MASVINGO REGION – WIGLEY HOUSE, HARARE ROAD

(a) Mandiva Primary
P O Box 1078
Masvingo
Tel: 036-2504

(b) Mujiji Primary
P Bag 596
Nyika

(c) Nemamwa Secondary
P O Box 88
Masvingo
Tel: 039-7045

(d) Madangombe Secondary
P O Box 160
Mashava
Tel: 035-24021

COLLEGES OF AGRICULTURE

MINISTRY OF LANDS AND AGRICULTURE, P BAG CY 7701, CAUSEWAY, HARARE TEL:04-706081

1. Esigodini Agriculture Institute
   P Bag 5808
   Esigodini
   Tel: 088-270

2. Mlezu Institute of Agriculture
   P Bag 8063
   Kwekwe
   Tel: 055-23087

INTERESTED SCHOOLS (Some of them)

Gatsi Primary
P O Box 26
Hauna (Honde Valley)
Manicaland

Parirewa High School
P Bag BW 340
Borrowdale
Harare
Tel: 04-879713
(Goromonzi District – Chinamora)

Makumbi High School
P O Box 4230
Harare
Tel: 04-88

Tiya Primary School
P.A. Biriiri
Chimanimani

Mvuthu Secondary School
P O Esigodini
Esigodini

Muzavazi Permaculture Centre
P O BoX 189
Beatrice

Sengezi School
P O Box 54
Hwedza

Kutama Day Secondary School
P Bag 2039
Murombedzi

Nottingham Primary School
P O Box 60
Beitbridge

St Marks Zinondi Secondary School
P O Box 104
Chivhu

Simpat Primary
P Bag 5706
Maphisa
(Mat. South – Kezi)

Chiedza Primary School
P O Box 50
Mbizo
Kwekwe

Ukona Primary
P O Box 2
Turkmine

Esigodini Primary School
P O Esigodini
Esigodini

Mvuthu Primary School
P O Esigodini
Esigodini

Chemhaiza Primary
P O Box 69
Wedza

Nebiri Primary School
P.A. Siakobvu
Via Karoi

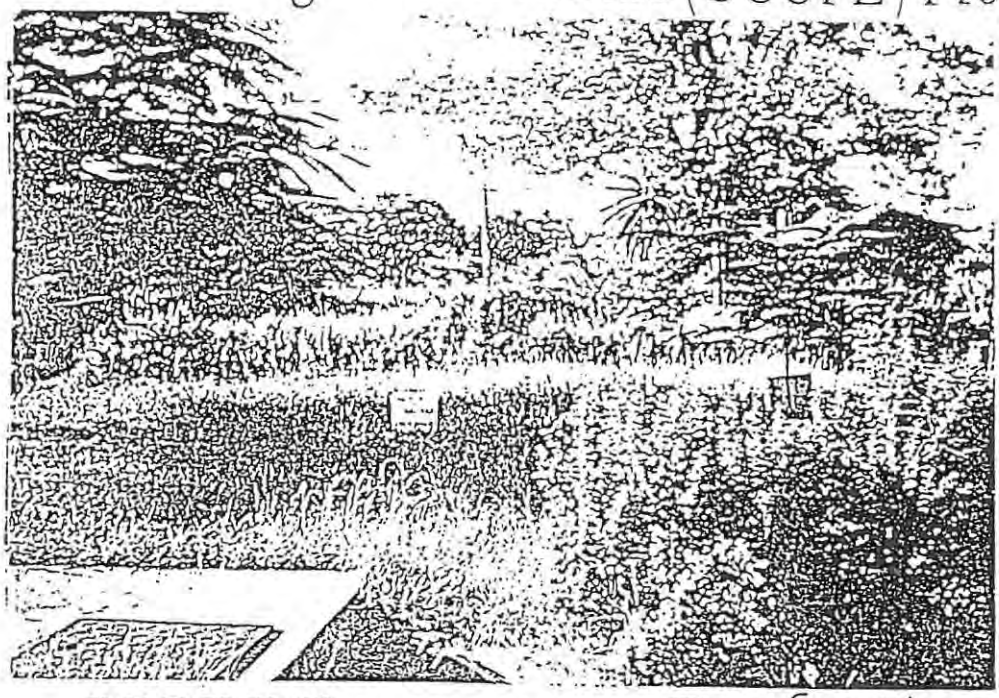
Maruta School
P O Box 20
Wedza

Kafusi Secondary School
P.A. Kafusi
Gwanda
Via Bulawayo

Kudzanayi Primary School
P O Box 244
Magunje

	PHASE 4 SCHOOLS					
	School	Address	District	Tel	Region	Head
1	St Agnes Gokwe Prima	P O Box 38, Gokwe	Gokwe South		Midlands	
2	Njelele Secondary	P Bag 6101, Gokwe	Gokwe South		Midlands	
3	Ntobe Primary School	P Bag 8053, Kwekwe	Kwekwe		Midlands	
4	Dendera Secondary	P Bag 8149, Kwekwe	Kwekwe		Midlands	
5	Chemimwe Secondary	P Bag 628, Mberengwa	Mberengwa		Midlands	
6	New Gato Primary Sch	P O Box 230, Shurugwi	Shurugwi		Midlands	
7	Siyahokwe Secondary	P O Box 34, Mvuma	Chilimanzi		Midlands	
8	Nyamakare Secondary	P O Box 34, Shurugwi	Shurugwi		Midlands	
9	Siboza Primary	P O Box 268, Zvishavane	Zvishavane		Midlands	
10	Utongani Secondary	P O Box 279, Zvishavane	Zvishavane		Midlands	
11	Kubatana- Nyamuroro I	P Bag 002, Nembudziya, Gokwe	Gokwe North		Midlands	Mr S Mudzamba
12	Nyamasaka Primary	P Bag 16, Nembudzia, Gokwe	Gokwe North		Midlands	Mr E Chikonye
13	Kadyamadare Primary	P O Box 93, Juru	Goromonzi	074-22182	Mashonaland East	
14	Beta Primary	P O Box 175, Marondera	murehwa		Mashonaland East	
15	Theydon Secondary	P O Box 573, Marondera	Marondera	079-20437	Mashonaland East	
16	Kwenda Secondary	P Bag 2001, Sadza	Chikomba	022-422	Mashonaland East	
17	Kachimana Primary	P O Box 23, Mudzi	Mudzi		Mashonaland East	
18	Chikwizho Secondary	P O Box 2, Mudzi	Mudzi		Mashonaland East	
19	Chidodo Primary	P O Box 153, Murewa	UMP		Mashonaland East	
20	Magunje Secondary (U	P O Box 109, Murewa	UMP		Mashonaland East	
21	Kaunye Primary	P O Box 3, Mutoko	Mutoko		Mashonaland East	
22	Mutoko Central Second	P O Box 43, Mutoko	Mutoko	072-2296	Mashonaland East	
23	Kandava Primary	P O Box SK 178, Seke	Seke		Mashonaland East	
24	Marirangwe Secondary	P O Box 1221, Harare	Seke	065-2363	Mashonaland East	
25	Murembe Secondary	P/A Manhenga, Bindura	Bindura Rural		Mashonaland Central	Mrs Chikari
26	Mukodzongi Primary	P Bag 2013, Glendale	Mazowe Rural		Mashonaland Central	Mr Murongazvombo
27	Centenary Secondary	P O Centenary, Centenary	Centenary		Mashonaland Central	Mr Mushonga
28	Nyandoro Primary	P/A Mudhindo, Guruve	Guruve		Mashonaland Central	Mr B Chikuwira
29	Chimanda Primary	P.A. Rushinga, Rushinga	Rushinga		Mashonaland Central	Mr Mandova
30	Chimanda Secondary	P.A. Rushinga, Rushinga	Rushinga		Mashonaland Central	Ms Gasa
31	Chakanetsa Primary	P Bag 2041, Mt Darwin	Mt Darwin		Mashonaland Central	Mr Waniwa
32	Dotito Secondary	P Bag 2036, Mt Darwin	Mt Darwin		Mashonaland Central	Mr Mutuma
33	Tamuka Primary	P O Box SK 38, Seke, Chitungwiza	Chitungwiza	070-24916	Harare	Mr T R M Gara
34	Zengeza 3 High	P O Box ZG 100, Zengeza, Chitungwi	Chitungwiza	070-22997	Harare	Mr F G Chigande
35	Glen Norah High 1	P O Box GN27, Glen Norah, Harare	High-Glen	04-613134	Harare	D Machoko
36	Tshidixwa Secondary	P O Box 398, Beitbridge	Beitbridge	086-2507	Matabeleland South	Mr P Dube
37	Malala Primary	P O Box 180, Beitbridge	Beitbridge		Matabeleland South	Mrs R Tshuma
38	Fort Rixon Secondary	P Bag V5559, Bulawayo	Insiza	088-600	Matabeleland South	Mr R Ngwenya
39	Tahangana Secondary	P O Box 415, Plumtree	Plumtree		Matabeleland South	Mr E Dube
40	Mashumba Primary	P O Box 177, Maphisa	Matobo		Matabeleland South	Mr T Ngwenya
41	Kuwadzana Secondary	P O Box 192, Banket		066-2213	Mashonaland West	
42	Dalston Primary	P O Box 77, Raffingora			Mashonaland West	
43	Pedzisai Primary	P/A Mudanda, Buhera	Buhera		Manicaland	Musakaruka
44	Chabata Secondary	P O Box 85, Bazely Bridge, Mutare	Buhera		Manicaland	W R Podzo
45	Pachije Primary	P Bag 7680, Mutare	Mutasa		Manicaland	S Musademba
46	St Mathias High	P O Box 80, Watsomba	Mutasa		Manicaland	E Nyakanda
47	Sadze Primary	P O Box 27, Nyanga	Nyanga	23223	Manicaland	Nyamupangedengu
48	Rowa Secondary	P O Box 3990, Paulington, Mutare	Mutare	020-82044	Manicaland	D Kapfumvuti
49	Tsindi Secondary	P Bag 8113, Rusape	Makoni	025-29802	Manicaland	M Zenda
50	Chikukwa Primary	P Bag 2003, Chimanimani	Chimanimani	026-22317	Manicaland	C C Chituwu
51	Sigonde Secondary	P Bag T5454, Bulawayo	Umguza		Matabeleland North	Mr L Pepa
52	Mate Primary	P Bag T5404, Bulawayo	Tsholotsho	0878-407	Matabeleland North	Mr Lewis Malusalila
53	Lupote Primary	P O Box 24, Dete	Hwange		Matabeleland North	Miss T Malubi
54	Neshaya Secondary	P O Box 360, Hwange	Hwange	081-3348	Matabeleland North	Mr V Nyathi
55	Pashu Primary	P O Box V1, Kamativi	Binga	018-586	Matabeleland North	Mr A Nhliziyo
56	Kariyangwe Secondary	P Bag 5750, Binga	Binga	015-420	Matabeleland North	Mr I Ndlovu
57	Gloag Secondary	P O Box 61, Turkmine	Bubi	085-2003	Matabeleland North	Mr A Ndlovu
58	Mganwini Primary	P O Box 1226, Bulawayo	Bulawayo	09-78492	Matabeleland North	Field Marshall Moyo
59	Gozho Primary	P Bag 9014, Masvingo	Masvingo		Masvingo	Mr J Hore
60	Nerupiri Secondary	P Bag 939, Gutu	Gutu		Masvingo	Mr T Makanyire
61	Chibwedziva Secondar	P Bag 7076, Chiredzi	Chiredzi		Masvingo	Mr S Ticharwa
62	Chikembedzi Primary	P Bag 7051, Chiredzi	Chiredzi		Masvingo	Mr T Chikuka
63	Mwenezi Govt. Second	P/A Neshuro, Masvingo	Mwenezi		Masvingo	Mr Chuma
64	Matande Primary	P/A Neshuro, Masvingo	Mwenezi		Masvingo	Mrs Makore
65	Zaka Secondary	P Bag 19, Zaka	Zaka		Masvingo	Mrs G Kumutsana
66	Dekeza Primary	P/A Chivamba, Zaka	Zaka		Masvingo	Mr Nguvo
67	Makonde Primary				Mashonaland West	
68	Makonde Sec				Mashonaland West	
69	Kariba Primary				Mashonaland West	
70	Kariba Sec Sch				Mashonaland West	
71	Chegutu Primary				Mashonaland West	
72	Chegutu Sec				Mashonaland West	

Schools and Colleges Permaculture (SCOPE) Programme



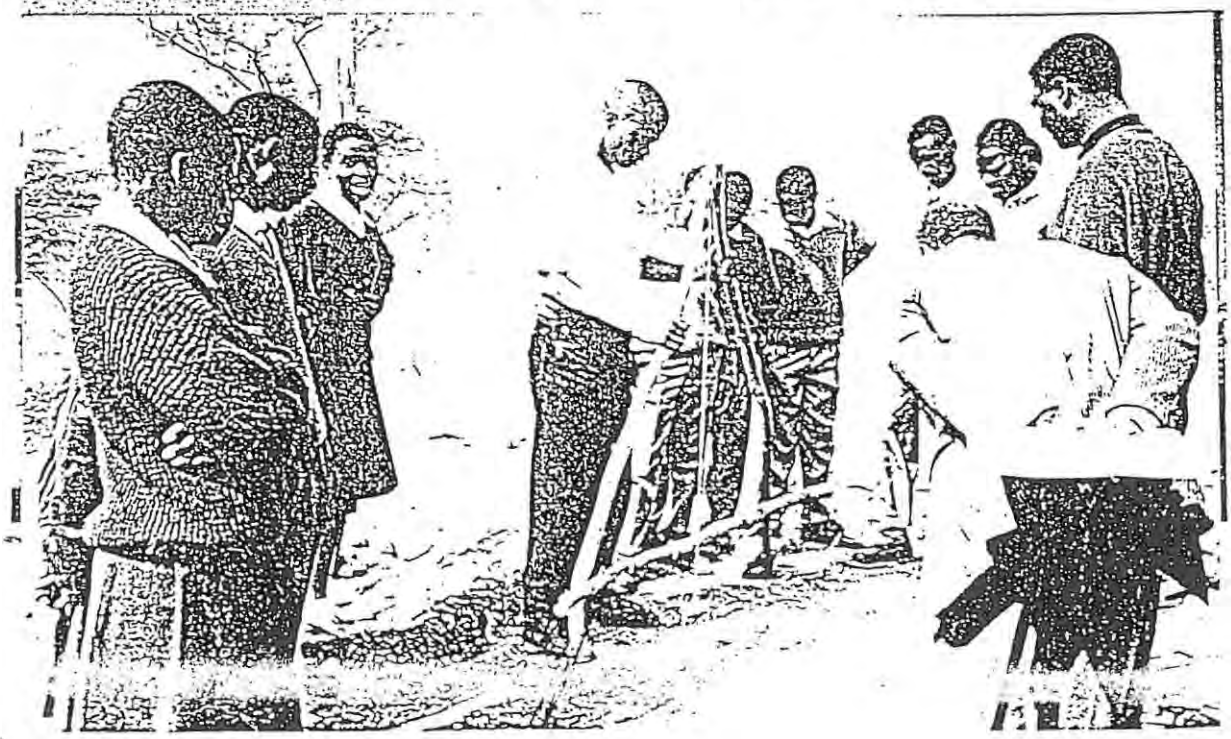
SCOPE Programme Evaluation Report

Towards a better SCOPE...

Striving to make green schools and colleges greener.

Evaluator: K. Makoni Illustrations by: K. Makoni
Report produced by: K. Makoni Photographs by: P. Makoni

APRIL 2000



Chapter Four

Summary, Recommendations and Conclusions

The evaluation has shown that the SCOPE coordinating office has weaknesses that should be addressed but demonstrating that most of those weaknesses result from inadequate funding and a tight budget. The recommendations for the reversal of the SCOPE programme's weaknesses will therefore be based on the assumption that more funds will be made available. The SCOPE programme is undoubtedly highly relevant to schools and communities and the approach of targeting schools and colleges is equally intelligent. More communities in addition to those that are currently enjoying the programme's fruits, are likely to soon benefit from lessons they will draw and nurseries they will buy from schools participating in the SCOPE programme. Although the programme has enhanced permaculture practice and awareness almost in the fullest sense (it is difficult to reach perfect standards), the main worrying observation is the reversing effect of problems linked to people's attitudes, natural phenomena, resources and other things on the impact and progress of permaculture in schools and colleges. Recommendations in this chapter will strive to address these.

4.1 Recommendations

Recommendations in this section will be divided into three sections: commendable initiatives that SCOPE is currently doing and should uphold, specific recommendations for:

a. SCOPE head office and;
b. Participating schools and colleges.

4.1.1 Commendable ongoing initiatives

The SCOPE programme should uphold the following:

i. *The programme's targeting of institutions of learning.* Schools and colleges should cease to offer education through lessons or lectures and experiments alone, which benefit students only, but enrich their training by serving as models to all who pass through them. The major importance of empowering students with skills to manage the physical environment lies in the fact that they are bound to be future leaders and parents and are poised to rely on the natural environment for longer periods than older people. The evaluation showed that students were sufficiently enlightened about permaculture and could effectively introduce the practice to their homes, which justifies the model of using schools and colleges as nuclei from which environmental awareness will diffuse to other members of society.

ii. *Training of trainers and holding implementation workshops* on introducing the programme to virgin schools and/or colleges. The local trainers can then ensure the continuation of SCOPE even in the absence of the central coordinating office. The move is especially useful if more than one trainer from each school is trained at a time to cater for those who transfer elsewhere. Trainers should also be encouraged to take the initiative of introducing the programme to new schools when they opt to migrate. Implementation workshops can only be effective if all possibly obtainable stakeholders, from local people to government officials, are invited to participate because their contribution to the programme is critical.

iii. *Involvement of parents in the implementation of SCOPE* should be continued because communities are the ultimate beneficiaries of the programme. Schools are useful entry points into communities because they act as centers of various community activities (e.g., meetings) many times.

iv. *The programme's production of publications,* notably the termly newsletters and textbooks is commendable in that the literature enriches school libraries and is most useful in poor schools in remote areas that have inadequate financial resources to purchase books and access to competitive purchasing outlets. More efforts are necessary to produce literature that all educational levels and communities can readily consume.

v. *The collaboration of SCOPE with fellow institutions participating in permaculture* fosters a wide base for sharing of ideas and should be upheld. As most other agencies promoting natural farming target their efforts at communities and SCOPE at schools and colleges, SCOPE serves to complement rather than duplicate efforts of its partners. What could be crucial at this stage would be to utilise the existing coalitions to jointly publicise permaculture through local and international print and electronic media. That element seems to be lacking and if considered should be planned strategically enough to reach out to the appropriate people and as widely as possible. The same initiative can serve to attract more funding for SCOPE.

vi. *The fostering of competitions* is central to the rise in environmental standards at participating learning institutions because these characteristically value competitions very highly. That approach should certainly be retained.

vii. *Regular programme reviews* are commendable in that they shape and redirect SCOPE to the most pressing needs of beneficiaries. It is encouraging that the programme has, to a great extent, implemented the recommendations of the last evaluation. It will be more encouraging if these recommendations are successfully implemented.

viii. *The partnership between ZIP and government ministries through SCOPE* is crucial and can result in greater impact. The partnership has shown that government agencies and NGOs can productively work together. The SCOPE programme should therefore continue to serve as an example of that partnership.

4.1.2 Specific recommendations for SCOPE head office

i. The SCOPE programme should operate in ways that encourage participating schools and colleges to become more actively involved in introducing the programme to other schools rather than leaving that duty to the programme's head office. Five schools close to one primary school were interested in the programme but still waiting for the coordinator's visit because instructors from already participating schools, who have the technical skills, were not empowered to train others. If the interested schools wait for the coordinator's response to their applications for too long, which is likely considering the coordinator's many commitments, they may soon lose interest. It may be necessary to form a panel of trainers of trainers from already participating schools and colleges in the districts composed of instructors whose school/college schedules allow them room to do that extra work. These trainers may need extra training on how to facilitate or run implementation workshops. In that arrangement the main role of the programme coordinator becomes monitoring and advising trainers and new participating schools and colleges and that can be done at more widely spaced times that allow him to perform other tasks, especially administrative ones. The trainers from old and new participating schools and colleges can share the coordinator's burden of progress monitoring, which is both cumbersome and time consuming, by monitoring each other through exchange visits. Local participation

should go beyond that and entail the participation of the entire cross section of the programme's stakeholders in setting the criteria or standards for competitions. Sub-committees currently performing that task were reported to be less representative of the beneficiaries than is desired, especially in schools that reported not winning the competitions.

ii. Related to the recommendation above and to intensify the participatory nature of SCOPE, the programme's coordination needs to be decentralized. The previous chapter of this report proves how the many tasks for the coordinator that the centralized structure entails have affected his communicating efficiency. Besides, the education ministry to which SCOPE is affiliated has already decentralized and is intensifying the process. Suggesting how SCOPE can exploit the ministries' structures in decentralizing, respondents' widely proposed an administrative structural model in which the current coordinator remains in that capacity but this time overseeing regional and district coordinators who then supervise cluster (school or college) authorities and local resource persons – teachers in charge, school heads, prefects or club leaders and community representatives. Below is the illustration of the model.

Proposed organisation chart for SCOPE

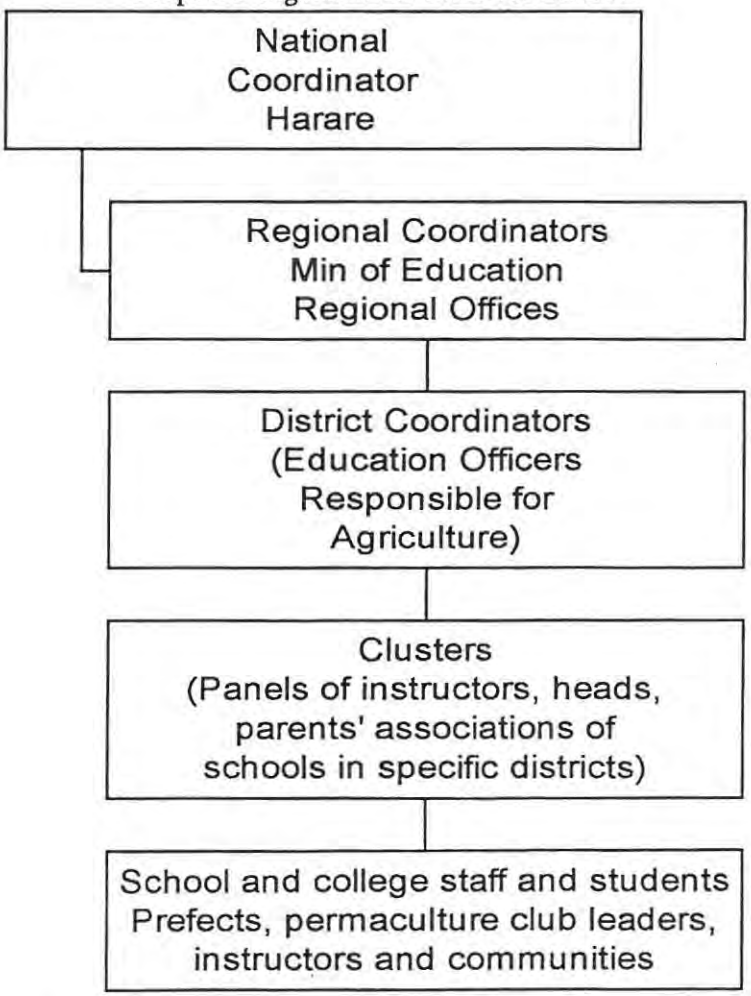


Table 4.1: Notes on applying decentralization model

Post	Main duties	Crucial considerations

National coordinator	More massive production of publications, fund-raising, designing training materials, executing and coordinating training of trainers, overseeing regional coordinators, coordinating national competitions, monitoring programme implementation and any other duties as assigned by management committee.	The system best works if communication is allowed to move in two directions as opposed to the slow, inefficient and top-down bureaucratic pattern of most government systems. The decentralization model requires further deliberations because many diverse views were expressed about implementing it. It will also be necessary to discuss the terms under which new staff members will be engaged. The application of a similar model by the Better Schools and Better Environmental Science Teaching (BEST) programmes can provide useful lessons. Adopting the recommendation to decentralize requires more funds and more vehicles. Under the current arrangement the Education Sports and Culture Ministry can provide the relevant personnel and SCOPE the funds and infrastructure.
Regional coordinators	Coordinating programme activities including competitions at regional level, publicising work of schools in the region, reporting to national coordinator on behalf of schools and colleges in region, recruiting new participants, handling grievances from lower levels of the hierarchy.	
District coordinators	Recruiting district-based trainers, inspecting programme implementation in schools, identifying schools and colleges interested in programme, soliciting for newsletter features, facilitating exchange visits and coordinating district competitions.	
Clusters	Hosting and jointly financing exchange programmes and special permaculture days, contributing resource persons for competitions (e.g., judges), identifying interested schools, identifying potential trainers to be trained by national coordinator to train others.	
Schools and colleges' staff and students	Participating in the programme's practical activities, sharing ideas and engaging in competitions.	

iii. As an alternative to the above recommendation, it may be necessary to explore the possibility of engaging two or three extra trainers to assist the national coordinator. If that option is adopted, the extra trainers would do most of the field duties that the coordinator is currently doing alone, which allows him to focus on administrative duties. Engaging extra trainers is more economic than adopting the decentralization model above and it allows work to progress when the coordinator is on leave. For that reason, some respondents felt that the need for an assistant to the coordinator will remain necessary even if SCOPE opts for the above decentralization model.

iv. The SCOPE programme's interventions should be based on careful considerations of the different conditions affecting different schools and colleges in order to handle them flexibly as opposed to applying a blanket programme package to all institutions irrespective of their special circumstances. Training of trainers should follow thorough analyses of local conditions and resultant demands, and should flexibly equip trainers with skills to handle their unique problems. Teachers in charge of permaculture at Nyangani High School found excessive water flowing on their surfaces or accumulating in swamps for a reasonable time difficult to handle because they had received training for conditions that teachers in drier regions face.

v. To undo the negative attitudes of different stakeholders that are slowing down the programme's progress it is necessary to introduce a special form of training specifically designed to reverse these attitudes and aiming to bring all contrasting groups together to assist them to reach a common understanding. That training is popularly known as *'training for transformation'* and is a very useful tool in changing people's regressive attitudes and perceptions as well as building their confidence. It has helped many grassroots development organisations that faced related problems. This recommendation is based on a review of workshop and evaluation reports of one transformational training workshop held for Agricultural Extension Services (Agritex), Dairy Development Programme (DDP) and Veterinary Services officers at Nyarungu Training Centre. As the training

sessions are most successful if an external resource person(s) facilitate(s) them, more funds will be required to achieve the desired fruits of attitude challenge and eventually change.

vi. The programme coordinator should, in collaboration with school and college officials and students, begin to feature special advertisements in the newsletter, publicizing the scenic value of schools that have progressively implemented permaculture. Ntepe Secondary School is a good example of such a school. The advertisements must challenge tourists to change from simply visiting artificially beautified resorts designed with exotic plant varieties and encourage them to visit schools and colleges where surroundings are beautiful, natural and truly Zimbabwean. Some schools like Chirichoga Secondary, which are close to such existing resorts as Great Zimbabwe, can benefit from visits of tourists en-route to those resorts. Alternatively, a catalogue of schools impressively beautifying their environments through permaculture, which specifies the main attractive attributes of each, can be prepared and featured in the newsletter. Subject to more funds being availed, the SCOPE programme also needs to be connected to the internet and to have a website installed for similar purposes. The move will, in addition to attracting tourist interest, which increases the schools and colleges' likelihood of securing financial support or raising funds, publicise the currently insufficiently funded programme. The local mass print and electronic media constitute another channel for that.

vii. As SCOPE is part of the Ministry of Education, Sports and Culture and a partner of the Ministry of Higher Education and Technology, this evaluation recommends that the incorporation of permaculture principles into formal secondary school and tertiary college syllabi and making them formally examinable should be speeded up. The relevance of the practice to other subjects in the schools' and colleges' curricula is clearly shown in chapter 3 to be beyond doubt. Hopefully, if the decentralization of the programme's coordination is successfully implemented, its head office may manage to more rapidly compile relevant permaculture textbooks, which are key to a more serious recognition of permaculture principles in secondary school syllabi where they best fit in the studies of Agriculture and Geography. The principles cannot, however, be learnt under one secondary school subject because permaculture has components that are relevant to several subjects, especially Geography and Agriculture. Introducing permaculture as an officially examinable topic can mean the appraisal of instructors' commitment to its teaching and practice, which is currently lacking in some areas. Some instructors interviewed said the established structures in the education system have created a culture of inspection-motivated performance and that can be used as an opportunity for making permaculture firmly popular in all schools. That means faster repair of the environment nationwide, especially if the involvement of communities remain intensive. It is encouraging that Ordinary level, Zimbabwe Junior Certificate (ZJC) and grade seven examinations are now set and marked locally. The discouraging element of that is that permaculture is not yet firmly established in secondary school syllabi and practical studies of agriculture still strongly promote traditional practices, particularly the heavy use of chemicals.

viii. It would be meaningless to dream of permaculture principles being incorporated in the formal educational syllabi across all levels if only 54 schools and four colleges in Zimbabwe are currently participating in SCOPE. Efforts towards incorporating permaculture principles into school and college curricula should run parallel to attempts of involving all learning institutions in the programme, lest non-participating ones may resist the introduction of permaculture into the curricula.

4.1.3 Specific recommendations for schools and colleges

4.1.3 Specific recommendations for schools and colleges

This section of recommendations is included on the basis of the observation that SCOPE is primarily a programme for schools and colleges, which implies that action should not be expected from the SCOPE head office alone, but also schools and colleges themselves. While school and college heads and instructors mostly emphasised the roles of the programme's coordination and concerned ministries' officials, their students showed greater concern for what their authorities needed to do to improve the programme.

i. There are many ways of turning the problems recorded in this report into solutions. The table below highlights some significant suggestions.

Problem	Solution	Execution method
Staff members being reluctant to support the programme because of regressive attitudes of any kind.	Practical persuasion	Using permaculture to benefit the staff members in question by, say, growing fruit trees close to their residential quarters and asking them to take care of the plants with the assurance that they own the fruit trees. The responsibility they develop for their then-own plants and enjoyment of the fruits may transform into appreciation of permaculture, especially if they have to invest little effort in caring for the plants. At Bikita Fashu where that was impressively executed, teachers did not need to water the banana and sugar cane plants close to their houses because they were planted close to water taps to thrive from excess water.
Communities being reluctant to support the programme	Creating special days to popularize permaculture	Schools can either organise special days that are convenient to them and communities on which poems, dramas and other presentations popularising permaculture can be made, or they use the parents' days for that.
Students' reluctance to participate.	Introducing appropriate incentives	Capitalizing on students' enthusiasm about trips away from school to attract the interest of more of them. If permaculture activities' budgets are insufficient to meet the costs entailed, responsible teachers may need to consider combining travel plans with other clubs that are formally recognised by the school officials (e.g., sports, drama or music clubs).

The diagram below illustrates the use of practical persuasion.

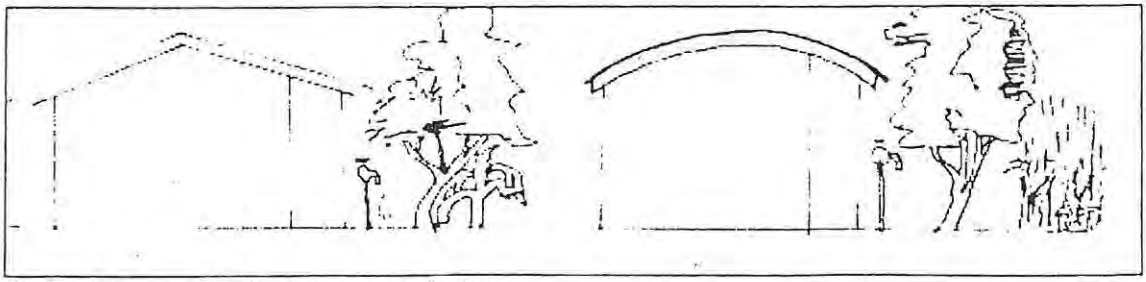


Figure 1: A practical persuasion technique

There are many other unique approaches that were introduced in some schools and not in others which are worth future consideration by all other schools and colleges. These are illustrated and explained below.

Water management model for drier areas

Bikita Fashu, Ntepe and Chirichoga Secondary Schools were practicing interesting water resource management techniques that were used to construct the model illustrated below. As the scarcity of water is rife during dry seasons in drier regions, schools and colleges in such regions need to harvest water during rainy seasons for future use. To do so they need to install gutters on roofs of their classrooms and construct concrete or brick linings on slopes down which water from gutters flow. At a point where linings from several gutters can converge, a pit can be dug, the depth depending on need. The pit needs some concrete lining and a lid on top. It is necessary to place wire gauze at the point where the linings and the underground tank meet to avoid the accumulation of litter and pebbles in the tank. The water can be stored in the tank for a reasonable time because the tank's upper cover lessens the rate of evaporation.

Water taps can also be more strategically positioned if erected close to toilets, but upslope, so that people can conveniently wash their hands after using them. Some water-loving plants can be planted between the taps and toilets so that they simultaneously gain from excess tap water and liquid humus that seeps horizontally from toilets. Aromatic water-loving plants can be planted close to toilets to dilute the intensity of smell from them.

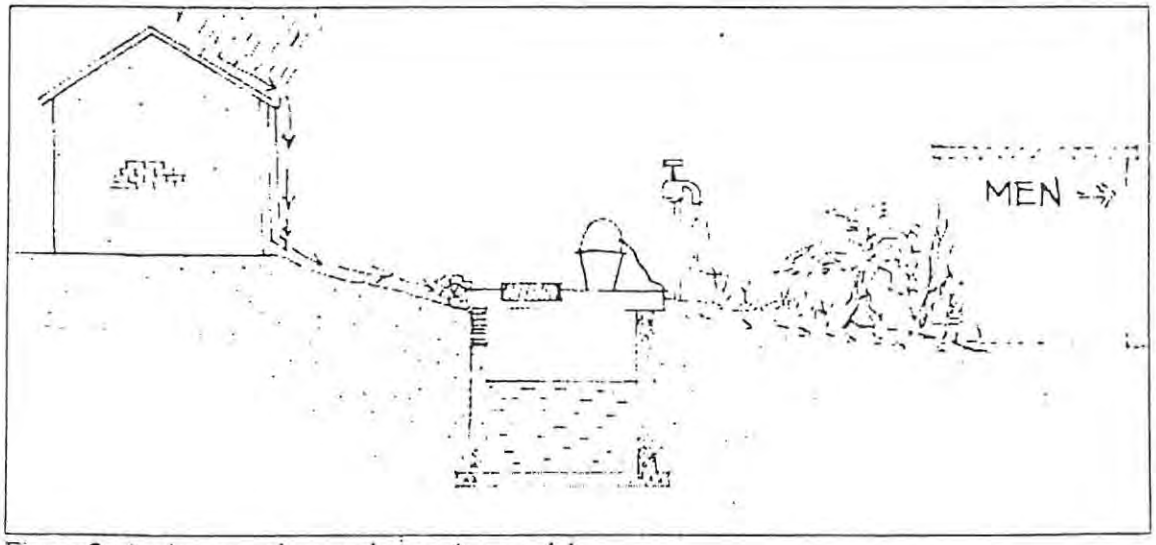


Figure 2: An integrated water-harvesting model

Controlling pests while sustaining natural balance

Some pests can be controlled by creating natural habitats of organisms that feed on them, for instance, constructing a rockery to attract lizards that in turn feed on many species of insect pests. That destruction of pests is natural and more likely to sustain the natural ecosystem (see figure 3).

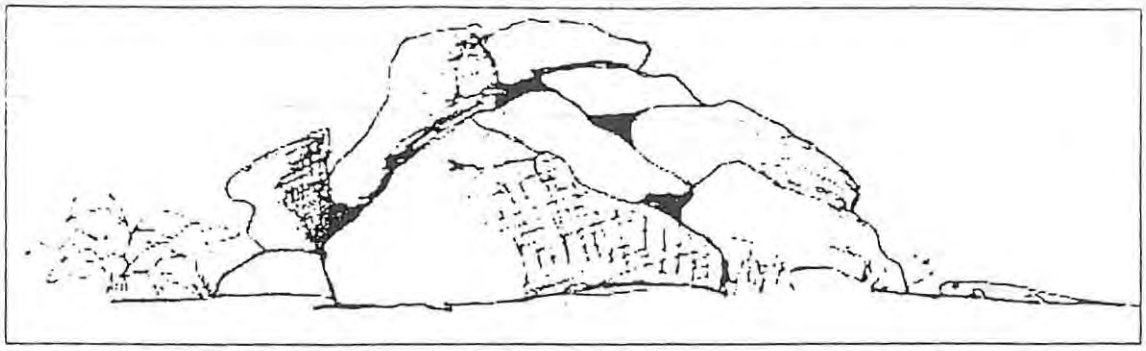


Figure 3: A unique pest control remedy

4.2 Conclusions

Considering the circumstances in which the evaluation was conducted and SCOPE is operating, it is safe to conclude that:

a. The evaluation's usefulness mainly lies in the strategic nature of the roles played by respondents who were accessed, although more parties could have been involved under better circumstances.
b. SCOPE is worth retention and in fact expansion to become a major nationwide initiative that transforms the country's physical environment using schools and colleges as nuclei from which to start.
c. The SCOPE programme has its own weaknesses and faces problems that if not addressed may continue to dilute the significance of its impact, which however is enormously impressive.
d. To reverse the programme's weaknesses and problems, critical as it is, will require a lot of investment in the form of human resources and especially funds. Main among the necessary but financially demanding reforms is restructuring.
e. Of the recommendations proposed in this report, the coordinator of SCOPE and participating institutions share the duty to initiate the changes required but the responsibility of that belongs to all stakeholders ranging from high-level government officials to communities.

The overall assessment of the programme is that it is a necessary initiative that needs to be retained but with some refinements that require increased funding. Obtaining the extra funds should be the main challenge and priority of the SCOPE programme as it enters its fourth phase.

APPENDIX K

EVALUATION REPORT FOR THE FIRST PHASE OF THE SCHOOLS' AND COLLEGES PERMACULTURE (SCOPE) PROGRAMME

RECOMMENDATIONS ON POSSIBLE IMPROVEMENTS IN PROGRAMME DESIGN ORGANISATION AND ON MODIFICATION TO TARGETS, OBJECTIVES AND PLANS FOR FURTHER IMPLEMENTATION.

The principal issue to be raised during this evaluation is whether or not Permaculture is the most appropriate form of ecological agriculture to form the educational thrust against environmental degradation; the widespread ignorance about its cause and the methods which can be employed to prevent its spread.

The programme has in a short space of time had a profound and beneficial effect on most of the schools and people actively participating and as such should definitely be continued. However, the gap which exists within the present educational system and in the wider community would be more appropriately filled by an understanding of ECOLOGY rather than by permaculture alone. It would follow that through understanding of ecology, schools would select to undertake permaculture; which is an example of a form of ecological agriculture. The subject should also include other practices which can contribute to ecological agriculture, such as minimum tillage, agroforestry, appropriate technology and the sustainable use of natural resources.

RECOMMENDATION 1

That the basis of the programme shifts from being solely a Permaculture programme to being an Econology programme with Permaculture as a main component.

RECOMMENDATION 2

As the National Co-ordinator left the Programme at the end of June 1995. It is essential, if the momentum of the programme is to be maintained that a replacement be found at the earliest opportunity.

RECOMMENDATION 3

Greater effort must be spent on the regular circulation of information regarding the programme to all concerned parties.

RECOMMENDATION 4

That the programme be extended into another phase; involving at least one school (either Primary or Secondary) from each District within the coming year. Scheduling of this will depend on the availability of resource people and should be decided ultimately by the regions in consultation with SCOPE Programme Regions should also be given some autonomy in the decision about how many additional schools they will allow to become involved at different stages of the programme's development.

- Issues and problems raised during meetings of the SCOPE Programme should be referred to programme participants for response, which would encourage the feeling of active involvement in decision making.

RECOMMENDATION 6

The proposed exchange visits between schools should be facilitated as soon as possible.

RECOMMENDATION 7

Workshops, seminars, open days and training sessions should be carried out on a regular basis and should involve more pupils and members of the community. The SCOPE programme National Co-ordinator should liaise with the regions regarding their training needs.

The workshops/training should be locally based; more effort should be spent collecting local technical knowledge into the design exercise, involving local people in the process and identifying local plants which can replace the exotic which are recommended at present.

RECOMMENDATION 8

Further training and exposure must be planned for the relevant groups, to ensure that maximum support is given to the programme.

RECOMMENDATION 9

That a follow-up team be established to provide more regular on the spot assistance. Ideally this permaculture expertise should be available within regions and schools must be encouraged to seek help locally. However, if this is not possible channels must be opened so that schools can secure permaculture help and expertise. This team would identify common problems which would be addressed at workshops and through the involvement of technical specialists. A budget should be provided to reimburse EOs and DEOS for travel and subsistence expenses incurred travelling to schools to meet the follow-up team.

RECOMMENDATION 10

That motivation information be provided within the programme by the provision of a range of materials to participants such as:

Certificates of attendance or competency following training. The provision of materials such as information relating to the programme, charts, posters, texts, T shirts and school signs describing the programme. These could bear recognisable symbols associated with the programme. Consideration should be given to the support or the establishment of some form of competition within the programme.

- The Ministry of Agriculture be approached to provide space at agricultural colleges and institutes for the establishment of permaculture trial and demonstration plots.

- That AGRITEX be approached regarding ways in which they can support the SCOPE Programme.

- The Forestry Commission can support the SCOPE Programme and in particular how the programme can be affiliated with the Schools and Colleges Tree Growing and Care Programme.

- That special emphasis be placed on the involvement of local communities in the planning and implementation of their Permaculture programme.

a/om/permacul

APPENDIX L

THE INTEGRATED LAND USE DESIGN PROCESS

The integrated land use design and management process has four main parts:

These are:

1. **Observation and assessment:** This involves carrying out a number of exercises which bring as much involvement as possible and which analyse the existing situation. The aim is for those involved to move forward with a reasonably common understanding of what is happening, why it is happening, (cause and effect), what resources are available and so on.

2. **Holistic Goal Formation:** This is where the common vision is established. Students, staff and parents create a goal which states what the values of the school or institution are, the forms of production it engages in and will engage in and what the future landscape must look like in order to sustain the forms of production.

3. **Mapping the future landscape:** This stage gives participants the tools to design land in an integrated way to turn the vision of what the land should look like into an achievable plan. This is where many practical techniques are introduced.

4. **Implementation and monitoring:** Straight forward plans of action are produced and a simple monitoring procedure is established.

This process is practical Environmental Education. It is a process that has gradually evolved and continues to evolve based on experience.

APPENDIX M

MEMORANDUM OF UNDERSTANDING BETWEEN THE ZIMBABWE INSTITUTE OF PERMACULTURE (ZIP) AND THE MINISTRY OF EDUCATION (MoE) CONCERNING THE DEVELOPMENT, INCORPORATION AND IMPLEMENTATION OF PERMACULTURE CONCEPTS AND PRACTICES IN SCHOOLS AS PART OF THE SCHOOLS' AND COLLEGES' PERMACULTURE (SCOPE) PROGRAMME.

1.0 PREAMBLE

1.1 The SCOPE Programme is a unit of the Zimbabwe Institute of Permaculture (ZIP) a registered Welfare Organisation (Registration W.O. 92/12) which promotes Environmental Education through the participatory design and maintenance of school grounds in ecologically sound ways. The Programme is also seeking to incorporate permaculture approaches and principles into relevant syllabi. The subjects being considered are Environmental Science at the primary level and Agriculture, Geography and Science at the secondary level.

1.2 The SCOPE Programme has , since its inception in 1992, been working closely with the Ministry of Education. During its pilot phase in schools from 1992 to 1995 Ministry of Education officials such as Regional Directors and Education Officers were inducted into permaculture approaches at seminars and workshops organised for them by the programme. 18 pilot schools were selected for the programme by the Ministry's Regional Offices and some teachers from each of these schools were trained for 2 weeks in permaculture practices.

1.3 The SCOPE Programme arises out of a need to correct the mismanagement of the environment both within the school grounds and in the communities around the schools. Schools generally lack a systematic process with which to plan and manage their grounds. It is also a response to a need to equip pupils and students with relevant information and skills that would enable them to make a positive contribution towards sustainable use of the environmental elements.

2.0 PROGRAMME AIM

The Programme has the dual aim of promoting sustainable land-use management systems of school grounds and incorporating permaculture ideas within existing syllabi of relevant subjects at both primary and secondary levels.

3.0 PROGRAMME OBJECTIVES

These are to :

3.1 Assist the Ministries of Education, Higher Education and Agriculture in the introduction of Permaculture in Schools and Colleges.

3.2 Initiate the integrated land-use design and management process in pilot schools and colleges.

3.3 Assist the Curriculum Development Unit and Audio Visual in the integration of permaculture principles in school syllabi and learning materials.

3.4 Encouraging the participation of pupils, staff and the community in holistic planning and ecologically sound use of school and college grounds.

3.5 Facilitate the training of Ministry officials, lecturers and teachers in participatory ecological land use management.

3.6 Process and disseminate appropriate information.

3.7 Liaise with other organisations working in Environmental Education.

4.0 PROGRAMME ACTIVITIES

The SCOPE Programme will carry out the following activities with the support of CDU,AVS, selected Regional and District Education Officers, College Principals, School Heads, lecturers, teachers and communities participating in the Programme.

4.1 raise awareness through meetings and workshops.

4.2 induct 36 additional schools to the Programme.

4.3 conduct training workshops for selected personnel, parents, pupils and students.

4.4 assist schools and communities in implementing the Programme's activities.

4.5 introduce the permaculture programme to pilot Agricultural and Teachers' Training Colleges.

4.6 work with the CDU and AVS to incoporate permaculture into relevant syllabi and learning materials.

5.0 PROGRAMME IMPLEMENTATION

5.1 The Programme will be managed by a Committee that is composed of:

5.1.1 The Chief Education Officer (CDU + AVS) or his/her appointee.

5.1.2 Two representatives of the Curriculum Development Unit.

5.1.3 One representative of the Audio Visual Services.

5.1.4 Two Trustees of the Zimbabwe Institute of

Permaculture.

5.1.5 . a representative of Natural Farming Network.

5.1.6 Up to five members co-opted by the Committee who shall be eligible to vote but may not serve as office-bearers.

5.2 The SCOPE Programme shall be guided by an Advisory Council which will be composed of up to 50 members appointed by the Management Committee.

5.3 A full time Co-ordinator is employed to run the Programme.

6.0 **TERMS OF REFERENCE FOR THE MINISTRY OF EDUCATION (Moe)**

As a key player in the integration of the Programme within the existing institutional structures the MoE will support the programme by facilitating the following:

6.1 Continue supporting the programme as per letter from the Permanent Secretary of Education.

6.2 Co-ordinate and communicate with Regions, Districts and Schools in relation to the Programme.

6.3 provide members of the CDU and other Ministry officials to work with the Programme Co-ordinator in the training and implementation workshops.

6.4 facilitate the integration of permaculture within the relevant curricula of schools.

6.5 monitor and evaluate the Programme's outputs to ensure that they meet the MoE's set criteria.

6.6 promote the introduction of permaculture in schools.

6.7 develop the modalities for the assessment of the knowledge and skills of permaculture in the curricula by agreement with, and in collaboration with the Zimbabwe Schools Examinations Councils (ZIMSEC).

6.8 provide office accommodation for the programme when required.

7.0 ON ITS PART THE ZIMBABWE INSTITUTE OF PERMACULTURE WILL ENDEAVOUR TO PROVIDE THE FUNDING REQUIRED TO FULFILL THE OBJECTIVES OF THE PROGRAMME AS SET OUT IN CLAUSE 3

SIGNED: .....

(ON BEHALF OF THE MINISTRY OF EDUCATION)

DESIGNATION .....

DATE: .....

SIGNED: .....

(ON BEHALF OF THE ZIMBABWE INSTITUTE OF PERMACULTURE)

DESIGNATION: .....

DATE: .....

SUMMARY OF TERMS OF REFERRENCE FOR THE ZIMBABWE INSTITUTE OF PERMACULTURE (ZIP) AND THE MINISTRY OF EDUCATION (MoE) IN THE SCHOOLS AND COLLEGES PERMACULTURE (SCOPE) PROGRAMME.

1. The Zimbabwe Institute of Permaculture (ZIP) provides:

   (a) funding for the programme
   (b) a Coordinator for the programme
   (c) a vehicle for the programme
   (d) facilitators for the programme
   (e) the operational framework for the programme

2. The Ministry of Education (MoE) provides:

   (a) part of its officers' time to the programme
   (b) office accommodation for the programme Co-ordinator
   (c) standards control
   (d) formal support to the programme
   (e) communication channels for the Programme.

3. The Programme will be managed by a Committee which will be chaired by the Chief Education Officer (CDU/AVS) or his/her appointee.This Committee will comprise of trustees of the Zimbabwe Institute of Permaculture and officials of the Ministry of Education's Curriculum Development Unit and Audio Visual Services as outlined in the constitution and the Memorandum of Understanding between ZIP and the Ministry.

SIGNED: .....

(ON BEHALF OF THE ZIMBABWE INSTITUTE OF PERMACULTURE)

DESIGNATION: .....

DATE: .....

SIGNED: .....

(ON BEHALF OF THE MINISTRY OF EDUCATION)

DESIGNATION: .....

DATE: .....

We have developed a step-by-step process for use by schools in sustainable land management. The process is called Integrated Land-Use Design (ILUD) and it has been successfully applied in many different contexts and geographical areas.

Key Stakeholders and Linkages

The Zimbabwe Institute of Permaculture (ZIP) (w.o. 12/92)

The Government of Zimbabwe through the Ministries of Education, Sport and Culture; Higher Education and Technology; and Lands and Agriculture.

ZIMBABWE

The Royal Norwegian Embassy - NORAD fund;
The Tudor Trust, UK;
Deadly Designs Incorporated "ISHWA fund" - Harare;
Global Village Japan;
The Rockefeller Foundation, U.S.A;
terre des hommes, Germany;
Environmental Liaison Forum, Zimbabwe;
Environmental Education Association of Southern Africa (EEASA)

HOW TO GET INVOLVED

We have many schools, colleges and communities who have requested for our training. You can assist by adopting one or more of the school or college communities and sponsoring their training.

For more information on how you can help please get in touch with us without delay.

Contact:

The National Co-ordinator
Attention: Mr Mugove Walter Nyika
The SCOPE Programme
P O Box CY 301
Causeway
Harare
Zimbabwe

Tel/fax: (263-4) 333811
Cell: 011 406 508
Tel: (263-4) 334481 or 333812/6/8 ext. 2038
Email: zip@mango.zw

THE SCOPE PROGRAMME

Integrated Land-Use for School and College Communities

THE SCHOOLS AND COLLEGES PERMACULTURE (SCOPE) PROGRAMME

SCOPE

THE SCOPE PROGRAMME

MISSION STATEMENT

Our mission is to facilitate participatory and sustainable land-use management in school and college communities and to develop and integrate Permaculture principles into the curriculum.

WHO ARE WE?

The Schools and Colleges Permaculture Programme (SCOPE) is a dynamic but practical environmental education programme of the Zimbabwe Institute of Permaculture (ZIP). ZIP is a registered welfare organisation (w.o. 12/92) which promotes sustainable agriculture approaches throughout the country. Apart from SCOPE, the other arms of ZIP are Fambidzanai Permaculture Centre, African Farmers Organic Research and Training, Natural Farming Network and the Participatory Ecological Land-Use Management Association. The SCOPE Programme is housed in the Curriculum Development Unit of the Ministry of Education, Sport and Culture but it also works closely with the Ministry of Higher Education and Technology and the Ministry of Lands and Agriculture.

The SCOPE Programme is managed by a dynamic team which is made up of Permaculture experts and distinguished professionals in education. The close working relationship forged between the non-government organisation - ZIP and the government agencies is the envy of many Programmes in Zimbabwe.

PROGRAMME OUTPUTS

- A land-use design and management process which can be used by educational institutions and farmers to adopt sustainable land use practices;
- Green schools with rich ecosystems that will be a source of food, income, health products and educational experiences for their communities including the pupils;
- A variety of curriculum materials that are easily accessible to the pupils, parents and staff at participating institutions;
- An integrated curriculum that incorporates the key principles of sustainable resource utilisation

THE BENEFICIARIES

The implementation of the SCOPE Programme is of direct benefit to the pupils, students, parents, teachers and all lecturers in the participating institutions. They are empowered to use their local resources in a manner which is economically viable, socially just and environmentally stable.

In particular, the SCOPE Programme tries to improve access to a wide variety of nutritious foods for disadvantaged children especially those suffering from HIV/AIDS. The foods include fruits, vegetables, legumes and herbs.

WHAT HAVE WE DONE SO FAR?

The SCOPE Programme was launched in 1994 with one primary and one secondary school from each of the country's nine provinces taking part. 1997 saw the expansion of the pilot phase to include an additional two primary and two secondary schools in each province. An evaluation of the first phase concluded that "the SCOPE Programme has in a short space of time, had a profound effect on the participating schools and should definitely be continued."

From 2000 to 2005 the number of participating school and college communities is set to increase to include:

- All teacher training colleges;
- All colleges of agriculture;
- At least one primary and one secondary school in each of the country's 63 districts.

APPENDIX O

LIST OF PLANT NAMES

Common name	Botanical name
African marigold	*Tagetes erecta*
Aloe ferox	*Aloe ferox*
Aloe Vera	*Aloe vera*
Alum root	*Heuchera richardsonii*
Angelica	*Angelica atropurpurea, occidentalis*
Apple	*Malus pumila, Podophyllum*
Banana	*Musa paradisiacal*
Baobab	*Adansonia digitata*
Basil	*Ocimum basilicum*
Bean	*Phaseolus vulgaris*
Bergamot	*Monarda fistulosa,*
Blue gum	*Eucalyptus globulus*
Borage, Boraginaceae	*Borago officinalis, Lithospermum canescens, carolinense*
Bougainvillea	*Bougainvillea Nyctaginaceae*
Burdock	*Arctium lappa*
Cabbage	*Brassica spp*
Calliandra	*Calliandra spp*
Caraway	*Carum carvi*
Carrion flower	*Smilax herbacea*
Carrot	*Daucus carota*
Cassava tapioca	*Manihot esculenta, Euphorbiaceae f.*
Castor bean	*Ricinus communis,. Euphorbiaceae f.*
Catnip	*Nepeta cataria*
Cauliflower	*Brassica oloeracea*
Celery	*Apium graviolens*
Chamomile	*Matricaria chamomilla*
Chervl	*Anthriscus cerefolium*
Chicory	*Cichorium intybus*
Chilli pepper	*Solanum frutescens*
Chives	*Allium schoenoprasum*

Cinnamon	*Cinnamomum zeylandicum*
Coriander	*Coriandrum sativum*
Costmary	*Chrysanthemum balsamita*
Cotton	*Gossypium spp.*
Cotton Lavender	*Santolina chamaecyparissus*
Cowpea	*Vigna sinensis*
Croton	*Euphorbiaceae croton*
Cucumber	*Cucumis sativus*
Culver's root or physic	*Veronicastrum virginicum*
Cup plant	*Silphium perfoliatum American medicinal*
Dandelion	*Tarascum officinalle*
Dill	*Anethum graveolens*
Drumstick tree	*Moringa oleifera*
Echinacea	*Echinacea purpurea* L. Moench, Purple coneflower
Eggplant	*Solanaceae melongena*
Elderberry	*Sambucus spp.*
Evening-primrose	*Oenothera biennis*
Fennel	*Foeniculum vulgare*
Fenugreek	*Trigonella foenum-graecum*
Feverfew, wild quinine	*Parthenium integrifolium* L.
Flax	*Linum usitatissmum* L. FIBER``
Garlic	*Allium sativum*
Geranium. South African	*Pelargonium*
Geranium, wild Crane's bill	*Geranium maculatum L.*
Ginger	*Zingiber officinale*
Ginseng	*Araliaceae* f., *Panax quinquefolius*
Golden Rod	*Solidago virgaurea*
Goldenseal	Vernicastrum hydrastis
Granadilla	*Passiflora quadrangularis*
Grape	*Vitis vinifera*
Guava	*Pisidium guavaja*
Hibiscus	*Rosa-sinensis*
Honey locust	*Cerare gledistsia, triacanthos*
Horseradish	*Armoracia lapathifolia, rusticana*

Lantana	*Lantana camara*
Lavender	*Lavendula varieties*
Leeks	*Allium Ampeloprasum*
Lemon balm	*Melissa officinalis*
Lemon grass	*Cymbopogon citratus*
Lemon verbena	*Aloysia tryphylla*
Leucaena	*Leucaena leucocephala*
Lipia	*Lipia javanica*
Lovage	*Levisticum officinale*
Lucerne	*Medicago sativa*
Lupine	*Lupinus perennis* L. *alba*
Marigold	*Tagetes minuta*
Marjoram	*Origanum marjorana*
Milkweed	*Asclepias syriaca*
Mint, wild	*Mentha varieties e.g. Stachys palustris*
Mountain mint	*Pycnanthemum virginianum*
Mullein	*Verbascum thapsus*
Nasturtium	*Nasturtium var.*
Neem tree	*Azedarachta indica*
Nettle, stinging	*Urtica dioica*
Okra	*Hibiscus esculentus* cotton/ mallow / *malvaceae f.*
Onion	*Allium cepa*
Oregano	*Oreganum vulgare*
Parsley	*Polytenia nuttallii* Carrot f. Apiaceae *pteroselinum crispum*
Parsnip, wild	*Pastinaca sativa L. Carrot f. APIACEAE*
Paw paw	*Carica papaya*
Pigeon pea	*Cajanus cajan*
Pepper	*Capscum Annuum*
Periwinkle	*Vinca minor*, dogbane or *Apocynaceae* f.
Pink periwinkle	*Vinca rosea*
Plantain	*Plantago spp., Musa spp.*
Poinsettia	*Euphorbia poinsettia* hedge
Prickly pear, eastern	*Opuntia rafinesqueii, macrorhiza, compressa.fragilis*
Pomegranate	*Punica granatum*

Rose geranium	*Pelargonium graveolens*
Rose wild	*Rosa blanda*
Rosemary	*Rosemarinus officinalis*
Rosy Periwinkle	*Catharanthus rosea*
Rue	*Ruta graveolens*
Rue, purple.	*Thalictrum dasycarpum, hypoglaucum, revolutum,*
Russian Comfrey	*Symphytum officinale*
Sage	*Salvia officinalis*
Sage, white	*Artemisia ludoviciana*
Savory	*Satureja varieties*
Sesbania	*Sesbania spp.*
Sisal	*Aloe sisalina*
St John's Wort	*Hypericum mutilum L. , sphaerocarpum*
Sorrel	*Oxalidaceae* f. *Rumex sculatatus*
Stinging nettle	*Urtica dioica*
Sweet bay	*Laurus nobilis*
Sweet potato, morning glory	*Ipomoea batatas*
Sweet violet	*Viola odorata*
Tarragon	*Artemisia dracunculus*
Tephrosia, goat's rue, rabbit pea	*Tephrosia virginiana or holsericea CANDIDA.*
Thistle	*Cirsium discolor, carduus, hilii, muticum*
Thyme	*Thymus vulgaris*
Tomato	*Solanaceae lycoperscon*
Valerian	*Valeriana edulis*
Vervain, blue, hoary	*Verbena hastata, stricta*
Violet	*Viola pedatifida, palmata pedata*
Watercress	*Artemisia ludoviciana*
Wood nettle	*Laportea canadensis*
Wormwood	*Artemisia campestris L. ssp. Caudata c var. calvens*
Yarrow	*Achillea millefolium*

APPENDIX P

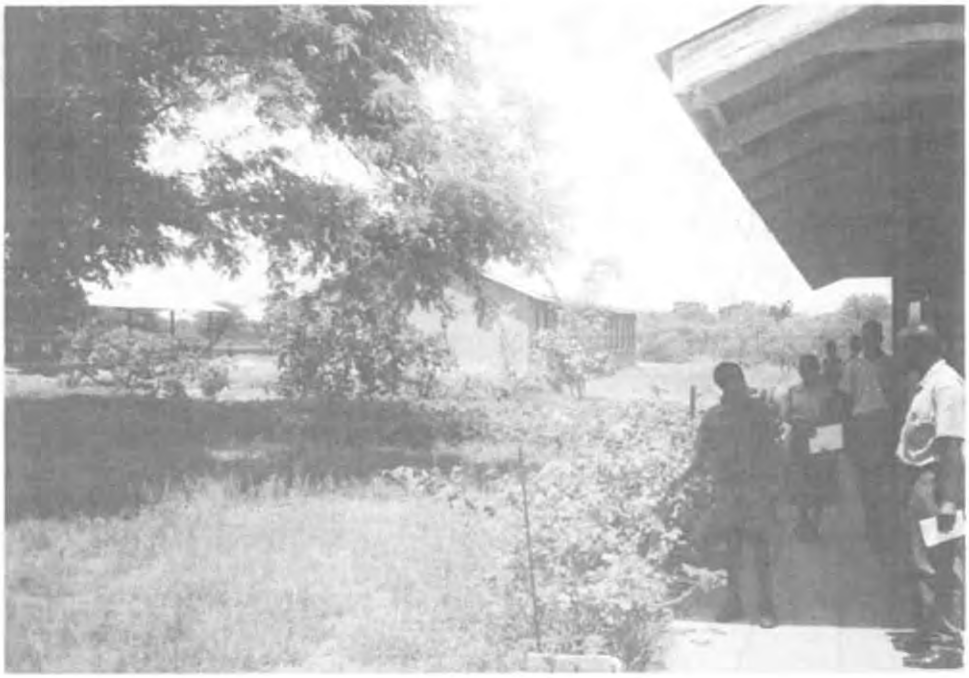
PHOTOGRAPHIC ILLUSTRATION OF SOME OF THE LAND-USE OBSERVATIONS MADE.

Welcome to Ntepe secondary school: You have entered a Permaculture school – *your disorder may be our order.*

Demonstrating biodiversity: An orchard garden taking shape at Ntepe secondary school in between the classrooms. Note the herbs on the ground.

The researcher conducting an interview in one of the numerous outdoor classroom structures at Ntepe secondary school.

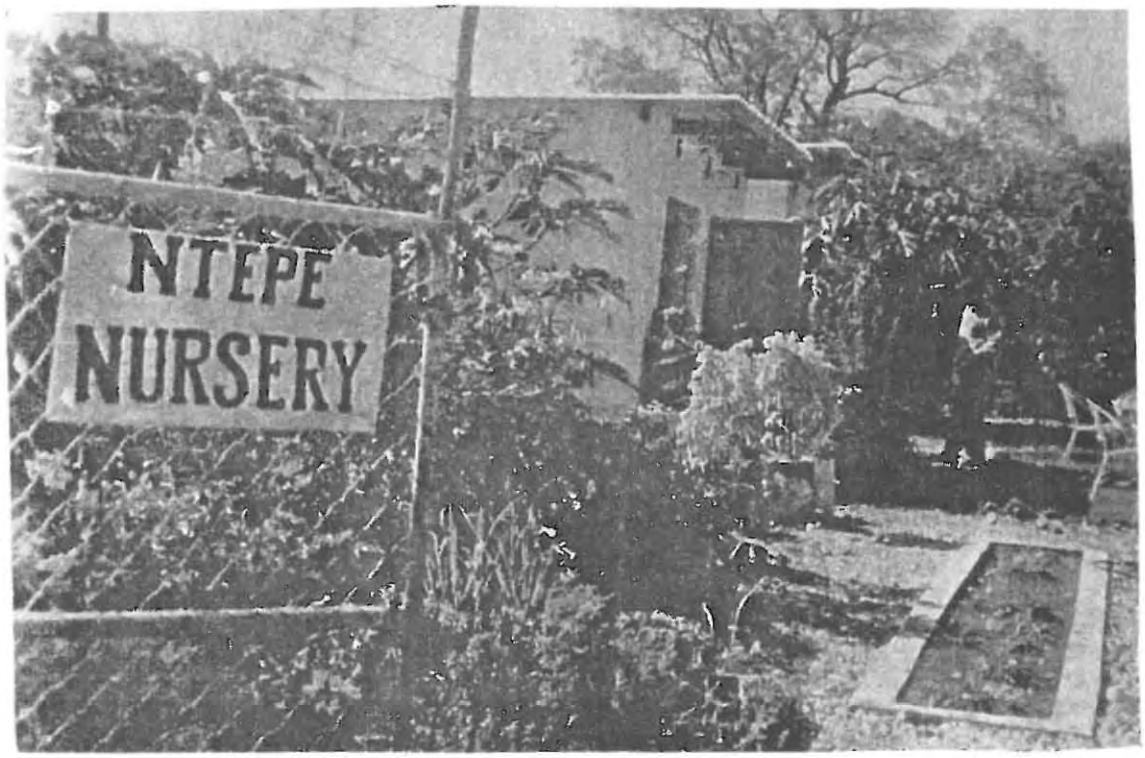
Outdoor classroom structures at Mavela secondary school. The pupils enjoy leisure reading or relaxed discussions under these trees during break times.



Maximum ground cover: there is no exposed soil at Mavela secondary school in Tsholotsho. There is no sweeping of school grounds at the school.

Climbers, trees, shrubs, flowers, grass and herbs – they have it all at Mavela secondary school. The vegetation here is a multipurpose one.

We design, mix and match. Each element performs many functions. A constant reminder of some Permaculture principles at Mavela secondary school.



A priceless community resource – Ntepe nursery is always open for the local community to access a wide range of seedlings ranging from herbs to fruit and nitrogen fixing trees.

Welcome to the Permaculture homestead of Alitalia and Miclas Ndlovu, Ntepe village, Garanyemba communal lands, Gwanda district, Matebeleland South Province.

Doing it differently – The innovative hanging vegetable nursery for Mr. And Mrs Ndlovu. They say that this technique helps them to keep the plants safe from chickens and other marauding animals.

Water harvesting: The rain water harvesting tank at the Ndlovu homestead. Mr. M. Ndlovu shows the guttering which he improvised from local timber.

Conserving water – Mr. Miclas Ndlovu demonsrates the bottle irrigation method.

The orchard-garden at the Ndlovu homestead. They started the project when the SCOPE Programme began to work with the Ntepe school community in 1998 but the family has already started to enjoy the fruit from it.

A moringa oleifera tree at the Ndlovu homestead. The family is using the moringa leaves as a nutritious vegetable.