

# The Role of Relevant Basic Education in Achieving Food Security and Sustainable Rural Development



Tutui Nanok  
Peter Taylor  
Eric Tollens  
Tom Vandenbosch

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KATHOLIEKE UNIVERSITEIT  
**LEUVEN**

  
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## SUMMARY

The main objective of this study is to contribute to improving the effectiveness and efficiency of development policies and cooperation of the European Community, the European Union and other development actors by understanding the ways by which relevant basic education can contribute to achieving food security and sustainable rural development.

Many development policies – including the European Community's development policy which is currently under debate and review – encourage approaches which integrate multiple strategies for poverty reduction. These include food security and sustainable rural development, as well as promotion of equitable access to education. The results of the current study are expected to further improve poverty reduction policies, programmes and projects by revealing the dynamic interplay between education relevance, food security and sustainable rural development.

Food insecurity and under-education are still common in many developing countries. The challenges are enormous, especially in rural areas where food insecurity, poverty and educational deprivation often create a vicious circle. Climbing out of this 'poverty trap' can not be achieved by addressing one sector alone. It is therefore essential to explore feasible measures in which these interrelated issues can be tackled together, focusing on interventions which have the greatest effect on poverty reduction.

Basic education initiatives in rural areas which have used agricultural or environmental experience as a means of making teaching and learning more relevant and the potential impact of this kind of approach on food security and sustainable rural development were studied. This was done through a global literature review, looking at different policies, initiatives and analyses complemented with field work in Kenya, Zimbabwe and Mali. Potential implications for policy and suggested areas for increased investment are proposed.

Main findings include the following:

- Relevant basic education contributes to rural development; the quality and relevance of schooling can positively influence productivity.
- Relevant basic education can help imparting life skills which are useful in alleviating poverty in rural areas.
- School curricula are often overloaded and leave little room for local interpretation; rural teachers are often poorly equipped.
- Teaching and learning support materials are in many cases inadequate.
- Agricultural and environmental experiences can be used as a way of making basic education in rural areas more relevant to the local situation.
- Community ownership is crucial for relevant and effective basic education.

Implications for policies and donor support include:

- A concerted multi-sectoral effort in rural areas of the developing world to develop basic education geared towards rural development is needed.
- Basic education in rural areas should focus on learners' needs.
- School curricula should be meaningful regarding the life situations of rural children and relevant to local needs and conditions.
- Improved pre-service and in-service teacher training should be supported.
- Adequate teaching and learning materials should be provided.

- Improved school-community linkages should be encouraged.
- More effective monitoring and sound scientific research and analysis of basic education in rural areas should be supported.

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## LIST OF ACRONYMS

AIDS	Acquired Immune Deficiency Syndrome
AREX	Department of Agricultural Research and Extension
BEST	Better Environmental Science Teaching
CAMPFIRE	Communal Areas Management Program for Indigenous Resources
CSP	Country Strategy Paper
DFID	UK Department for International Development
EC	European Community
ECDPM	European Centre for Development Policy Management
ECHO	Humanitarian Aid Department of the European Commission
EC-PREP	European Community's Poverty Reduction Effectiveness Programme
EFA	Education for All
ERSWEC	Economic Recovery Strategy for Wealth and Employment Creation
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
GER	Gross Enrolment Ratio
GoK	Government of Kenya
HIV	Human Immunodeficiency Virus
ICEI	<i>Instituto Complutense de Estudios Internacionales</i>
ICRAF	International Centre for Research in Agroforestry (now the World Agroforestry Centre)
IFPRI	International Food Policy Research Institute
IIEP	International Institute for Educational Planning
HDI	Human Development Index
KCPE	Kenya Certificate of Primary Education
KESSP	Kenya Education Sector Support Programme
KOEE	Kenya Organization for Environmental Education
LGDA	Lower Guruve Development Association
MDG	Millennium Development Goal
NEMA	National Environmental Management Authority
NEPAD	New Partnership for Africa's Development
NER	Net Enrolment Ratio
ODI	Overseas Development Institute
PFIE	<i>Programme de Formation et d'Information pour l'Environnement</i> (Training and Information Programme on the Environment)

PID	Project Information Document
PRSP	Poverty Reduction Strategy Paper
REAL	Rural Ecology and Agriculture Livelihoods
RSP	Regional Strategy Paper
SCOPE	Schools and Colleges Permaculture Programme
SDA	School Development Association
SDC	School Development Committee
SID	Society for International Development
SPFS	Special Programme for Food Security
TEC	Treaty of the European Community
TEU	Treaty of European Union
TGTC	Tree Growing and Tree Care
TIPE	Training and Information Programme on the Environment
TMS	Teacher Management and Support
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UPE	Universal Primary Education
USAID	US Agency for International Development
VAC	Vulnerability Assessment Committee
VVOB	Flemish Association for Development Cooperation and Technical Assistance
WFP	United Nations World Food Programme
ZINTEC	Zimbabwe Integrated National Teacher Education Course
ZJC	Zimbabwe Junior Certificate

# 1 INTRODUCTION

This document reports on the main findings of the study on “*The role of relevant basic education in achieving food security and sustainable rural development*” commissioned by the European Community’s Poverty Reduction Effectiveness Programme (EC-PREP)<sup>1</sup> (Ref: EP/RO4/01) and prepared by the Catholic University of Leuven (K.U.Leuven) in collaboration with the World Agroforestry Centre (Nairobi).

Many development policies – including the European Community’s development policy which is currently under review – encourage approaches which integrate multiple strategies for poverty reduction. These include food security and sustainable rural development, as well as promotion of equitable access to social services such as education.

Progress towards achieving the international development goals of ‘Food for All’ and ‘Education for All’ by the year 2015 has been too slow. Food insecurity, low school participation, high dropout rates and under-education are still common in rural areas of the developing world.

The challenges in these fields are enormous, especially in rural areas where food insecurity, poverty and educational deprivation often create a vicious circle from which underprivileged households and communities are unable to escape. Climbing out of this ‘poverty trap’ can not be achieved by addressing one sector alone.

It is therefore timely and essential to explore feasible measures in which the interrelated issues of food security, sustainable rural development and relevant basic education can be tackled together, focusing on interventions which have the greatest effect on poverty reduction.

This research project wants to respond to this need by understanding the ways by which relevant basic education can contribute to achieving food security and sustainable development in rural areas.

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<sup>1</sup> The European Community’s Poverty Reduction Effectiveness Programme (EC-PREP) is a programme of research to enhance collaboration between the European Commission and the UK Department for International Development (DFID). Its main objective is to enhance the poverty impact of the European Community’s development assistance and contribute to achieving the international development target of halving the number of people living in extreme poverty by 2015.

## 2 AIM OF THE STUDY

### 2.1 CONTEXT OF THE RESEARCH

Orienting international development – including EC external assistance – towards **poverty reduction** is a complex issue, which requires an integrated approach which is based on research findings. Despite the growing consensus that poverty is multi-dimensional and complex, a lot of poverty research has been based on using approaches and methods that cannot capture a full picture. To deepen the understanding of poverty, research needs to be multi-disciplinary. This research project aims to contribute to the understanding of the multi-faceted character of poverty by studying the relation between relevant basic education and food security and sustainable rural development.

**Education** generates important benefits for human development. Research has provided strong evidence that basic education makes a direct contribution to poverty reduction and sustainable development, particularly in rural areas. Findings from several studies around the world suggest that education facilitates an increase in farm output in rural areas in different ways. **Productivity** may be enhanced either through the adoption of more productive inputs and techniques or through improvements in productive efficiency for a given technology. Farmers with no or little schooling generally operate far below their productive potential. Furthermore, since formal education is thought to be particularly important in terms of encouraging the adoption and spread of innovations, schooling may increase farm productivity and efficiency further. This has provided scope for increasing productivity and efficiency through higher levels of formal schooling.

There is little evidence however on how the **quality and relevance of education** could influence agricultural production and hence food security and sustainable rural development, since most studies have focused on the effects of the number of years of initial formal education, rather than on the effects of the quality and relevance of this education. This research project aims at helping to bridge this knowledge gap, by studying the role of relevant basic education in achieving food security and sustainable rural development.

### 2.2 OBJECTIVE OF THE STUDY

The objective of this study is to contribute to improving the effectiveness and efficiency of the European Community, the European Union and other development policies by understanding the ways by which relevant basic education can contribute to achieving food security and sustainable rural development. The results are expected to further improve poverty reduction policies, programmes and projects by revealing the dynamic interplay between education relevance, food security and sustainable rural development.

## **2.3 RESEARCH QUESTIONS**

Within this framework, the research has focused on the following specific **research questions**:

1. What are the characteristics of a relevant education in rural areas?
2. What are the skills needed for learners to enhance food security and sustainable rural development?
3. To what extent is an approach on learning these skills reflected in national policies?
4. How are these skills addressed through teaching and learning in rural primary schools at present?
5. How do the use of natural resource management in schools and natural resource management practices in the community interact?
6. What strategies would allow the potential of natural resource management to be explored as a basis for more relevant teaching and learning in the rural space?
7. What recommendations can be made on the basis of the research for policy formulation and implementation?

## 3 METHODOLOGY

### 3.1 DESIGN OF THE METHODOLOGY

The research methodology was developed specifically for this project and designed to find answers to the research questions detailed in Section 2.3.

The project was carried out in 4 phases:

1. Planning and organisation
2. Data collection (including case studies)
3. Data analysis
4. Dissemination.

**Phase 1 (planning and organisation)** included a desk study through a literature review, an organisation and planning workshop and the preparations for the fieldwork. The literature review and the planning workshop and organization workshop resulted in a clear study organisation. Relevant actors and experts were included in this process. Participatory research tools and draft questionnaires were cross-checked by experts to assess whether they were expected to produce the required information and whether the study objective and research questions were adequately treated. The research tools were also pre-tested in a school and community which were not included in the final research.

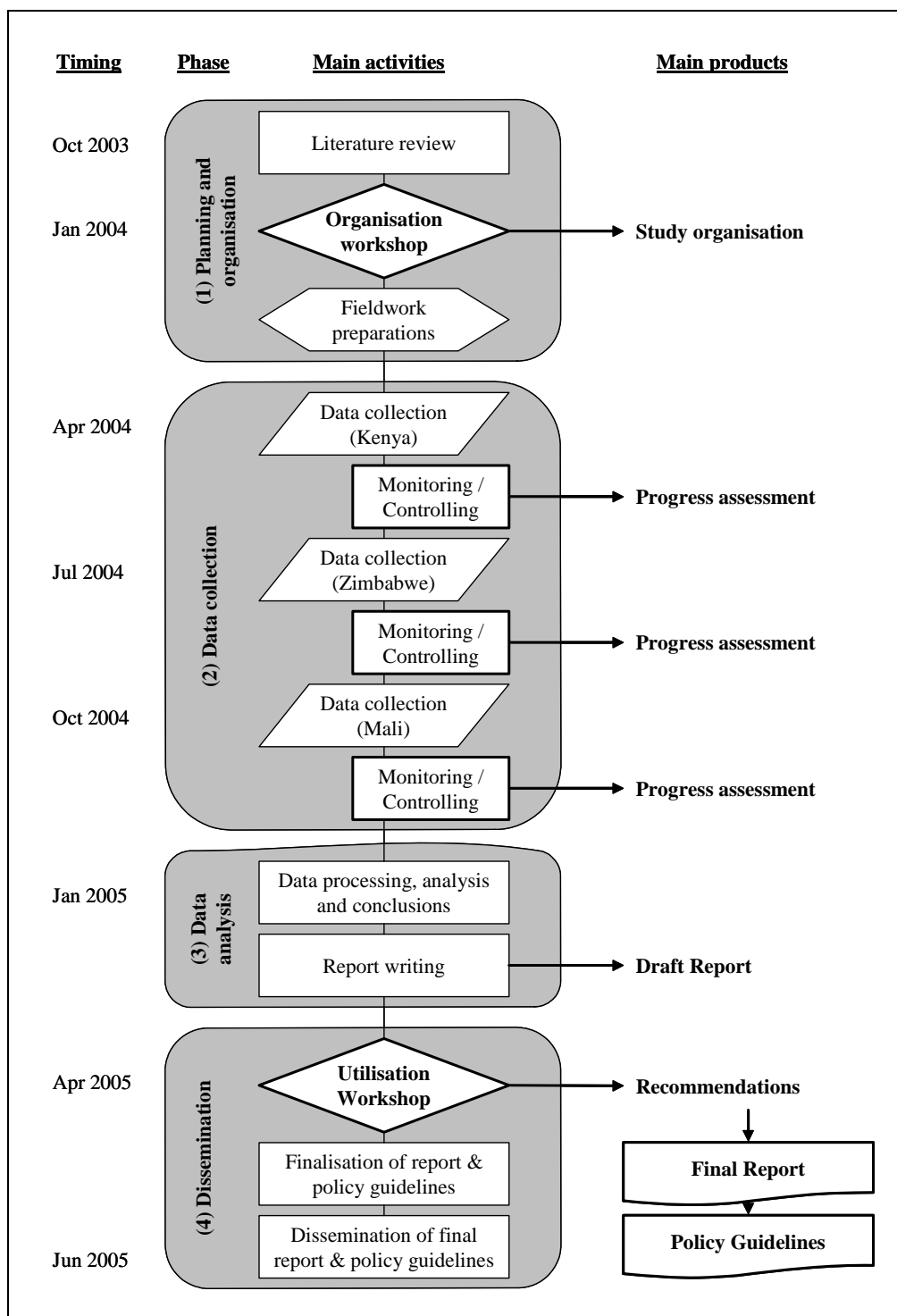
**Phase 2 (data collection, case studies)** included data collection in 3 countries (Kenya, Zimbabwe and Mali). This was done using a wide range of participatory tools for information gathering and data collection and is described in more detail in section 3.3. Monitoring and controlling was done to regularly assess progress and the participatory research tools and questionnaires were slightly modified in between the different case studies where necessary and appropriate.

**Phase 3 (data analysis)** included data processing, analysis and writing of a draft report. Parts of the data processing and analysis already took place during the data collection phase.

**Phase 4 (dissemination)** included an utilisation workshop, finalisation of the report including policy guidelines, and dissemination of the results. An utilisation workshop was organised and this was followed by the translation of findings and conclusions into recommendations for action (policy guidelines). Based on the results of the utilisation workshop, a final report was produced and disseminated to users and the wider public.



The project flow is schematically represented in the diagram in Figure 1.



**Figure 1: Project flow**

## 3.2 LITERATURE REVIEW

The literature review was designed to provide a comprehensive analysis of the main issues related to relevant basic education and its potential role in enhancing food security and sustainable development in rural areas. It involved analysis of research evidence published internationally. The focus was on establishing not only what is known about these issues, but also what is not known and how such gaps in knowledge might be addressed by this research and future research projects. We were most interested in evidence relating to the rural development impact of initiatives that have used natural resources as a way of making teaching and learning in rural primary schools more relevant to the local context.

Published articles, books and monographs, research thesis, statistical evidence, and government and international publications covering primary education, food security and rural development formed the basis of most of the review. Relevant research literature was identified using a number of complementary search methods including electronic bibliographic database searches, hand searches of journals and other documents; and email requests for information researchers working in the field.

## 3.3 CASE STUDIES

Field data on the role of relevant basic education in achieving food security and sustainable rural development have been collected in six schools and communities in 3 countries (Kenya, Zimbabwe and Mali).

The sample size is small due to the nature of the research work. The case studies are not meant to be representative or comparative of the particular country's situation. They are intended to be illuminative, illustrating in a unique study what actually happens in a rural primary school and its community.

The main focus of the field work was on finding answers to research questions 4 (how are skills needed for learners to enhance food security and sustainable rural development addressed through teaching and learning in rural schools at present?) and 5 (how do the use of natural resource management in schools and natural resource management practices in the community interact?).

### 3.3.1 SELECTION OF THE SCHOOLS

The **criteria** used for the selection of the schools to be studied in detail during the fieldwork were the following:

- Two schools and communities to be studied in detail in each of the three countries (Kenya, Zimbabwe and Mali)
- Schools should be primary schools
- Schools should be located in rural areas
- Schools should be public or community schools
- Schools should have attempted to use locally available natural resource management practices in the teaching and learning process for at least five consecutive years.

All case studies are in sub-Saharan Africa (namely Kenya, Zimbabwe and Mali). Sub-Saharan Africa is the only developing region in the world where food insecurity has worsened instead of improved in recent decades.

Government agencies and NGOs working with schools were interviewed to help in the selection of study schools.

We decided to focus on primary schools because of the following reasons:

1. Primary schools are located more closely to the homes of the students as compared to secondary schools. Secondary schools are often boarding schools located further away from the homes of the students. Primary schools thus allow the parents to visit the school more frequently and parents are likely to have more contact with the teachers and the headteacher of the school. This makes it more likely that community members have a sense of ownership of a primary school. In the case of secondary schools, parents may feel more excluded, not only because of the distance to the school, but also because often they haven't attended secondary school themselves.
2. Primary school children are generally more open to new ideas and visions and more inquisitive.
3. More children attend primary schools as compared to secondary schools.
4. Primary school curricula are often a bit less rigid than secondary school curricula and primary schools have relatively more opportunities for using cross-curricular approaches integrating different subjects.

We decided to focus on schools in rural areas because of the following reasons:

1. The study has an important aspect of rural development, which obviously would come out more clearly in rural areas than in urban areas. In rural areas in developing countries, most parents of schoolchildren are farmers.
2. Most primary schools in developing countries are located in rural areas.

### **3.3.2 PARTICIPATORY RESEARCH TOOLS**

The research in the selected schools (and their communities) was done as much as possible in a participatory manner with plenty of time and opportunities for open discussion. **Methods and tools** used in the case study research included:

- Semi-structured individual discussions with key informants
- Semi-structured individual discussions with school headteachers
- School and community walks
- Semi-structured group discussions, mapping and ranking with school teachers
- Structured individual interviews and semi-structured group discussions, mapping and ranking with school students
- Lesson observations
- Informal observations
- Structured individual interviews and semi-structured group discussions, mapping and ranking with parents
- Home visits to parents/farmers and discussions.

These methods and tools are described in more detail below.

#### **3.3.2.1 SEMI-STRUCTURED INDIVIDUAL DISCUSSIONS WITH KEY INFORMANTS**

In each of the 3 countries we studied, these included semi-structured discussions with education officials at different levels and representatives of organisations working with schools and communities in the study area and the country. The discussion guideline was designed to contribute to finding answers to the research questions described in Section 2.3 and more specifically to get a better view on the following issues:

- Influences of schooling on communities (in general)
- School activities related to food security and sustainable rural development which draw on the local environment as a learning resource
- Teachers capacity – especially in using natural resources as a way of making teaching and learning more relevant to rural life
- Perceptions on how schools can help in creating food security and wealth in rural areas, what the learning needs are for students in rural areas and how they are being taught in school
- How skills needed to create food security and sustainable rural development are addressed in the curriculum and in educational policies
- Contact and interaction of schools with parents and the local communities – and specifically the interaction of agricultural and natural resource management practices in communities with teaching and learning in schools.

### **3.3.2.2 SEMI-STRUCTURED INDIVIDUAL DISCUSSIONS WITH SCHOOL HEADTEACHERS**

In each school, the headteacher or acting head was interviewed. The discussion was generally done at the very beginning of the field work in the school/community setting. The discussion guideline was designed to contribute to finding answers to the research questions described in Section 2.3 and more specifically to get a better view on the following issues:

- Structure and the functioning of the school
- Context of the use of natural resources in school
- School activities related to food security and sustainable rural development which draw on the local environment as a learning resource
- Teachers capacity – especially in using natural resources as a way of making teaching and learning more relevant to rural life
- Perceptions on how schools can help in creating food security and wealth in rural areas, what the learning needs are for students in rural areas and how these learning needs are being addressed through schooling
- Contact and interaction of the school with parents and the local community – and specifically the interaction of agricultural and natural resource management practices in the community with teaching and learning in the school.

The formal discussions with the school headteacher typically lasted for about 1.5 to 2 hours. Throughout the fieldwork, there were also plenty of other opportunities for informal exchanges with the headteacher.

### **3.3.2.3 SCHOOL WALKS**

During the first day of research at a school, a school walk was organized allowing the research team members to familiarize themselves with the activities related to natural resource management in the school compound. These walks were done with the help of the headteacher, the teacher on duty or the teacher in charge of the natural resource management activities.

### **3.3.2.4 SEMI-STRUCTURED GROUP DISCUSSIONS, MAPPING AND RANKING WITH SCHOOL TEACHERS**

These discussions and exercises were done in each school with a small group of teachers (between 5 and 12 teachers), especially the ones teaching in the upper grades of primary education and/or with a particular interest in the research questions.

A mapping exercise of the school and its surrounding community at the beginning of the discussion allowed getting a better visualisation of possible school-community linkages.

The discussion guideline for the semi-structured group discussions was designed to contribute to finding answers to the research questions described in Section 2.3 and more specifically to get a better view on the following issues:

- Context of the use of natural resources in school
- School activities related to food security and sustainable rural development which draw on the local environment as a learning resource
- Teachers capacity – especially in using natural resources as a way of making teaching and learning more relevant to rural life
- Perceptions on how schools can help in creating food security and wealth in rural areas, what the learning needs are for students in rural areas and how these learning needs are being addressed through schooling
- Contact and interaction with the parents and the local community – and specifically the interaction of agricultural and natural resource management practices in the community with teaching and learning in the school.

Timelines were used to get an historical perspective on the practice and use of natural resource management in the school. Ranking was done when a list of different responses emerged from the discussion to get a better indication of the relative importance of the different factors or issues.

These group discussions with mapping and ranking exercises typically lasted for about 2 to 2.5 hours each. Again, apart from the formal discussion, there were plenty of other opportunities for interaction with the teachers.

### **3.3.2.5 STRUCTURED INDIVIDUAL INTERVIEWS AND SEMI-STRUCTURED GROUP DISCUSSIONS, MAPPING AND RANKING WITH SCHOOL STUDENTS**

These interviews, discussions and exercises were done with 50 randomly selected school students (25 boys and 25 girls) in the upper grades of each primary school. The same students were involved in the group and individual interviews.

Structured individual interviews with school students were done before the group discussions to avoid that the outcomes of the group discussions would influence the individual interviews. Structured individual interviews were kept as short as possible (lasting between 5 and 20 minutes each). Structured individual interviews were done as much as possible outside the traditional classroom environment (see Picture 1) to make the children feel more comfortable and relaxed and to avoid children getting the impression that this would be an examination type of activity.



**Picture 1: Structured individual interview with school student  
(Nyandoro Primary School, Zimbabwe)**

The interview sheet for structured individual interviews with school students was designed to contribute to finding answers to the research questions described in Section 2.3 and more specifically to get a better view on the following issues:

- General background and family situation of the student and distance from home to the school
- Membership of co-curricular clubs in the school
- Knowledge and skills learnt in school related to agriculture, natural resource management and the environment
- Homework related to agriculture, natural resource management and the environment
- Practice at home of knowledge and skills learnt in school related to agriculture, natural resource management and the environment
- Perceptions on food security (months of the year which are food (in)secure, meals taken in a day, effects of hunger on children's learning)

Semi-structured group discussions, mapping and ranking with school students were done in each school in 2 groups of about 25 school students.

The mapping activity with students was “make a map of your school compound, illustrating agricultural and natural resource management practices”. The mapping activity was usually done at the beginning of a group discussion so that it also helped in ‘breaking the ice’ between researchers and students. More silent children were actively encouraged to participate in the discussions.

The discussion guideline for the semi-structured group discussions was designed to contribute to finding answers to the research questions described in Section 2.3 and more specifically to get a better view on the following issues:

- School activities and topics related to food security and sustainable rural development which draw on the local environment as a learning resource, and what students have learnt as a result of these activities
- Perceptions on food security (months which are food (in)secure, reasons for food insecurity, effects of hunger on children's learning)
- Perceptions on how schools can help in creating food security and wealth in rural areas, what the learning needs are for students in rural areas, how these learning needs are being addressed through schooling and whether students practice at home skills learnt in school
- Contact and interaction with the parents and the local community – and specifically the interaction of agricultural and natural resource management practices in the community with teaching and learning in the school.

Ranking was done when a list of different responses emerged from the discussion to get a better indication of the relative importance of the different factors or issues.

Group discussions with mapping and ranking exercises took about 1.5 to 2.5 hours for each group. The discussions were held as much as possible without the presence of teachers.

### **3.3.2.6 LESSON OBSERVATIONS**

A tool for lesson observation was developed. In each school, between two and nine lessons were observed in different subjects and grades. Lesson observations were done with the aim of studying teaching and learning practices, participation of students, availability of teaching and learning materials and the use of locally available materials and natural resource management practices in teaching and learning. The lesson observations were also learning experiences for the teachers observed, as well as for the research team doing the observing. The different steps and purposes of the lesson observations are described in Table 1.



**Table 1: Steps and purposes of lesson observations**

<b>Steps</b>	<b>Purposes</b>
1. Getting acquainted	<ul style="list-style-type: none"> <li>– Get to know each other</li> <li>– Get to know the situation in which the teacher will be observed</li> <li>– Exchange expectations and possible fears</li> </ul>
2. Pre-observation discussion	<ul style="list-style-type: none"> <li>– The teacher informs the observers about: <ul style="list-style-type: none"> <li>– The topic of the lesson and learning objective</li> <li>– The lesson plan (if used)</li> </ul> </li> <li>– Agree upon: <ul style="list-style-type: none"> <li>– The lesson(s) that will be observed</li> <li>– What data will be collected</li> <li>– How the data will be collected</li> <li>– Rules to be followed during the observation</li> </ul> </li> </ul>
3. Lesson observation	<ul style="list-style-type: none"> <li>– Observe the performance of the teacher and the students</li> <li>– Collect the data agreed upon</li> </ul>
4. Discussion with pupils at the end of the lesson	<ul style="list-style-type: none"> <li>– Explore: <ul style="list-style-type: none"> <li>– How the lesson compared to other lessons</li> <li>– What pupils liked and didn't like about the lesson</li> <li>– What pupils learned from the lesson</li> <li>– What things pupils learned that might be useful for them to talk about at home or that they could use themselves outside school</li> </ul> </li> </ul>
5. Preparation for post-observation discussion	<ul style="list-style-type: none"> <li>– Analyse the data obtained during classroom observation</li> <li>– Select specific points to be discussed in the post-observation conference</li> </ul>
6. Post-observation discussion	<ul style="list-style-type: none"> <li>– Share observations and reflections</li> <li>– Discuss what was learned from the experience</li> <li>– Help the teacher think about goals and methods for improvement if desired</li> </ul>

### **3.3.2.7 INFORMAL OBSERVATIONS**

Informal observations were done in the schools and communities throughout the study period.

### **3.3.2.8 STRUCTURED INDIVIDUAL INTERVIEWS AND SEMI-STRUCTURED GROUP DISCUSSIONS, MAPPING AND RANKING WITH PARENTS**

In each school, about 50 parents (or other family members or caretakers in the case of orphans) were actively involved in the research. They were the parents or caretakers of the children we had selected. Again, individual interviews were done before the group discussions to avoid that the outcomes of the group discussions would influence the individual interviews. Primary school children acted as co-researchers for the structured individual interviews, interviewing their parents. This process is described in more detail in section 3.3.4. The group discussions with parents, including mapping and ranking exercises, took about 2 to 2.5 hours each.

The interview sheet for structured individual interviews with parents was designed to contribute to finding answers to the research questions described in Section 2.3 and more specifically to get a better view on the following issues:

- General background, occupation, type of household, family situation and distance from home to the school
- Knowledge and skills learnt in school related to agriculture, natural resource management and the environment
- Homework related to agriculture, natural resource management and the environment
- Practice at home of knowledge and skills learnt in school related to agriculture, natural resource management and the environment
- Perceptions on food security (months of the year which are food (in)secure, preferences of the types of food eaten, reasons for food insecurity)

Semi-structured group discussions, mapping and ranking with parents was done in each school in 1 group.

A mapping exercise of the school and its surrounding community at the beginning of the discussion allowed getting a better visualisation of possible school-community linkages.

The discussion guideline for the semi-structured group discussions with parents was designed to contribute to finding answers to the research questions described in Section 2.3 and more specifically to get a better view on the following issues:

- Influences of the school on the community (in general)
- School activities and topics related to food security and sustainable rural development which draw on the local environment as a learning resource, and what students have learnt as a result of these activities
- Perceptions on food security (months which are food (in)secure, reasons for food insecurity, effects of hunger on children's learning)
- Perceptions on how schools can help in creating food security and wealth in rural areas, what the learning needs are for students in rural areas and whether students practice skills learnt in school at home

- Contact and interaction with the parents and the local community – and specifically the interaction of agricultural and natural resource management practices in the community with teaching and learning in the school.

Ranking was done when a list of different responses emerged from the discussion to get a better indication of the relative importance of the different factors or issues. Group discussions with mapping and ranking exercises took about 1.5 to 2.5 hours for each group.

### **3.3.2.9 HOME VISITS TO PARENTS/FARMERS AND DISCUSSIONS**

Based on advice from the headteacher, teachers and other stakeholders in the school some parents and students were chosen for in depth interviews. Selection of these parents was done gradually as the other interviews and discussions evolved.

These parents were visited at their homes. Main purpose was to see natural resource management practices in the community and skills related to natural resource management which students are practicing at home. The headteacher, another teacher and/or students accompanied the research team as guides during these home visits to parents.

### **3.3.3 TESTING OF PARTICIPATORY RESEARCH TOOLS**

A pilot study was conducted at Mumboha Primary School in Vihiga District in Kenya to pre-test the participatory tools and questionnaires developed. The pilot study showed that the questions in the semi-structured questionnaires adequately captured most of the issues explored. However, some questions or terms were not completely clear and needed reformulation, others were irrelevant to various respondents and there was a need to add more questions.

During the testing phase, we also got a better view on the optimal time allocations for the different interviews and discussions. We also noted that the presence of teachers during the students' discussions and interviews should be avoided, because students could tend to shy away from unfavourable or sensitive answers.

### **3.3.4 SCHOOLCHILDREN AS CO-RESEARCHERS: CHILDREN INTERVIEWING THEIR PARENTS**

We employed about 300 schoolchildren as co-researchers for parts of the study, mainly the parents' interviews. This approach was found to be effective and enriching for both the children themselves and the rest of the research team.

Few adults are likely to be willing to fill out a questionnaire that is left with them. Children can instead use questionnaire forms to interview parents. However, children are commonly intimidated by the idea of interviewing adults. It is true that adults, particularly in certain cultures, often find the idea of a child interviewing them strange. If a child is well prepared however, a successful interview can dramatically change the opinion of an adult about children's capacities. Also, children quickly discover that they can become the collectors and providers of information.

We designed the interview forms to be clear and to have a minimum number of questions, yet still reveal the information required. We also adapted the language to the children's and parent's capacity levels, which meant that in most cases the local language was used.

To build the young researchers' confidence and skill in carrying out the field research – and to help them to become familiar with the research tools – they often need plenty of support and practice (Kirby, 1999). Training children to undertake parents' interviews was a vital component of the research process and took considerable time. Children also first practiced the interviews with each other using role play (Picture 2), which was then discussed in the group to explore how the questioning could be improved.



**Picture 2: Children practicing interviewing techniques using role play  
(Nyandoro Primary School, Zimbabwe)**

### **3.4 DATA ANALYSIS**

Data analysis comprised mainly a qualitative assessment to identify mechanisms that better enable integrating relevant basic education, food security and sustainable rural development programmes. As mentioned earlier, the case studies are not meant to be representative or comparative of the particular country's situation. They are only intended to be illuminative, illustrating what actually happens in the classroom of a selected rural primary school and how it links or not to the local community and their needs. The small number of case studies that are not intended to produce data to be generalised. The research was also not be action-oriented, but rather evaluative.

Data analysis took place at a combination of levels: individual, household, and school and community levels. Assessment at the individual level permitted an exploration of

how different people experience the effects of relevant basic education. Household level analysis allowed appreciation of links between individuals, households and schools and communities. School and community level analysis enhanced understanding of differences within the community and potential community level transformation generated by relevant basic education as well as some understanding of potential sustainability of impacts and broader change and influence.

Qualitative analyses were combined with some quantitative analyses. In the quantitative analyses, we used tests of statistical significance to determine the degree of confidence in accepting or rejecting a hypothesis. We used chi square as a non-parametric test of statistical significance for bivariate tabular analysis (also known as crossbreaks). Hypotheses tested with chi square were hypotheses whether or not two different samples are different enough in some characteristic or aspect of their behaviour that we can generalize from our samples that the populations from which our samples are drawn are also different in the behaviour or characteristic.

### **3.5 POLICY RECOMMENDATIONS**

A utilisation workshop was organized for policy makers and other stakeholders where the outcomes of the study and possible policy guidelines were discussed. This yielded policy suggestions for future policy reduction interventions, based on the findings of the study. We used a series of guidelines described by Start and Hovland (2004) to come up with a Policy Brief.

Policy recommendations were designed to be useful in the development and implementation of Regional Strategy Papers (RSPs), Country Strategy Papers (CSPs), country programming guidelines, thematic and sector guidelines and programme proposals for Community cooperation. The policy guidelines also are intended to be helpful in the design of multidimensional and integrated approaches to poverty reduction, particularly in the areas of relevant basic education, food security and sustainable rural development, thus having the potential to improve the poverty focus of European development cooperation. The guidelines are also expected to support developing countries' own efforts to tackle poverty through their national development strategies, basic education policies, food security and rural development programmes and Poverty Reduction Strategy Papers (PRSPs).

## **4 CURRENT EC/EU DEVELOPMENT POLICY RELATED TO RELEVANT BASIC EDUCATION, FOOD SECURITY AND SUSTAINABLE RURAL DEVELOPMENT**

### **4.1 FRAMEWORK FOR EC/EU DEVELOPMENT POLICY**

#### **4.1.1 INTRODUCTION**

The framework for the current European Community's development policy is provided by the Treaty, and by the Joint Declaration adopted by the Council and the Commission in November 2000<sup>2</sup>. They determine the main thrust of policy and lay down the basic principles underlying the Community's approach to development cooperation.

#### **4.1.2 OBJECTIVES OF EC/EU DEVELOPMENT POLICY**

The European Community's development assistance is one of three elements within the broader framework of external relations, together with trade and political dialogue. The Treaty of European Union (TEU) states the importance of assuring "*consistency of its external policies and instruments in the context of its external relations, security, development, economic and trade policies*" (Article 3).

The Treaty of the European Community (TEC) declares in its article 177 that Community development assistance policy shall foster the campaign against poverty, sustainable economic and social development, and the smooth and gradual integration of the developing countries into the world economy.

The draft EU Constitution<sup>3</sup> confirms that development co-operation is an EU policy in its own right for which the Community has shared competence. It also reaffirms poverty eradication as one of the key objectives of external action that applies to all external policies and all regions.

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<sup>2</sup> It should be noted however that a review of this Declaration is currently under debate. There are three main reasons for this: 1) an accelerated globalization process, 2) new political priorities in an enlarged EU, and 3) the emergence of a more robust international consensus. The new Declaration which could result from the current debate would provide a framework for a longer-term reflection and positioning of the Union on a series of issues in the international debate, as well as a framework to guide the implementation of EU aid for development. On 13 July 2005, the Commission adopted a Communication to the Council, the European Parliament, the European Economic and Social Committee of the Regions: Proposal for a Joint Declaration by the Council, the European Parliament and the Commission on the European Union Development Policy "The European Consensus". The policy proposal aims at reducing poverty in line with the Millennium Development Goals (MDGs). The "European Consensus" would provide, for the first time in 50 years of development co-operation, a common framework of objectives, values and principles that the Union – all 25 Member States and the Commission – supports and promotes as a global player and as a global partner. The Commission's proposal for a new EU Development Policy puts poverty eradication at its core. The proposal will now be discussed with the Council and the European Parliament in view of issuing a Joint Statement by the end of 2005.

<sup>3</sup> The Treaty establishing a Constitution for Europe has been signed in Rome on 29 October 2004 and shall enter into force on 1 November 2006 if all Member States have ratified it.

The draft Constitutional Treaty presents this external action as aiming to “*foster sustainable economic, social and environmental development of developing countries, with the primary aim of eradicating poverty*” while safeguarding the EU’s values, fundamental interests, security, independence and integrity, preserving peace, preventing conflicts and strengthening international security.

Reducing and eventually **eradicating poverty** is identified as the main objective of development cooperation in both the EC Treaty and the draft Constitutional Treaty as well as, in even more precise terms, in the current Commission’s proposal for a new EU Development Policy.

The Joint Declaration by the Council and the Commission of November 2000 provides the Community with an overall framework to guide its co-operation and partnerships with all developing countries with which it has links. The Declaration emphasises that the main objective of the Community’s development cooperation policy is to reduce and eventually eradicate poverty, through support for economically, socially and environmentally sustainable development, promotion of the gradual integration of the developing countries into the world economy, and a determination to combat inequality. It also highlights the core principles on which the Community’s assistance is grounded: sustainable, equitable and participatory human and social development, with the promotion of human rights, democracy, the rule of law and good governance as an integral part of this process.

To follow up on these policy declarations, the European Commission has committed itself to focus its development assistance on helping developing countries achieve the Millennium Development Goals (MDGs), thereby giving the MDGs a prominent role in Community development assistance (European Commission, 2004).

#### **4.1.3 PRIORITY SECTORS AND CROSS-CUTTING THEMES**

In order to maximise its impact within the global development framework, the Community decided to focus its assistance in six areas where it could add particular value:

1. The link between trade and development
2. Support for regional integration and cooperation
3. Support for macroeconomic policies and the promotion of equitable access to social services
4. Transport
5. Food security and sustainable rural development
6. Institutional capacity building including good governance and the rule of law.

In addition, there are cross-cutting themes that have to be integrated (mainstreamed) into all activities. These are:

- Human rights
- Gender equality
- Children’s rights
- The environment.

This concentration of development aid on a limited number of predefined areas is essentially justified on grounds of effectiveness: specialisation makes for more effective intervention.

Concentration has made it possible to develop a coherent set of sectoral policies and has allowed the Commission to increase its capacity and expertise in some sectors. With regard to country programmes, it has enabled the EU to develop coherent programmes where previously there was just a disparate collection of unrelated measures.

However, concentration, driving factor for effectiveness, should be accompanied by a proper division of labour between the Commission and the Member States in order to better meet partner countries' needs. This has not materialised until now. In addition, concentration has been made more difficult to put into practice by the multiplication of new initiatives, e.g. water and energy following the Johannesburg summit or integration of new EU priorities like immigration. Mainstreaming has remained merely a good intention within programming documents. Lastly, in some cases, the selection of focal sectors a priori has forced some countries to choose their priorities from a set menu and aid instruments have not been flexible enough to accommodate adjustment of priorities as and when the need arises. While the principle of concentration of Community aid at the programming stage of country-based assistance is a valid one, experience shows that it is hardly possible to meet partner countries' requirements with a set formula such as six priority areas (European Commission, 2005). As a result, it may be more appropriate to define focal areas at the country level than at the EU wide level (Mackie et al., 2005). These issues are now being addressed in the Commission's proposal for a new EU Development Policy.

## **4.2 EC/EU DEVELOPMENT POLICY AND APPROACH TO RELEVANT BASIC EDUCATION**

The Declaration adopted by the Council and the Commission in November 2000 mentions "support for macro-economic policies and promotion of equitable access to social services" as one of the six priority areas for EC's development policy. Education is part of this priority area:

*"In line with the macro-economic framework, the Community must also continue its support in the social sectors (health and education), particularly with a view to ensuring equitable access to social services. Such support will take the form of sectoral programmes and will be based on a dialogue with all the partners."*

The fundamental role of education to reduce poverty is recognised at international level by the Millennium Development Goals (MDGs) adopted by the United Nations' Millennium Summit in September 2000. The MDGs set two ambitious targets in the field of education: first, to give all boys and girls a full primary education by 2015; and second, to eliminate gender disparity in primary and secondary education preferably by 2005, and for all levels of education by 2015 at the latest. These two targets are part of the drive to achieve 'Education for All', a wider objective set by the international community in Dakar in April 2000.



The European Community (EC) subscribes fully to the international community's focus on basic education and gender equality. This is reflected in the two documents adopted in 2002 that define the EC policy in the field of education and training in developing countries: a Commission Communication of March 2002 presenting its policy regarding "Education and training in the context of the fight against poverty in developing countries" and a Council Resolution on "Education and poverty". Together, these two documents form the new framework of the EC's development cooperation in the field of education. They identify key goals and essential principles. The EC approach was further strengthened by the adoption of a European Parliament Resolution in May 2003.

The Communication identifies three priorities for Community support:

1. basic education, in particular primary education and teacher training
2. work-related training
3. higher education, especially at regional level.

The strategy involves **support for basic education** as first priority (at both qualitative and quantitative level) and ensuring that girls as well as boys have attained an acceptable level of schooling.

As regards the development of basic education, nine main actions are set out:

- (i) Increasing substantially the total resources channelled into education, in particular primary education
- (ii) Improving the efficiency of education systems by drawing up strategies that take account of the specific situation of each country
- (iii) Improving school access opportunities and moving towards free and compulsory access to primary education
- (iv) Gearing budgets towards the most urgent needs for poor and vulnerable population groups which have only limited access to schools. These groups include women, people living in rural areas, indigenous peoples, children and disabled adults, etc
- (v) Reducing existing gender-based inequalities in relation to access to education by promoting the participation of women
- (vi) Placing emphasis as much on the quality as the quantity of education. In this context, teacher training and the availability of teaching materials are priorities
- (vii) Paying greater attention to the impact of AIDS on education systems and improving the prevention of the disease through education
- (viii) Protecting and restoring education in conflict and post-conflict periods
- (ix) Increasing knowledge of education programmes relevant to development.

The strategy explicitly mentions **education in rural areas** as a main concern:

*"Education budgets should be geared towards the most urgent needs, i.e. towards poor and vulnerable population groups which have only limited access to schools. Priority should be given chiefly to **rural areas** rather than urban areas where school attendance is easier and where gross attendance*

rates are much higher, even though severe problems of poverty in towns and cities may prevent children from attending school, girls and women, children and adults with special educational needs (disabled, orphans) and indigenous peoples whose specific needs need to be taken into account through intercultural dialogue.

From this point of view, the **urban/rural balance** needs to be seriously considered. This means that it must be possible to encourage children brought up in rural areas to pursue their education and training in situ; vocational and secondary education schools should be located at district level. When decentralisation processes are taking place the Community and the Member States should therefore promote financial support at district level in recipient countries within sectoral programmes.

Recognition of these urgent needs should be reflected by the construction of more schools closer to areas in which disadvantaged population groups live, and by the **training of more teachers in these areas.**"

The strategy also mentions that stress must be placed as much on the **quality** as the quantity of education:

"If **quality is to be improved** it has to be part and parcel of the content of sectoral programmes which **must reflect local situations**; the only way of ensuring success here is to involve the authorities of countries and the civil society actors working in the educational field. This highlights the fact that countries must attach as much priority to the **abilities acquired by pupils** as to the extension of school coverage.

The issue of quality overlaps the issue of stimulating demand for education. Such stimulation programmes highlighting the value of education include: care for infants, activities to upgrade girls' education, the availability of secondary education facilities, adult literacy programmes, **partnerships between schools, parents and communities**, and measures to promote children's health at school (nutrition, school canteens).

More specifically, measures that can help to improve quality include **local community participation in the management of educational issues** and an increase in the number and an improvement of the status and training of school teachers and principals which is an absolute priority in this context. **Curricula must be practical and adaptable.** There must be opportunities to monitor and evaluate educational performance so that progress can be measured other than in quantitative terms. The availability and adequate use of appropriate teaching materials (textbooks) is also important.

The language of learning (in particular the mother tongue and the common language) plays a key role in access to education and its quality.

Many countries of sub-Saharan Africa and southern Asia have a poor educational environment. The development, maintenance and appropriate location of school infrastructure plays a vital role in high-quality results. In this respect, the importance of locating schools as close as possible to pupils needs to be stressed.

The Commission also stresses the importance of including in curricula (wherever possible) essential elements relating to the protection of human

*rights and democracy in the context of education for peace and respect for cultural diversity.”*

### 4.3 **EC/EU DEVELOPMENT POLICY AND APPROACH TO FOOD SECURITY AND SUSTAINABLE RURAL DEVELOPMENT**

The Declaration adopted by the Council and the Commission in November 2000 mentions “food security and sustainable rural development” as one of the six priority areas for EC’s development policy:

*“Sustainable rural development and food security are an important component of the anti-poverty strategies of the Community, which subscribes to the undertakings entered into at the World Food Summit and remains a major partner under the London Food Aid Convention. Community action must develop in the light of the ongoing discussions on the relationship between food security as an objective which contributes to reducing poverty and food aid as an instrument of humanitarian aid. A closer link will also need to be sought between food security policy and humanitarian aid in the context of the link between emergency and development. As regards rural development, efficiency and sustainability can be assured only through long-term strategies prepared and implemented on a participatory basis which make it possible to reflect the priorities of the rural world in general and sectoral policies. The Community has acquired considerable experience in those areas.”*

**Rural development** has been identified as one of the six priority areas for the European Community's development policy, for three main reasons:

- At present, three quarters of the people living in extreme poverty live in rural areas
- Hunger and poverty are predominantly rural problems
- Rural development plays an important role in economic growth and the sustainable management of the environment.

The EC’s policy and approach to **rural development and sustainable natural resources management in developing countries**, as described in the Communication from the Commission of July 2002 on “Fighting Rural Poverty”, integrates the objectives of poverty reduction, food security and sustainable natural resources management in a coherent framework.

In addition to the global objective of reducing poverty, the specific objectives of the Community's policy to **fight rural poverty** are to (European Commission, 2002):

- (i) Promote broad-based rural economic growth
- (ii) Ensure more equitable access to productive assets, markets and services (such as land, rural finance and rural infrastructure)
- (iii) Support human and social development by investing in human capital, especially in social fields such as education and health
- (iv) Ensure sustainable natural resources management
- (v) Reduce vulnerability to risks

- (vi) Address social and political exclusion by building more effective, accountable, decentralised and participatory institutions.

As far as our current study is concerned, we are mainly interested in the third objective *“support human and social development by investing in human capital, especially in social fields such as education and health”*:

*“In the education sector, EC support will focus on strengthening the management and delivery of education services, mobilising resources and improving school buildings in remote rural areas, staff training, curriculum development, and measures to encourage girls, ethnic minorities and other disadvantaged groups to enrol and stay in school.”*

According to EC's Guidelines for Rural Profiles and Strategic Frameworks (European Commission, 2000c), low educational levels and inequitable access to education:

- Reduces livelihood options and opportunities open to poor people, especially women and members of other disadvantaged groups.
- Keeps labour productivity low, limits spread of new ideas in agriculture, and reduces likelihood of attracting direct foreign investment.
- Limits spread of information.
- Limits ability to make informed political choices; reduces people's awareness of their legal and constitutional rights.
- Reduces sustainability of institutions by excluding broad-based participation.

EC's Agricultural Sub-Sector Strategy Paper (European Commission, 2000b) also refers several times to the strong implications of **basic education for human capacity in agricultural development** in the following potential areas of strategic engagement by the EC:

- Support for basic formal education
- Support to governments to allow improved mainstreaming of gender in education
- Support for (especially) primary formal education in the less advantaged rural areas.

## 5 LITERATURE REVIEW

### 5.1 EDUCATION AND RURAL DEVELOPMENT

#### 5.1.1 ECONOMIC RETURNS TO SCHOOLING

While a variety of models and ideas have been developed to explain differences in economic growth rates across countries, they invariably include the importance of **human capital**, which is enhanced by a strong education system (Hanushek, 2005).

Private **economic returns** to schooling are substantial. The contemporary economic approach to education started developing from the late 1950's onwards with Jacob Mincer's application of human capital theory to the measurement of the economic return to education as the impact that the number of years of schooling an individual received has on her earnings. The returns to education literature has kept on innovating conceptually and methodologically, and it is now established that human capital acquired through schooling has a causal impact on earnings that can be measured econometrically (Card, 1999; Leclercq, 2005).

The importance of basic education to improving individual lives has been argued from various perspectives. From a narrow perspective of agricultural improvements, basic education improves farmer productivity. From a somewhat broader perspective of food security and rural development, it facilitates off-farm employment and the economic development of rural areas. Often the returns are highest for primary education, more moderate for secondary education (some studies suggest however that the returns on secondary education are comparable to those for primary education), and lower (but still considerable) for higher education.

Because of its early emphasis on the productivity impact of the human capital acquired through schooling, economics has focused on the number of years of schooling and other measures of attainment (the 'quantity of education') and on the achievement of so-called 'cognitive skills', be they basic literacy and numeracy or a more advanced mastery of language, mathematics and science, which are relatively easy to quantify as test scores. Other social sciences, however, have emphasized different dimensions of schooling, e.g. its impact on the psyche and the socialization of the students (Leclercq, 2005).

Education affects **development** through its enduring impact on various dimensions of cognitive competence: literacy (reading and writing), numeracy and problem solving (Scribner and Cole, 1999). These cognitive skills affect an individual's productive behaviour and ability to use the products of technological change correctly.

Education has the possibility of making both the individual receiving it and other better off. Specifically, a more educated society may lead to higher rates of innovation and invention, make everybody more productive by helping firms introduce new and better production methods, and lead to more rapid introduction of new technologies (Hanushek, 2005).

Education is a cornerstone of sustainable rural development; primary education is its foundation. It improves the productive capacity of rural societies and their institutions.

There are various explanations of why schooling contributes to economic productivity and development (Carnoy, 1995). These include the following:

- Individuals acquire skills in school that enable them to be more productive.
- What individuals learn in school makes them more likely to adopt new technologies and practices.
- Schooling helps individuals function more effectively in modern production organizations.
- Schools socialize people into functioning effectively in modern society.
- The discipline of learning taught in school helps individuals learn new skills outside of school.

Past research into economic growth differences across countries has emphasized school attainment differences and has found them to be highly related to economic growth. But the quantity of schooling is a very crude measure of people's knowledge and cognitive skills. Moreover, the role school attainment plays in economic growth has become controversial. A large part of the controversy – and the resulting policy mistakes – revolves around a fixation on school attainment without explicit consideration of the **quality of schooling** (Hanushek, 2005).

### 5.1.2 **BASIC EDUCATION AND AGRICULTURAL PRODUCTIVITY**

Of particular importance for rural development is the **productivity of farmers**, since the vast majority of the rural poor depend on agriculture and natural resources for their livelihoods. The direct effect of basic education on agricultural productivity is well documented. Workers and farmers with more education are generally more productive than those with less education. Four years seems to be the threshold beyond which education pays off, at least in rural areas of developing nations, particularly in Asia. Kurosaki and Khan (2004) showed that the effects of primary education on crop productivity are positive but the additional gain from higher education is small.

Lockheed, Jamison and Lau (1980) summarized the findings of eighteen studies containing thirty-one data sets from thirteen developing countries. They concluded that four years of primary education increased the productivity of farmers 8.7 percent overall and 10 percent in countries undergoing modernization (largely in Asia). Education increased the ability of farmers to allocate resources efficiently and enabled them to improve their choice of inputs and to estimate more accurately the effect of those inputs on their overall productivity. Phillips (1994) reviewed an additional 12 studies using 22 data sets (with more recent data and greater representation of Latin America), and confirmed these general trends. The average increase in output owing to an additional four years of schooling in the studies he considers is 10.5 percent.

Appleton and Balihuta (1996) point out that these surveys included only two African studies (both on Kenya) and that education was not found to be significant in either. They review several additional African studies and find that the effect of schooling on agricultural output is usually not significant, though in some cases it can be large, indicating that there is substantial variation in returns to schooling both within and between the areas surveyed. The authors suggest several possible reasons for the lack of significance of education in the African studies, including small sample sizes (for a few of the studies), errors in measurement of farm production, and wide

variation in the actual effects of education on agricultural output in different areas and under different farming systems. These reviews illustrate the need for further investigation of the effects of education on farm productivity in Africa.

**Numeracy and literacy** are developed through basic education and are both very valuable skills for rural farmers. Farmers who can read, write, and understand numbers can allocate inputs efficiently and thus increase productivity (Jamison and Moock, 1984). Numeracy helps farmers estimate the profitability of past activities and the risk of future ones. Reading and writing help farmers keep records and properly apply agricultural technologies. Cotlear (1986) stresses the relationship between education and technological innovation by emphasizing the importance of non-cognitive aspects of education - such as receptivity to new ideas - which put the educated farmer more easily in contact with new technologies. A modern or technically changing agricultural environment is correlated with higher returns to education (Phillips, 1994).

Education also affects production by developing **analytic modes of problem solving**. Cotlear (1986) notes that education increases the ability of farmers to think abstractly, which enables them to recognize the causal relation between technology and output. An example of this comes from Eisemon's (1989) survey of farmers in Kenya, which examined the effect of primary education on the cognitive skills of farmers. Farmers who had been to school were able to construct causal models of events in the natural world and to demonstrate how these events could be controlled by humans. They were able to observe, diagnose, and correct common agricultural problems better than farmers with fewer years of education. They actively sought to solve problems, while unschooled farmers did not. Farmers' understanding of how technology could improve productivity was enhanced by a primary curriculum that taught science in conjunction with farming practice and that emphasized scientific theory over memorization.

Gurgand (2003) showed that education provides a higher relative advantage – and therefore has a higher economic value – when the environment is more unstable and more difficult to deal with. This gives empirical support to the notion that education improves the capacity to **adapt to change and disequilibria**, on top of its static technical effects.

### 5.1.3 **FACILITATING OFF-FARM EMPLOYMENT**

Successful rural development goes beyond increased productivity in agriculture and the provision of quality primary education has efficiency enhancing effects on various rural activities. Expansion of **off-farm job opportunities**, particularly via small- and medium-sized enterprises, is a necessary condition for reducing the size of the agricultural population and labour force (Tollens, 2002; Tollens, 2003). Changes in the occupational composition of the labour force, formal and informal, prevent overcrowding on the land and make possible higher levels of productivity and per capita income (Johnston and Clark, 1982). Youth and adults who seek a transition from farming to off-farm employment often require basic skills in literacy and numeracy, if not the experience of formal learning and discipline that comes from attending school. They need to be able to make business transactions, to weigh and measure, and to read documents.

Increasing the educational attainment of farm households is impacting on off-farm activities, including the reallocation of time away from farm work. Off-farm work has a higher return to education than does farm work (Jolliffe, 2004). Households with better-educated members will therefore act more quickly in devoting more capital and labour to non-agricultural activities (Fafchamps and Quisumbing, 1998; Yang and An, 2002; Yang, 2004). As a result of these allocative effects, education contributes significantly to sustained rural income growth.

Cash income from off-farm employment also positively influences farm productivity. This means that education serves to facilitate not only diversification into remunerative off-farm employment, which could be misinterpreted as prompting exit from farming, but also reinvestment in agricultural intensification through the use of improved inputs to raise productivity. Those who cannot self-finance through such means as salaried off-farm employment cannot put their agricultural land and labour resources to their full productive use, thereby trapping them in poverty (Marenja et al., 2003).

#### **5.1.4 EDUCATION, AGRICULTURE AND HIV/AIDS**

No other infectious disease of the modern era has had such a devastating impact on the world's youngest and most vulnerable citizens as HIV/AIDS. In addition to its obvious health, economic, and social impacts, the disease has serious impacts on food security and nutrition. Since AIDS strikes the most productive age group, when family members fall ill or die from the virus, households are less able to produce or buy food, assets are depleted for medical or funeral costs, and children are frequently left without adults to care for them. Those who are infected often die before they can pass on crucial farming knowledge and expertise to the next generation, a situation that has lasting effects on agricultural production.

HIV/AIDS also directly affects the education system. It affects the demand for education: there are fewer children to educate, fewer wanting to be educated or fewer who can afford to be educated. It also affects the supply of education and the quality of the educational process. It affects the management – with the risk that the whole system may become disorganized, paralyzed by fear and the lack of guidance on what is to be done. Responding to the challenge of designing and managing education in a world with AIDS requires mobilization of all sectors of society, flexibility, openness to change, willingness to loosen bureaucratic procedures and constraints, and sensitivity to the needs of those infected and affected by HIV/AIDS.

One of the most telling and troubling consequences of the epidemic's growing reach is the number of children it has orphaned or seriously impacted. Most often, food consumption of children declines when an adult dies. In many areas, there is a loss of agricultural and off farm skills. In most rural areas, the usual way for children to learn needed farm and off farm skills is by working with their parents. Given the AIDS pandemic, this is often no longer possible. Education, training and the provision of survival skills are essential for orphans in order to protect them from hunger, exploitation and abuse.



## 5.2 QUALITY AND RELEVANCE OF BASIC EDUCATION IN RURAL AREAS

### 5.2.1 WHY FOCUS ON QUALITY?

It seems highly likely that the achievement of universal participation in education will be fundamentally dependent upon the quality of education available. For example, how well pupils are taught and how much they learn, can have a crucial impact on how long they stay in school and how regularly they attend.

Furthermore, whether parents send their children to school at all is likely to depend on judgements they make about the quality and relevance of teaching and learning provided – upon whether attending school is worth the time and cost for their children and for themselves.

The instrumental roles of schooling – helping individuals achieve their own economic and social and cultural objectives and helping society to be better protected, better served by its leaders and more equitable in important ways – will be strengthened if education is of higher quality. Schooling helps children develop creatively and emotionally and acquire the skills, knowledge, values and attitudes necessary for responsible, active and productive citizenship. How well education achieves these outcomes is important to those who use it (UNESCO, 2004a).

The two most recent United Nations international conference declarations focusing on education gave some importance to its qualitative dimension. The Jomtien Declaration in 1990 and, more particularly, the Dakar Framework for Action in 2000 recognized the quality of education as a prime determinant of whether Education for All is achieved. More specifically than earlier pledges, the second of the six goals set out in the Dakar Framework commits nations to the provision of primary education 'of good quality'. Moreover, the sixth goal includes commitments to improve all aspects of education quality so that everyone can achieve better learning outcomes, 'especially in literacy, numeracy and essential life skills'.

### 5.2.2 CHARACTERISTICS OF QUALITY BASIC EDUCATION

There are two main approaches generally used to define quality in education (UNESCO, 2004b):

1. The first is to use a systems framework and then assess the quality of education in terms of **inputs, process and outputs**. This is essentially an efficiency model that typically rates the results achieved (usually a measure of learning achievement) against the quantum of investments made in the system and the efficacy of the processes through which the results have been obtained. It is also a normative production model in that it assumes matters of goals and interests are largely uncontested and the issue of quality is simply about how much inputs it takes and what processes are essential for achieving the desired output.
2. The second approach generally used to define quality involves a sector framework that treats education as one sector that is closely interlinked with other sectors in the society. This approach is concerned with 3 main strands

that constitute quality of education, in terms of relevance, effectiveness and efficiency:

1. The issue of relevance acknowledges that the goals set and content prescribed for education are contentious and often have to be negotiated. We cannot talk of quality education when the goals and content do not address the needs of the learners or the values and aspirations of the community and the society at large. Characteristics of relevant basic education are described in Section 5.2.3.
2. Effectiveness is about how far the goals and objectives set and are being achieved. Here again there is a broader scope of consideration in that a wide range of goals could be set in terms of information, knowledge, skills, values, attitudes and change in behaviour patterns, etc. A quality education must deliver on what it promises, and this is what is being assessed by looking at effectiveness as a measure of quality.
3. Efficiency concerns what it takes to deliver on the promises of quality education. It is about whether increased results could be achieved with the same resources, or whether the current results could be achieved with fewer resources. In other words efficiency as a measure of quality education relates to the adequacy of resources and the efficacy of methods used.

Secondary school students participating in the UNESCO Associated Schools Project Network (ASPnet)<sup>4</sup> were invited to share their views on quality education for the 21st century. Their opinions are frank and spontaneous, often critical but also constructive. They reflect a consensus among young people concerning their needs and priorities for a better education whether they come from rich or poor countries, from urban or rural schools. Some of their texts and images are represented in Table 2.

### **5.2.3 CHARACTERISTICS OF RELEVANT BASIC EDUCATION**

As discussed earlier, the issue of relevance acknowledges that the goals set and content prescribed for education are contentious and often have to be negotiated. We cannot talk of quality education when the goals and content do not address the needs of the learners or the values and aspirations of the community and the society at large. We have summarized some of the characteristics of relevant basic education in Table 3.

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<sup>4</sup> ASPnet is a UNESCO international network comprising some 7,600 schools in 175 countries engaged in promoting quality education in practice.

**Table 2: Young people speak out on quality education (UNESCO, 2004c)**

<p><i>"Quality education determines the quality of the future of the world's peoples"</i> David, 16, Ecuador</p>
<p><i>"Quality education is a new mentality where the teacher transforms the school into a pleasant atmosphere so students can solve problems they face in life and set priorities"</i> Pedro, 16, Portugal</p>
 <p>Mara, 11, Romania</p>
<p><i>"The government should give teachers better salaries so that they can concentrate on improving education. Poorly paid teachers will lack the morale to perform well"</i> Laurel, 12, Uganda</p>
<p><i>"We dream of friendly and supportive teachers who teach more than they test"</i> Agnes and Maria, 14, Greece</p>
<p><i>"Teachers should encourage logical thinking and not make students remember tons of information which we forget after a couple of days... we don't learn for school or for our teachers, we learn for life"</i> Matija, 17, Slovenia</p>
<p><i>"The problem is that we do not have the opportunity to practice what we learn"</i> Alba, 17, Albania</p>
<p><i>"Quality education should provide relevant basic skills for life and knowledge in health, nutrition, HIV/AIDS prevention and education for peace and tolerance"</i> Students, Hayovel High School, Israel</p>

**Table 3: Some characteristics of relevant basic education**

	<b>Requirements</b>	<b>Possible indicators</b>
<b>Input factors</b>	<b>Relevance of the curriculum and teaching practices</b> Relevant curriculum content <ul style="list-style-type: none"> <li>– Level of stakeholder participation in the curriculum development process</li> <li>– Conformity of curriculum to local conditions</li> </ul> Relevant teaching methods <ul style="list-style-type: none"> <li>– Variety in teaching methods used (e.g. active student involvement, group work, practicals)</li> <li>– Application of learner-centered teaching</li> <li>– Use of mother tongue in early years</li> </ul> Students assessment <ul style="list-style-type: none"> <li>– Frequency of students' assessment</li> <li>– Frequency of feed back on homework and assessment</li> </ul> Contextualisation of teaching and learning <ul style="list-style-type: none"> <li>– Degree of linking theory with practice, related to students' experience</li> </ul>	
	<b>Availability of relevant teaching and learning materials</b> Access to textbooks, reading materials and teacher guides by students and teachers <ul style="list-style-type: none"> <li>– Availability of relevant textbooks and reading materials to students</li> <li>– Availability of teacher guides and background materials to teachers</li> </ul> Availability of other teaching and learning materials <ul style="list-style-type: none"> <li>– Use of locally available resources in teaching and learning</li> <li>– Use of the local environment in teaching and learning (e.g. school garden, trees around the school, agricultural practices)</li> </ul>	
<b>Facilitating conditions</b>	<b>Parent and community participation in schools</b> Operational support for the schools <ul style="list-style-type: none"> <li>– Monetary and/or in-kind contributions</li> <li>– Labor contribution (e.g. construction, site preparation)</li> </ul> Community participation in school governance <ul style="list-style-type: none"> <li>– Activeness of parents, school committees, school boards</li> <li>– Authority, functions and roles of the committees</li> </ul> Communication between school staff and parents <ul style="list-style-type: none"> <li>– Frequency and usefulness of communications between parents and school staff</li> <li>– Frequency of school public events</li> </ul> Involvement of community in the education process <ul style="list-style-type: none"> <li>– Parents assist and monitor students' homework</li> <li>– Community members serve as information resources</li> </ul>	
	<b>Enabling school environment</b> Regular communication between school head, teachers and students <ul style="list-style-type: none"> <li>– Frequency of staff meetings</li> <li>– Headteacher works closely with teachers and shares responsibility</li> <li>– Frequency of student-teacher interactions</li> </ul> Positive attitude of students and teachers <ul style="list-style-type: none"> <li>– Low absenteeism</li> <li>– Degree of students' participation in classroom</li> <li>– School day and classes start and end in time</li> </ul>	
	<b>Capable teaching force</b> Qualified teachers <ul style="list-style-type: none"> <li>– Quality of pre-service teacher education</li> <li>– Frequency and suitability of in-service teacher training</li> <li>– Motivation of teachers</li> <li>– Subject matter knowledge</li> </ul> Teaching staff stability <ul style="list-style-type: none"> <li>– Closeness of teachers to the school</li> <li>– Percentage of teacher turnover</li> <li>– Number of years teachers have taught in the same school</li> </ul>	
<b>Outputs</b>	<b>Skills as learning outcomes</b> Students' performance <ul style="list-style-type: none"> <li>– Examination results</li> <li>– Skills acquired</li> </ul> Economic returns <ul style="list-style-type: none"> <li>– Productivity of students</li> </ul>	

## 5.2.4 CHALLENGES OF QUALITY, RELEVANT EDUCATION IN RURAL AREAS

During the past ten years, nearly every developing country has made a concerted effort to get more children into school. In many countries, enrolment numbers and ratios have increased impressively.

Successful strategies for educating children in rural areas, however, remain somewhat elusive. The curriculum may be overloaded, irrelevant to rural communities and ineffective at teaching such essentials as mathematics and science; or teachers may use little discretion in adapting the curriculum to what students know and what their needs and interests are. This makes learning difficult for rural children, who see little relevance of what is being taught to their own experiences at home and in their communities. Mingat (2003) found that disparities in terms of access, retention, and completion of primary schooling in Africa between urban and rural areas (in favour of urban dwellers) are on average two to three times greater than those existing between boys and girls (in favour of boys).

Great **inequities in the quality of schooling** also still exist **between rural and urban areas** in many countries. Results on a test of children in Bangladesh to measure basic skills, for example, found the proportion of urban children satisfying the criteria to be more than double that of rural children (Greaney et al., 1998). Another study in Peru (Cotlear, 1986) found a particularly marked difference in quality of formal education between urban and rural schools. The effects of urban schooling on productivity were found to be much stronger than those of rural schooling.

The quality and relevance of education in rural areas is often lower than in urban areas due to a combination of factors (Vandenbosch et al., 2002):

- Factors relating to the curriculum:
  - Lack of agreement on education for who and for what
  - Problems of participation of the underprivileged and marginalized
  - Urban bias and irrelevance to local needs
  - Minimum focus on skills for life and sustainable development
- Factors relating to teaching and teacher capacity:
  - Use of traditional pedagogies - such as rigid, chalk-and-talk, teacher-dominated, lecture-driven pedagogy and rote learning
  - Underqualification and demotivation of teachers
  - Lack of support to teachers and schools in rural areas and institutional constraints
  - Need for capacity building of teachers, teacher trainers and education advisors
  - The HIV/AIDS pandemic negatively affects the number of teachers, especially in rural areas with relatively small schools, where the death of a teacher may result in the disruption of schooling, if the teacher can not be replaced rapidly (Haacker, 2002)

These rural-urban inequities have severe consequences for rural development.

Basic education that is seen to be relevant to rural people's learning needs and of good quality would better be able to attract and retain learners (Atchoarena and Gasperini, 2003). The type of schooling offered affects parental willingness to incur the costs of education, because most parents are concerned with the relevance of education and the quality of teaching. Parents are more willing to educate their children if they find the curriculum relevant and the quality of schooling adequate (Spohr, 2002).

### 5.3 SKILLS FORMATION FOR FOOD SECURITY AND SUSTAINABLE RURAL DEVELOPMENT

As shown above, increased investments in education are essential to hasten improvements in food security. In agricultural areas, education works directly to enhance the ability of farmers to adopt more advanced technologies and crop-management techniques, thereby achieving higher rates of return on land (Rosegrant and Cline, 2003). More broadly, education encourages movement into more remunerative off-farm employment, helping to increase household incomes. Success in reducing poverty is usually enhanced by increasing the proportion of educational resources going to primary education and to the poorest groups or regions (World Bank, 1990; Singh and Hazell, 1993; Gaiha, 1994; Lipton et al., 1998).

But what type of skills formation would be needed in education in order to have the greatest impact on food security and sustainable rural development?

By skills formation we mean the development of **social capacity** for learning, innovation and productivity (Brown, 1999). Thus, rather than seeing skill acquisition simply as a technical issue, this approach aims to take account of the economic, political and cultural contexts within which skills are defined and learned. Skills themselves are understood to be more than just narrow technical competencies but also include interpersonal, communications, teamwork and creative skills. Both the learning of skills and their practice are acknowledged to be inherently social rather than individual in nature (Tikly et al., 2003). Even the practice of subsistence agriculture is more than just the application of technical skills.

The importance of basic skills, notably numeracy and literacy, is recognized in most countries as a foundation for further development and basic education is given a high priority. Low literacy levels are sometimes recognized as a problem in developing agricultural and other basic vocational skills (Tikly et al., 2003). But the role of basic education goes beyond that of laying a foundation for an individual's occupational skill development. There is considerable reference in the literature to the notion of 'externalities', that is, 'the value of a well-educated workforce in general which helps the ability of a nation to adjust quickly to changes in technology and markets' (Kuruvilla and Chua, 2000).

We have listed some of the skills needed for agricultural production, food security<sup>5</sup> and sustainable rural development in Table 4. Not all of these skills will be addressed directly through primary education. The role of primary education is to lay a foundation which will allow for these skills to be developed through non-formal, informal and further education. Indeed, qualitative skills reflect more than just formal schooling, including family input, cultural norms, health and other factors (Hanushek, 2005). Most of the skills are interlinked and are used simultaneously in practice.

**Table 4: Skills for agriculture, food security and sustainable rural development**

<p><b>Basic skills needed for agricultural production</b></p> <ul style="list-style-type: none"> <li>– Literacy (reading and writing)</li> <li>– Numeracy</li> <li>– Basic decision making and problem-solving skills</li> <li>– Technical and vocational skills in agriculture; land and water management</li> </ul>
<p><b>Additional skills needed for food security and sustainable rural development</b></p> <ul style="list-style-type: none"> <li>– Planning skills</li> <li>– Management skills</li> <li>– Social, interpersonal and communication skills</li> <li>– Negotiation skills</li> <li>– Facilitation skills</li> <li>– Critical thinking (necessary for fostering innovation and change)</li> <li>– Food preservation and processing skills</li> <li>– Marketing skills</li> <li>– Leadership skills</li> <li>– Business skills</li> <li>– Income-generating skills</li> <li>– Entrepreneurial skills</li> <li>– Awareness about social, political and legal institutions (necessary for the development of skills for effective participation in civil society)</li> </ul>

## 5.4 CONTEXTUALIZING TEACHING AND LEARNING USING AGRICULTURAL EXPERIENCE

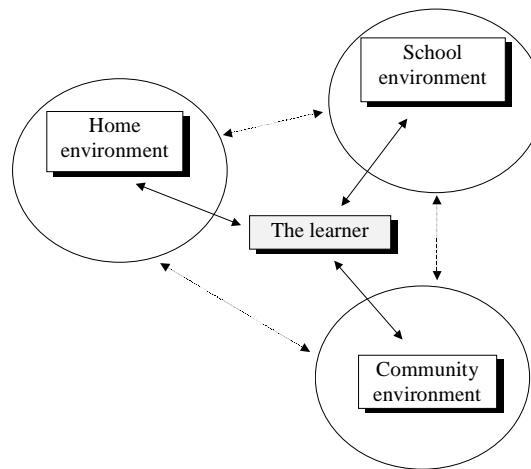
In many countries around the world, irrelevance of school curricula to the life experience of pupils in rural areas seems to be an enduring problem. Many attempts have been made to adjust the content of the curriculum so that it becomes relevant to local conditions. In practice, this has often meant the introduction of some “localized” topics and activities, for example, agriculture and other skill-based subject areas.

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<sup>5</sup> While the definition of **food security** has evolved over time (see Heidhues et al. (2004) for a more detailed discussion), a food-secure household is generally described today as one that can reliably obtain food of adequate quality and quantity to support a healthy and active life for all members of the household. Food security is influenced by many factors, including poverty, consistent access to food, nutrition, food production, the availability of resources, and coping strategies. Food availability is crucial to food security, but it is not the only factor necessary for a household to be food secure. Even when production levels are sufficient to meet demand in a given region, households remain food insecure if they do not have the income or resources to purchase or produce the food they require. Consistent access to food is also important; smallholder farmers can often produce enough food for their households following the harvest, but they may struggle with food shortages at other times of the year (Benson, 2004).

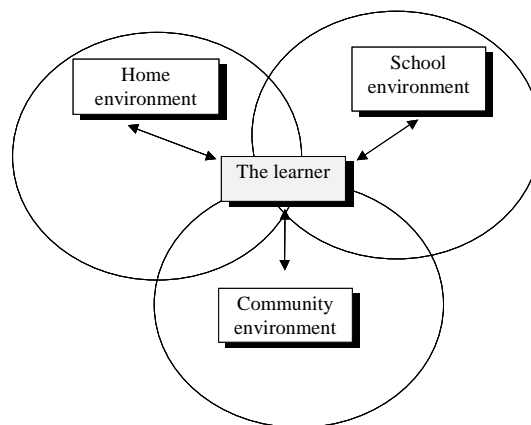
Relatively little emphasis has been placed, however, on the development of appropriate strategies for curriculum development and teaching and learning that are based on the immediate context in which the school is located.

The learning environment of an individual is a complex, multi-faceted system which could be analyzed in many different ways. A study by Taylor and Mulhall (2001) aimed to explore three key learning environments for school-going children: the school, the home and the wider community. These three learning environments are often rather weakly linked and the experiences gained in each, although individually of great value, are seldom drawn together and integrated in the learning process. This “distant” relationship between learning environments is illustrated in Figure 2.



**Figure 2: Linkages between school, home and community environments (Taylor and Mulhall, 2001)**

The existence of weak linkages between the three learning environments infers that the experiences gained by pupils in school are often perceived to be divorced from life outside school, not only by pupils but also by parents and teachers. By strengthening these linkages and maximizing the interfaces between learning environments, then learning should become more effective (Figure 3).



**Figure 3: Linking the learning environments (Taylor and Mulhall, 2001)**



Contextualization of learning occurs when the content of the curriculum, and the methods and materials associated with it, are related directly to the experience and environment of the learner. In rural primary schools, most learners have direct, first hand experience of agriculture, either as a result of their own activities, contributing to the family livelihood, or from observation in their immediate surroundings (Taylor and Mulhall, 1997). An agricultural topic used as a medium for contextualizing part of the curriculum can provide an avenue through which children can have repeated experiences which help them to master cognitive, physical and social skills. Agriculture can be the basis of integrated projects incorporated in the school curriculum, with academic activities chosen for their locally relevant, experimental attributes.

Contextual learning can serve as a method of combining natural sciences, mathematics, and technology with social and behavioural sciences into a coherent whole (Balschweid and Thompson, 2000). It is difficult to discuss living organisms, plants, and animals, devoid of any conversation involving science.

Contextualization draws on a constructivist perspective, in which a learner constructs his or her own knowledge as a result of experience which stems from living and interacting with animate and inanimate objects in the environment (Duit, 1991). The challenge for basic education is to find ways of relating those areas of teaching required and laid down in centrally-planned curricula to the pupil's own personal experience of life, and thus to integrate the entire learning experience by linking learning environments (Taylor and Mulhall, 2001).

New approaches to contextualisation of content and pedagogy offer encouraging options to improve the relevance of basic education. The local environment, school gardens and agricultural practices such as agroforestry can be used as media for contextualising teaching and learning in rural areas and have potential to enable children to cope more effectively with general subject matter in school (see Box 1, Box 2 and Box 3 for examples). At the same time, contextualised teaching and learning can contribute to the skills formation process.

**Box 1: The Lake Victoria Schools Agroforestry & Environmental Education Network**

The “Lake Victoria Schools Agroforestry & Environmental Education Network” is an informal network of primary and secondary schools around Lake Victoria in western Kenya which was formed in 2001.

The network uses natural resources as a way of making teaching and learning more relevant to life in rural areas. Each school organizes events and activities in response to issues of importance to their students, institutions and communities.

Activities of the network include in-service teacher training courses, awareness creation with headteachers and district education officers, establishment of micro-projects in schools, organization of education days, field visits, exchange visits and seminars for students and teachers, competitions in schools in form of demonstration, recitals and mural paintings.



**Picture 3: Students practicing tree seedling grafting techniques (Bunyore Girls' High School, Kenya)**



**Picture 4: Learning about beekeeping and honey production (Emwatsi Primary School, Kenya)**

## **Box 2: The Landcare in Schools approach in the Philippines**

The Landcare in Schools programme in the Philippines is one example of using agricultural experience in a way that is innovative, learner-oriented, and strongly linked to the realities of pupils, parents and communities (Vandenbosch, 2002).

Landcare in Schools is promoting soil and water conservation and agroforestry technologies targeting children and youth. Pupils and students are taught the value of caring for the land and managing natural resources. Many of these schoolchildren are the future caretakers and managers of natural resources.

Landcare in Schools is a triadic partnership between teachers, local government units and the pupils/students. It complements the activities of their parents on conservation farming. Elementary pupils and high school students are not only being educated on the benefits of the technologies, but are also encouraged to relate what is being taught at school to their home and community context and experiences. As described above, this contextualization of teaching and learning enhances the quality and relevance of education. Landcare in Schools has become a practical learning guide for pupils and students to apply what they have learned in the classroom in actual field activities while sharing it with their families and communities.

Landcare in Schools follows two streams of implementation (Catacutan and Colonia, 2000):

1. through integration of agroforestry into existing subjects in the primary and high school curricula
2. as a co-curricular programme for pupils or students in form of a non-academic club.

Teacher training activities and information and education campaigns are being organized. These include slide showing about the ongoing natural resource degradation, demonstrations on solutions through conservation farming and agroforestry, and training on the roles of pupils, students and teachers in the promotion and adoption of appropriate natural resource management. Training does not only include technical competencies, but also facilitation skills so that teachers are better prepared to address needs in their particular situation.

Landcare in Schools activities are strongly supported by the parents and teachers associations and local government units in the villages where the schools are located. The response of the schools is tremendous, such as formation of Landcare groups, associations or clubs among students, establishment of school nurseries for timber and fruit tree seedlings, and demonstration of conservation farming and agroforestry technologies. School nurseries are being used as learning laboratories. In the 'Trees for Tuition' campaign, parents are encouraged to plant trees on their farms as an investment to be able to pay for the education of their children.

### **Box 3: REAL Education in Thailand**

REAL stands for “Rural Ecology and Agriculture Livelihoods”. It is an integrated learning process in which children explore what is happening on local farms, gain an understanding of ecology, and develop critical thinking skills for addressing environmental, health and social problems. REAL is a low-cost approach to integrated learning. The students’ field observations serve as a starting point for learning about a wide range of topics, inspiring lessons in science, mathematics, art and language. In addition, the process of getting students out of the classroom and into local fields can break down barriers between schools and rural communities and encourage inter-generational learning and relevance of the curriculum to the needs of rural people. At least half of the children in Thailand grow up in rural areas. The fields that surround their homes and schools provide these children with an ideal place for learning about a wide range of issues (Bartlett and Jatiket, 2004):

- Agricultural fields are a good place for students to see biological and ecological processes taking place.
- Scientific studies and experiments can be carried out without any expensive equipment, thereby improving the organisational and analytical abilities of students.
- Information that students collect in the field can be used as a basis for integrated learning, bringing together subjects such as science, mathematics, language and art.
- The study of local agriculture is an effective starting point for understanding health and environmental problems such as water pollution, soil erosion and the loss of biodiversity.
- Agriculture brings rural schools into contact with the livelihoods of local people, creating a bridge between teachers, children and parents.

Agricultural production is the single most important economic activity in Thailand. But rural life is changing rapidly, and farming families must be able to respond to the evolving constraints and opportunities. The ability to collect information, analyse problems, conduct experiments, and communicate what is being learned are skills that could make a profound effect of the livelihoods of millions of rural people in Thailand. These are the skills that REAL Education aims to develop.



**Picture 5: Field work: looking for insects in rice field**  
(Photo: Thai Education Foundation)



**Picture 6: Students presenting their research results**  
(Photo: Thai Education Foundation)

## **6 CASE STUDIES**

### **6.1 KENYA**

#### **6.1.1 INTRODUCTION TO KENYA**

##### **6.1.1.1 KENYA: BASIS FACTS AND INDICATORS**

###### ***GENERAL BACKGROUND***

Kenya is a peaceful country in a region where ethnic divisions constitute a recurrent problem. A British colony and protectorate from the end of the 19th century until independence in December 1963, the country inherited a relatively diversified economic structure in which agriculture and tourism remain predominant. Although the country is still, to a large extent, underdeveloped it could play an important role in East African regional development. Poor management, corruption, uneven commitment to reform and a complex political situation have, in recent times, stifled economic growth.

###### ***POPULATION***

The population of Kenya was about 32.2 million in 2003, with 57% below the age of 20, and growing at 2.3% per year.

###### ***ECONOMIC SITUATION***

Per capita gross national income was US\$400 in 2003. Economic performance was relatively strong during the 1960s and early 1970s, but slowed down in the 1980s and 1990s. This poor performance of the economy was attributed to a combination of factors, including:

- Inefficient use of public resources
- Loss of economic competitiveness
- Soaring costs of doing business
- Deteriorating security conditions
- Droughts
- Poor donor relations
- Ethnic conflicts associated with the transition to a multiparty democracy
- Advent of HIV/AIDS
- Weak institutions and governance

The failure to generate growth increased poverty and worsened social indicators, including in the education sector. However, the elections of December 2002 brought to power a new government, and the positive steps it has taken since arriving in office have created an improved environment for development results to occur. Nevertheless, economic recovery has been very slow and the economy grew by only about 1.8 percent in 2003 (World Bank, 2005a).

The Kenyan economy is partly dependant on rain-fed agriculture, but has increasingly diversified into horticulture and services. Kenya is a much more industrialised country than its neighbours, with less than 20% of GDP originating in agriculture, as compared to over 40% in Uganda and Tanzania.

Government spending is about 21% of GDP. Education takes the largest share (about 20%) of government spending.

Current challenges in the development of Kenya include:

- Poverty (55% of the population live in poverty)
- HIV/AIDS (prevalence rate of about 7%)
- Malaria (costly and reduces productivity)
- Income distribution (inequality is very high)
- Limited access to development goods (health, education, clean water, etc.)
- Poor infrastructure (increasing the cost of doing business)
- Crime
- Entrenching democracy, constitutional reform

### **6.1.1.2 BASIC EDUCATION IN KENYA**

#### ***EDUCATION POLICY IN KENYA***

The provision of education and training to all Kenyans is fundamental to the overall development strategy of the Government of Kenya (GoK). The government recognizes the strategic importance of raising the overall education level of Kenyans within the context of poverty reduction and economic growth. Education is not only a welfare indicator; it is also a key determinant of earnings and, therefore, an important exit route from poverty.

The **goals** of both **primary and secondary education** in Kenya – as stated in various policy documents – include the following:

- Preparing the learners to fit in the world of work (the learner should get adequate knowledge and skills to be able to earn a living)
- Preparing the learners to fit into and contribute towards the well being of society (the learner should know how to live with others and deal with daily challenges in society).

The Government of Kenya (GoK) has recently developed a Sessional Paper which will provide a legal framework for the ongoing reforms in the education sector. The Sessional Paper will guide education for the next 20 years and will provide policy guidelines that will ensure every Kenyan the right to education and training no matter his or her socio-economic status. The right to education will be achieved through the provision of an inclusive and quality education that is accessible and relevant to all Kenyans. This vision is guided by the understanding that quality education and training contributes significantly to economic growth, better employment opportunities and contributes to expansion of income generating opportunities.

The Sessional Paper proposes the overall policy framework which will provide major reforms in the current education system to enable all Kenyans to have access to and

acquire lifelong education and training of high quality (Ministry of Education, Science and Technology, 2004a).

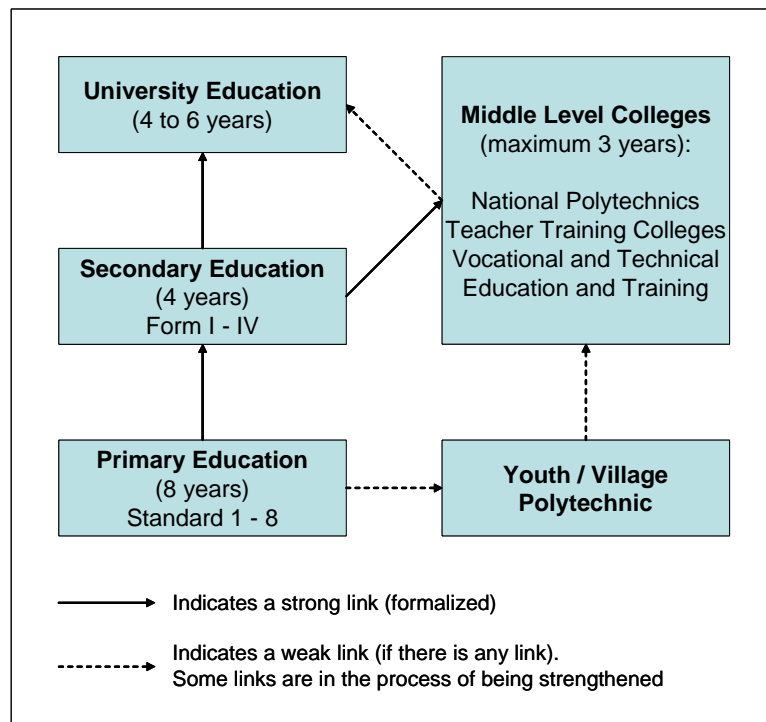
One of the goals outlined in the Sessional Paper which is relevant to the current study is “to improve all aspects of education and training quality so that recognized and measurable learning outcomes are achieved, especially in literacy, numeracy and essential life skills relevant to the world of work by 2010”.

### **STRUCTURE OF KENYA’S EDUCATION SYSTEM**

The education and training sector in Kenya contains (Saitoti, 2004):

- Early Childhood Development and Pre-School Education
- Primary Education
- Secondary Education
- University Education
- Technical and Vocational Education and Training
- Teacher Education and Training
- Non-formal Education and Adult Education
- Special Education

The structure of Kenya’s 8-4-4 education system (8 years primary education, 4 years secondary education and 4 years university education) is represented in Figure 4. This structure was implemented in 1985, to replace the 7-4-2-3 system (7 years primary education, 4 years at ordinary level, 2 years at advanced level and 3 years at the university).



**Figure 4: The structure of Kenya’s education system (Saitoti, 2004)**

The broad **objectives** of education sector interventions in Kenya as described in the Economic Recovery Strategy for Wealth and Employment Creation (ERSWEC) are to achieve 100% net primary school enrolment rate and reduce the disparity in access and quality of education. Secondary objectives are to improve access and quality and to reduce disparities at all levels of education.

The Government of Kenya (GoK) recognizes the need to create opportunities for post-primary school graduates and children and youth who do not complete primary or secondary school or do not transit to higher levels of learning. The Government of Kenya (GoK) is revitalizing Youth Polytechnics and Technical Institute so that they can offer market-driven courses to cater for these groups of children.

### **ACCESS TO EDUCATION BY WEALTH GROUP**

Data on access to education by wealth group are shown in Table 5. It is evident that the wealthier groups in Kenya have generally better access to education than the poorer ones. The attendance ratio in primary schools for the top wealth group is 86% while that of the lowest wealth group is only 61%. Although attendance is much lower in secondary schools than in primary schools, the richer segments of the population still maintain their dominance over lower wealth groups. The net attendance gap in both primary and secondary schools between the top and bottom wealth groups is about 25% (SID, 2004).

**Table 5: Access to education by wealth group in Kenya, 2003**

Wealth group	Net attendance ratio	
	Primary	Secondary
Poorest 20%	61.3	4.0
Second 20%	79.9	7.3
Middle 20%	83.8	11.4
Fourth 20%	88.1	16.2
Highest 20%	86.0	28.2

### **RURAL-URBAN DISPARITIES**

Table 6 provides various indicators of education in rural and urban areas in Kenya. Living standards in rural areas generally lag behind the urban areas. In education, the proportion of the population above 15 years of age who are literate is higher in the urban areas. Likewise, the percentage of school going children already in primary school is higher in urban areas (SID, 2004).



**Table 6: Education indicators in rural and urban areas, Kenya**

Education indicator	Rural	Urban
Gross enrolment (primary)		
Male	114.2	103.2
Female	107.2	99.9
Drop out rate	7.7	10.5
Net enrolment (primary)		
Male	78.0	82.4
Female	78.1	82.5
Population (>15 years) that is literate		
Male	86.2	93.7
Female	75.2	88.5

### **PRIMARY EDUCATION IN KENYA**

Primary education is the first phase of the formal education system. The start age is 6 years and it runs for 8 years. It promotes growth and imparts literacy and numeracy skills. It lays a firm foundation for further formal education and training and life-long learning.

English is the official language and the medium of instruction from Standard 4 of primary school, while the language of the school catchment area is used for instruction in the first three grades.

The primary school **completion rate** was 43.2% in 1990, with a slight increase over the years to 56.4% in 2003. The proportion of girls not completing their primary education is higher than that of boys (primary school completion rate is 60.3% for boys as compared to 53.2% for girls). Wide regional disparities in participation in education exist.

The **transition rate** from primary to secondary schools is relatively low, with 47% of primary school graduates entering secondary school. 12% of this group proceed for further education in public universities. These relatively low transition rates are due to several factors (Saitoti, 2004):

- Shortage of secondary schools and low quality of some of the existing secondary schools
- High cost of secondary education
- Lack of perceived incentives to continue education

The current policy in Kenya is that a primary school teacher should be able to teach all the 7 subjects in the primary school curriculum. However, the two years of teacher training is not adequate for the teacher trainee to acquire mastery in subject content and skills of pedagogy in all the 7 subjects. This comprises the quality of teaching offered after the training. Other factors that contribute to low quality include poor

resource management in primary schools, inadequate in-service training of teachers, poor learning environment due to overcrowding, inadequate facilities, poor health and sanitation, gender-insensitive environments, barriers for those with special needs and inadequacies in quality assurance (Ministry of Education, Science and Technology, 2004b).

### **THE INTRODUCTION OF “FREE” PRIMARY EDUCATION IN KENYA**

The new Government of Kenya has started to implement some major reforms in the education sector. In particular, it has introduced "free" primary education. Under this policy, which is central to the implementation of the Economic Recovery Strategy for Wealth and Employment Creation (ERSWEC), all fees and levies for primary education have been abolished. Besides meeting teachers' salaries, the government provides teaching and learning materials. This has resulted in the major jump in enrolment numbers from the first school term of the year 2003, as it is clear that the previous costs being charged to parents were the biggest constraint on many children attending school.

Provision of instructional materials including textbooks has been identified as one of the major achievements of the free primary education programme, particularly through reducing the cost burden of education on parents (UNESCO, 2005).

Significant changes have started to be made in the curriculum: the number of primary subjects has already been reduced: teaching subjects have been reduced from 13 to 8, and examinable subjects have been reduced from 7 to 5. The curriculum content has been revised to focus teaching and learning on essential core skills. Further curriculum changes will be introduced in all of the primary school grades (Standard 1 to 8) over the next few years (Table 7). The pupil-teacher ratio has increased substantially (from about 32:1 to about 40:1). As part of a move towards increased decentralization, the selection of teachers for primary schools has now been moved down to the district level (and for teachers in secondary schools to the school level).

**Table 7: Phasing of the introduction of the new curriculum in Kenya**

Year	Grade levels											
	Primary education								Secondary education			
	St. 1	St. 2	St. 3	St. 4	St. 5	St. 6	St. 7	St. 8	F. I	F. II	F. III	F. IV
2003	new	old	old	old	new	old	old	old	new	old	old	old
2004	new	new	old	old	new	new	old	old	new	new	old	old
2005	new	new	new	old	new	new	new	old	new	new	new	old
2006	new	new	new	new	new	new	new	new	new	new	new	new

One of the greatest challenges facing Kenya today is to reverse the erosion of education gains of the first two decades of independence, which saw steady progress towards equal education opportunities. Primary school and secondary school gross enrolment rates dropped significantly through the 1990s, largely due to the increasing costs of education to parents (and as evidenced by the very substantial increase in

enrolments with the latest policy change to abolish primary school fees). In 2002, the primary school enrolment estimate of the Ministry of Education, Science and Technology (MOEST) was 6.5 million pupils (in about 17,750 to 18,000 primary schools), although other estimates suggest a total figure then of about 5.8 million. The average school size in 2002 was about 370 students, and the largest primary school had about 1,600 students. But with the free primary education policy of the new Government of Kenya, enrolments vastly increased in January 2003, and the total enrolment is now likely to be about 7.5 million pupils (and a gross enrolment ratio of 104 to 115 percent), with an average school size of about 400 students, and the largest primary school having over 2,000 students. Most schools do not have adequate classrooms to accommodate the large number of pupils enrolled under free primary education.

After an initial increase in enrolment, some public schools have experienced a decline in enrolment due to dropouts and to a lesser degree, transfer to public schools (UNESCO, 2005).

The free primary education programme faces several challenges (UNESCO, 2005):

- Increased student population
- Shortage of teachers
- Lack of clear guidelines on admission, hence the entry of over-age children
- Lack of consultation with key stakeholders such as teachers and parents
- Delay in disbursement of funds
- Expanded roles for headteachers

There are indeed many issues that need to be addressed in order to achieve the education goals of universal primary education, Education for All (EFA), improved equity, relevance and quality of education, and adult education in the context of life-long education. There is now an enormous demand from parents for education for their children, but there are serious doubts about the country's attainment of the Millennium Development Goals in this sector unless some new policies are adopted to reverse the deterioration of recent years (World Bank, 2003a). These include:

- Increasing public expenditures on non-salary costs of education such as textbooks and other learning materials
- Implementing the revised curriculum to allow more time for core subjects and to help reduce the costs of education
- Preparing and adopting an action plan for the training, redeployment, hiring and upgrading of teachers
- Revising the Education Act and regulations to decentralize decision making to district and school level administrators, and to parents' representatives.

In order to attain these objectives, further measures will be required. These measures include (Government of Kenya, 2003):

- Optimal staffing
- Increasing the availability of textbooks
- Sensitization of communities on the benefits of education
- Conducting in-service training for teachers annually
- Increasing the bursary programme, with emphasis on vulnerable groups and paying particular attention to girls

- Reviewing the education curriculum to make it relevant to the changing socio-economic environment so that the students can more easily fit in the labour market.

Due to inadequate resources, no comprehensive in-service teacher training programme to prepare teachers to cope with the changes and emerging challenges in teaching has been put in place. The quality of the teaching force is also affected by the fact that many teachers took their teaching career as a last and only available option. To address this challenge, the government is reforming teacher education. Key reforms include (Ministry of Education, Science and Technology, 2004a):

- Upgrading of entry requirements to pre-service primary teacher training colleges
- Availing opportunities for further studies for teachers to enhance their academic and pedagogical competencies
- Identification and recruitment of teachers to be based on competence
- In-service training for teachers to be regularized and certificated
- Enhancement of exchange visits at organizational, professional and individual levels.

### ***THE KENYA EDUCATION SECTOR SUPPORT PROGRAMME (KESSP)***

The Kenya Education Sector Support Programme (KESSP) will be the basis upon which the Government, individuals, communities, the private sector, NGOs and development partners will jointly support the education sector for the period 2005/06 to 2009/10 (Ministry of Education, Science and Technology, 2005).

The KESSP has been developed in order to enable the Government to achieve the vision for education and training in Kenya which is to provide “*Quality Education and Training for Development*”. KESSP provides a framework for the achievement of the policy goals, targets and strategies outlined in the Sessional Paper described earlier.

### ***EDUCATION FOR SUSTAINABLE DEVELOPMENT IN KENYA***

The National Environmental Management Authority (NEMA) has recently recognized the need to develop a national framework (“*Education for Sustainable Development: Strategy for Kenya 2005-2010*”) to mainstream education for sustainable development in Kenya’s education system. The strategy focuses on key domains of education for sustainable development, namely (Otieno, 2005):

- Basic education
- Reorienting existing education programmes
- Developing public awareness and understanding of sustainability
- Training in achieving sustainable development.

The strategy also focuses on pertinent issues that need to be addressed in order to achieve sustainable development in Kenya. These include overcoming poverty, achieving gender equality, health promotion, environmental conservation and protection, rural transformation, sustainable production and consumption, intercultural understanding, peace and disaster preparedness.

The strategy aims at achieving the following specific objectives (Otieno, 2005):

- Raising the level of environmental awareness and building capacity to enable all Kenyans to engage in the achievement of the goals of sustainable development.
- Promoting the co-ordination of education for sustainable development activities.
- Recognizing the special relationships that local communities have with the environment and ensuring that their perspectives are represented in education for sustainable development initiatives.
- Enhancing and supporting the integration of education for sustainable development into all learning programmes, projects and initiatives.
- Developing partnerships between stakeholders, including the private sector, to promote and increase the level and quality of education for sustainable development.
- Promoting technical cooperation, networking and information sharing.
- Providing Kenyans with a framework within which to develop effective education for sustainable development programmes.

### **6.1.1.3 FOOD SECURITY AND RURAL DEVELOPMENT IN KENYA**

#### ***AGRICULTURAL PRODUCTION***

The main feature of Kenya's agriculture is domination of small-scale farmers who account for 75% of total agricultural production and 70% of marketed agricultural output. On average, small-scale farmers produce over 70% of maize, 65% of coffee, 50% of tea, 90% of Sugar, 80% of milk, 85% of fish and 70% of beef and related products. Production is carried out on small land holdings averaging 2-3 hectares mainly for both dairy and beef subsistence and commercial purposes.

Large-scale farming is practiced in Kenya on farms averaging 50 hectares and above and accounts for 30% of marketed agricultural production, covering mainly tea, coffee, horticulture, maize, and wheat as well as keeping livestock for commercial purposes (Kinyua, 2004).

Agriculture is the lifeline of 80% of Kenya's poor who live in rural areas, including farmers, workers and unemployed. 60-70% of Kenya's employment is in agriculture, consequently creating jobs and increasing income in that sector is vitally important and, if achieved, will have an important direct effect on poverty.

Agricultural growth has been well below potential in recent years due to a number of **constraints**. Those which result partly from an accumulation of poor past policies and which will take time to remedy include:

- Poor governance in key agricultural institutions, particularly the cooperative sector
- Non-availability of and/or lack of access to quality seeds and inappropriate production technologies - especially for small holder farming
- Poor access to credit by the majority of small holder farmers, particularly women
- High cost of farm inputs

- Poor and inadequate rural infrastructure, especially feeder roads, power supply and market facilities, leading to high production and marketing costs.

Other constraints, which the Government of Kenya intends to make relatively rapid efforts to ameliorate include:

- Inconsistencies in policy; poor institutional and legal framework
- Inadequate research, inefficient extension delivery systems as well as inadequate extension services and support
- Poor sequencing of the liberalization process
- Lack of effective co-ordination of investment activities among the key stakeholders in agriculture.

Lastly, there are constraints which are almost entirely exogenous, including:

- High prevalence of HIV/AIDS affecting agricultural productivity
- Limited availability of productive land (only about 16% of land is of high and medium agricultural potential)
- Insecurity in high potential areas and cattle rustling in some arid and semi-arid areas
- Unfavourable weather conditions and high dependence on rain fed production
- Declining agricultural commodity prices
- Population pressure on the natural resource base.

The growth of the agricultural sector fell from 3.4 percent in 1990 to 2.2 percent in 2001. As a result, many indicators of rural livelihood have been worsening, indicating an increase in rural poverty.

### **FOOD INSECURITY**

The **causes** of food insecurity in Kenya include (Kinyua, 2004):

- Low agricultural productivity
- Inadequate access to productive assets (land and capital)
- Inadequate infrastructure
- Limited well functioning markets,
- High population pressure on land
- Inadequate access to appropriate technologies by farmers
- Effects of global trade
- Slow reform process

### **MEASURES TO ACHIEVE FOOD SECURITY**

A concept note outlining the Special Programme for Food Security (SPFS) was developed in the year 2002. In developing this programme the draft Poverty Reduction Strategy Paper (PRSP) and the Rural Development Strategy were used as the building blocks. Split into phases, the Special Programme for Food Security (SPFS) aims to increase food availability and reduce chronic hunger over the next ten years until 2015. Phase one is a fast-track action plan that focuses on community capacity-building, school feeding programmes, and food for work activities in support of natural resource conservation within 50 000 households. Phase two will scale-up existing programmes to target one million rural families by 2010.

The Special Programme for Food Security (SPFS) gives specific focus to the more than 15 million absolute poor households living in rural areas primarily as farmers, pastoralists and fisherfolk. The Special Programme for Food Security (SPFS) is working towards the food security needs of these people by encouraging and supporting farmers and community-based organizations in their efforts to improve agricultural productivity and other income generating activities. Extensive successful experiences throughout the country in agricultural production and extension point to the need of supporting farmer groups in order to improve their capacities in realizing their food security needs and increase the desire to correct the situation.

In addressing food security issues in Kenya, it is recognized that there are many extension service providers within the Government, NGOs, private sector, religious organizations and community-based organizations (CBOs). There are also many resources (human, physical and financial) held by these organizations. However, they are utilized in an uncoordinated manner with little impact to the communities they are directed. The activities carried out by most of the extension service providers often do not consider the priority demands of the farmers. Through the Special Programme for Food Security (SPFS) farmers are being empowered to identify their priorities and make demands on the service they need to solve their problems. The extension service providers then work in a collaborative manner to respond to the farmers' demands. Demands from the farmers fall under different categories such as information, new technologies, credit, value addition and marketing. Some of the demands can be provided immediately, while others require research or borrowing of technologies from elsewhere or seeking for financial resources in case of demands on credit. Within the country there are many successful experiences that have benefited local farmers and communities. The main approach of the Special Program for Food Security (SPFS) is in up-scaling such successful experiences. This is best achieved by organizing farmers' tours to areas where solutions to their demands have succeeded. Farmers learn faster from other succeeding farmers than from extension providers. This approach has proved very useful and cheap. In carrying out extension advisory services, a group approach is employed. This enables extension service providers to reach many farmers. It also helps farmers to identify their problems and assess the progress they are making with interventions that are extended to them. Common interest groups, e.g. dairy, horticulture, beekeeping etc., provide for fast delivery of service.

In June 2003, the Government of Kenya (GoK) launched the Economic Recovery Strategy for Wealth and Employment Creation (ERSWEC) in order to halt and reverse further economic degeneration and poverty. In order to attain the goals stated in the Economic Recovery Strategy, the Ministries of Agriculture and Livestock and Fisheries Development developed the Strategy for Rehabilitation of Agriculture 2004-2014 which defines ways and means of economic recovery through improved agricultural growth. This strategy was launched in March 2004. It recognizes the need to mobilize resources to stimulate agricultural growth and need for coordinated resource utilization. The private sector is expected to take the lead while the Government will play a facilitative role (Kinyua, 2004).

Interventions contained in the Rural Development Strategy include (Government of Kenya, 2003):

- Legal and institutional reforms
- Research and extension services: The Government will put in place a new agricultural extension policy to promote collaboration with other extension service providers, enhance cooperative extension services, establish a database for extension planning and performance monitoring, and provide farmers with demand-driven extension services.
- Access to credit
- Irrigation development
- Diversification of enterprises and crop uses
- Liberalization of the domestic *Pyrethrum* market
- Cooperative development
- Value addition
- Establishment of a guaranteed minimum return facility for strategic crops
- Improvement of the performance of the livestock industry
- Removal of bottlenecks and exploitation of the potential in the fishing industry

## **6.1.2 STUDY SCHOOLS IN KENYA**

### **6.1.2.1 LOCATION OF THE SCHOOLS: VIHIGA DISTRICT**

#### ***LOCATION, SIZE AND DEMOGRAPHY***

Vihiga District is located in Western Province in Kenya. The district occupies 613 km<sup>2</sup>. Vihiga District is the most densely populated district in the province. It has one of the highest rural population densities in the world with a population density of about 800-1,200 persons per km<sup>2</sup>. Vihiga is inhabited mainly by Luhya people. Some demographic characteristics of Vihiga District are summarised in Table 8.

**Table 8: Demographic characteristics of Vihiga District in Kenya**

District population	Male	Female	Total	%
Aged 18 years and below	140,894	142,609	283,503	56.8
Aged above 18 years	91,826	123,554	215,380	43.2
Total	232,720	266,163	498,883	100
%	46.6	53.4	100	100

#### ***TOPOGRAPHY AND GEOLOGY***

The district is located in the Lake Victoria Basin. Its altitude ranges from 1,300 m above sea level in the west to 1,500 m in the east. There are hills which rise above this general level. It has a system of rivers running from northeast to southwest. River Eswalwa (Edzawa) is the main river though Yala River flows through sections of Tiriki and Sabatia Divisions. These two major rivers drain into Lake Victoria.



The southern part of the district is dominated by rugged granite tarsus which rises above 1,950 m above sea level. Some of the notable hills are Maragoli, and Nyangori which are remnants of greater peneplains. The plains are dissected by steep river valleys.

The geological formation of the district comprises of Kavirondo and Nyanzian rock systems. These rocks are granitic and are commonly found in Tiriki, Emuhaya and Vihiga Divisions. They have high potential for the exploitation of building stones and ballast. Some parts of the district comprise the basement system.

### **CLIMATE**

The district's annual rainfall ranges from 1,800 to 2,000 mm. It is reliable, adequate and well distributed throughout the year. There are two main seasons namely the short rains and the long rains. The long rains are received in April/May and are the highest while the short rains are received in September/October. The months of December, January and February are characterized by low rainfall. Though the district receives reasonable rainfall, some parts of Emuhaya receive lower amounts of rainfall.

Temperatures in the district range from 14 to 32°C. Seasonal variations in temperatures are minimal. High temperatures are generally experienced throughout the year.

### **SOILS AND AGRICULTURE**

The **soils** in Vihiga District include:

- Well-drained, dark-red, friable soils partly covered with humid top soil derived from both volcanic and basement complex rocks
- Yellow-red loamy sands derived from both sediments and basement.

The district can be divided into two main agro-ecological zones: the Upper Midland zone and Lower Midland zone.

The Upper Midland Zone has fertile, well drained, dark, red soils which support the growing of tea, coffee, finger millet and cassava. The zone covers the western slopes of Nandi escarpment and parts of central Sabatia, Vihiga and Tiriki Divisions. In total the upper Midland zone covers about 90 per cent of the district.

The Lower Midland Zone covers the western parts of Emuhaya. The soils are red loamy sands which have been derived from sediments and basement rocks. These soils support the growing of sugarcane, maize, coffee, beans, finger millet and sorghum. The soils from both zones are losing their fertility through leaching and over-cultivation. There is a need for undertaking conservation measures for ensuring sustainability of the fertility. Gully erosion is common in the district mainly due to high rainfall.

Much of western Kenya is considered to have good potential for **agriculture**, with medium elevation, deep, well drained soils, and relatively high rainfall that permits two growing seasons. The history of farming in the area, however, is characterized by low external inputs with low output farming (Place et al., 2003).

Recent studies have found that crop productivity is very low (less than 1 ton of maize per hectare per year) and that nutrient balances are seriously in deficit (Stoorvogel and Smaling, 1990; Soule and Shepherd, 2000). This in turn has led to situations whereby members of many households, often the male, would seek income earning opportunities off the farm. Labour migration often implies the withdrawal of labor, further reducing agricultural productivity. Where the migrant is employed in a low paying job, which is common because many are low-skilled jobs, few remittances are returned to the rural area and this once again reduces investment in agriculture (Place et al., 2004).

Generally the soils in Vihiga District have been subjected to considerable leaching due to high rainfall and continuous cultivation over the years. Farmers make little use of external inputs like fertilizers, and the farming system is characterized by poor soil fertility and erosion problems as well as high incidence of pests and diseases. This has resulted in low productivity and unstable yields.

Out of the 523 km<sup>2</sup> occupied by the district 409 km<sup>2</sup> is arable land supporting approximately 53,928 farm families. The average size per holding in the district is 0.6 ha per family of 5.5 persons. About 90 per cent of the total area is under cultivation and livestock holding. The high potential land with reliable rainfall found all over the district allows families to subsist on small parcels of land. Generally, the district is mainly composed of small-scale farmers growing food crops for household consumption and the local market.

The **farming systems** in Vihiga District incorporate crops, livestock and trees. Maize, beans, sorghum, millet are the main staple crops produced in most areas. Other crops are bananas, vegetables, guavas, pawpaw and avocados. Cash crops grown are beans, coffee, tea in the southern central and central parts of the district. Livestock like cattle, poultry, sheep, goats are also kept.

The most popular natural resource management practices in Vihiga district are (Mango et al., 2003):

- Digging of terraces ("*fanya juu*"<sup>6</sup>) to reduce soil erosion
- Planting of trees where they have been cut

These are the most popular natural resource management practices today because of serious soil erosion in farmers' small parcels of land. As population increases, forests get cleared to pave way for arable land. In the process the benefits of having forests are lost forcing farmers to establish their own woodlots.

The Ministry of Agriculture works with schools through the 4-K clubs. They currently concentrate on schools found in the focal areas where they work. They train 4-K clubs on soil conservation (e.g. terraces, cut-off drains), tree nursery establishment and planting of Napier grass and other fodder crops. They have school projects that

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<sup>6</sup> "*Fanya juu*"-terraces are made by digging a trench along the contour and throwing the soil uphill to form an embankment. The embankments are stabilized with fodder grasses or shrubs. The space between the embankments is cultivated. Over time, the "*fanya juu*" develop into bench terraces. They are useful in conserve water and soil.

focus on horticulture, maize and beans, rabbits, improved fallows<sup>7</sup>, woodlots and tree planting. They also organize competitions for the clubs every year.

### **WATER RESOURCES**

Vihiga District has high groundwater potential because of the high rainfall received. The water table is less than 20 feet below ground level in parts of Tiriki and Emuhaya Divisions. The groundwater resource is not fully exploited as there are few boreholes in the district. Despite the abundance of groundwater, it is polluted by farm inputs and has to be treated before consumption in major schemes. The district is well served by surface water which comprises of major rivers like Yala, Ezalwa and other numerous streams and springs.

There are only two water dams in the district namely Kaimosi and Mudete Dams. Mudete Dam is earmarked to serve the proposed Tea factory at Sabatia Division. Other possible sites for dams in the district are Gambogi, Enzaro, Mahanga and Lunyerere in Vihiga, Tiriki and Sabatia Divisions.

There are other rivers from catchment areas for water schemes. These are River Galagoli for Kaimosi Water Supply; Mbale Water Supply starts from River Idiogoi, Maseno Water Supply originates from River Ezala, Hamisi and Sosiani Water Supplies are supplied by springs, while Vokoli Water Project is supplied by a borehole. These water supplies undergo treatment before being supplied to consumers.

### **FORESTRY**

Vihiga District was originally within the transitional lowland forests of the Congo and the afro-montane forests of the western Rift Valley. Due to the human interference to the original vegetation exotic trees have now predominantly occupied the area. Tree species that remain to depict the equatorial forest include the Elgon olive (*Olea capensis*), pigeon wood (*Trema orientalis*) and Sudan teak (*Cordia africana*). Eucalyptus (*Eucalyptus* sp.) now forms about 70 per cent of trees grown on farms and is the major source of woodfuel and timber in the district. Eucalyptus (*Eucalyptus* sp.) planted along the river banks and catchment areas will gradually be replaced with indigenous species suitable for water conservation.

Kibiri forest comprises of exotic soft woods for timber production and indigenous forests of high timber value. Maragoli Forest comprises of exotic soft woods established for the protection of the hill but which could be exploited selectively.

The growing demand for building poles, fuelwood and fencing poles due to the rapid population growth has caused strains on the soil resources leading to destruction of soils by soil erosion. Both hill and gully erosion are common in the district due to the high rainfall in the district.

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<sup>7</sup> **Improved fallow:** Fallow enriched with fast-growing, nitrogen-fixing trees, shrubs or vines to accelerate the process of restoring productivity to degraded or damaged land, thereby shortening the length of natural fallow periods. The length of the fallow depends on the condition of the land. The trees directly add nitrogen to the soil, suppress weeds and provide other products such as fuelwood.

Substantial resources have gone into the protection of hill tops like Maragoli. Efforts will be made to encourage and support agroforestry activities in the district. Protection of river banks is another conservation measure that is being pursued. These together with other conservation measures will ensure that the exploitation of forest resources is controlled.

### **COMMERCIAL MINERALS AND OTHER MATERIALS**

Vihiga District is endowed with a variety of minerals and materials that are currently being exploited. These include sand, soils and clays, rocks for ballast all used in construction works. Pyrite, which is an important source of sulphuric acid, is found in large deposits in Kaimosi in the Akwirangi area. Quartz crystal occurs to the north-east of Kaimosi. Quartz is abundant in most streams in the district. Granite is found in plenty in south of Tiriki and possesses a high potential for quarry development from where ballast and building stones could be obtained for construction work.

### **SOCIO-ECONOMIC CONDITIONS**

Vihiga District is the poorest district in Western Province. It has an absolute poverty level of 62%. The monthly mean household income is KSh 6,025 (US\$ 75). Many communities under study are among the poorest in all of Kenya and clearly the poorest among the medium to high potential areas. For example, a national study of poverty found Western Province (including Vihiga District) to be one of the poorest in the country (Republic of Kenya, 1997).

Most people (80-90%) in Vihiga District practice small scale farming as their economic mainstay. The food situation is reported as deficient by almost 90% of the households who have to buy food to supplement their own harvest (Wangila et al., 1999).

Rapid population growth, increasing poverty and overstretched government service provision are major challenges to the development of the area. As a result this, a lot of pressure is exerted on the available basic services like education.

HIV/AIDS poses a very serious threat to communities in Vihiga District due to lack of proper information; the absence of sexual reproductive health for young people and secrecy, taboos, superstition and the stigma that is still associated with known HIV/AIDS cases. There isn't enough information available on systematic statistics that can help a multi-sectoral intervention in prevention and management of HIV/AIDS.

There is a big strain on the scarce resources available to families to ensure a basic education for their children, primary healthcare, shelter and food needs. Although the most of the adults in the community have had some exposure to formal education, they often lapse into functional illiteracy because of idleness and misuse of alcohol.

### **MIGRATION**

Migration trends from the district - though difficult to determine - appear to be significant. The small size of land holdings (0.6 ha per household) in the district in relation to the high population density of over 1,000 inhabitants per km<sup>2</sup> means that continued sub-division of land from the older generation to the young can only be

possible up to a certain stage. The only option, therefore, is buying of land outside the district which leads to out migration, more so as the population continues to grow.

Secondly, many people within the age-group 15-59 (labour force) move out of the district in search for gainful employment in other districts and in particular, major towns. This out-migration will play a major role in the district economy in the near future. With this in mind and with the ratio of male to female being 91:100, the percentage of female headed households is high within the district. On the other hand, in-migration is expected to occur on a small scale.

### **EDUCATION**

Vihiga District is leading in primary school enrolment rates in the province, at 104.1%, and being ranked 2<sup>nd</sup> nationally. Vihiga District has one of the highest secondary school enrolment rates in the province at 38.2%, being ranked 2<sup>nd</sup> in the province and 7<sup>th</sup> nationally. The pupil-teacher ratio in Vihiga district is 40.4.

#### **6.1.2.2 EBUSSAMBA PRIMARY SCHOOL**

##### **INTRODUCTION**

Ebussamba Primary School is situated about 3 km from the main Kisumu-Busia road in Ebussamba Village in South Bunyore Location. The school was established in 1962 and occupies land of 2.5 ha.

Ebussamba Primary School had a student's population of 1,021 (505 male and 516 female) in March 2004. There are 21 teachers in the school (14 male and 7 female) and they are all trained. The headmaster has been in the school for 19 years. He suggested his long stay the school was due to the school performing well in national examinations and his continued support for the development of the school (we found the library being constructed). The headmaster estimated the average length of the teachers stay in school to be 5 years; only 2 teachers joined in the past year. The teacher-student's ratio is 49. The distribution of students per class is as represented in Table 9. The total number of classes is 25. There are more classes (streams) in the lower grades due to the recent introduction of free primary education by the Kenyan Government. Many new students indeed joined in January 2003.

**Table 9: Distribution of students per class at Ebussamba Primary School (Kenya) in March 2004**

Grade	St.1	St.2	St.3	St.4	St.5	St.6	St.7	St.8	Total
Number of classes	4	4	4	3	2	3	3	2	25
Number of students	183	162	160	113	96	105	109	93	1,021
Average number of students per class	46	41	40	38	48	35	36	47	41

**THE SCHOOL ENVIRONMENT AND NATURAL RESOURCE MANAGEMENT  
PRACTICES AND HOW THEY ARE USED AS TEACHING AND LEARNING  
RESOURCES**

Natural resource management innovations implemented in the school compound include gabions and terraces. Various types of trees have also been planted in the school compound and along the boundaries. School members also practice compost manure making from litter and animal manure brought by students from their homes. Rainwater is also being harvested and collected in a water tank. In the school garden, students plant Napier grass, maize, beans, bananas, vegetables and sweet potatoes. They also plant shrubs for improved fallows such as *Sesbania sesban*, *Tephrosia candida* and *Crotalaria grahamiana*.

Parents informed us that the school land used to be unproductive before terraces and trees were planted. They said the school's land used to be uneven. Terraces and gabions are used for controlling soil erosion and - according to the headmaster - they have contributed to some classrooms not being eroded away by rainwater. They also control mosquitoes by draining water that would otherwise be stagnant. One parent mentioned that 'children hide inside them' like when playing 'hide and seek'. One parent said the first terrace was established in 1962. The headmaster and teachers can only remember the next terrace being dug in 1984.

Trees in the school compound are being used for timber for building classrooms and desks, and firewood for preparing lunches for teachers. The trees are also used as windbreaks as fences, they provide shade and medicine and they improve the soil. The school parade or assembly is held under a tree shade in front of the classes and teachers also prefer sitting there when not in class. The headmaster said he administers to students the bark of a tree for curing stomach problems. The library was being constructed and the headmaster informed us that the timber used was coming from trees grown in the school compound. Tree planting has always been there in the school as an activity. Eucalyptus trees (*Eucalyptus* sp.) were planted in 1994-1995 during the World Food Day and some other trees were planted recently in 2003.

Napier grass was first planted in 1986. It is being planted along terraces to control soil erosion. Income generated from the sale of Napier grass is used for buying teaching materials.

Compost manure provides soil nutrients when planting maize, beans, bananas and vegetables. The harvest from the school farm is used in school. Part of it is being sold which helps the school to buy teaching aids and construction materials.

Improved fallows were established in 2003 and are used for improving soil fertility, preventing soil erosion, and providing fuelwood and fodder.

The local environment and the natural resource management innovations available in the school are also used for teaching and learning. The subjects where these are used include Science, Geography, History and Civic (GHC), Christian Religious Education (CRE), English, Mathematics and Physical Education (PE).

Trees are used in **Mathematics** when teaching and learning about areas and perimeters (e.g. how many trees can occupy the perimeter of a field with a given spacing?). Terraces are being used for counting.

During a Mathematics lesson on the topic of “areas and perimeters” and the subtopic of “rectangles and triangles” students were asked to solve a mathematical problem from a textbook on the length of barbed wire and the number of poles required to fence an agricultural field. Students informed us that they could now apply these skills at home. One of the students said: “I can now help my parents by calculating the number of poles required to fence our farm.”

In **English**, students are asked to write a composition about the importance of trees.

In **Geography, History and Civic (GHC)**, trees are used to teach and learn about natural and man-made forests, uses of trees, and parts of plants.

In **Science**, experiments are set up when teaching and learning about transpiration. Polythene bags are tied around mango leaves. The following day, small drops of water can be observed in the bags. Teachers informed us that this helps the students to understand the process of transpiration better. Also in Science, compost manure available in the school is used to practically show the process of decay. We also observed a Science lesson on the topic of conservation of water and air where a plastic water container was brought into the classroom to practically demonstrate water conservation.

In **Christian Religious Education (CRE)**, children learn that God created man to care for our environment. The school compound is used as an example.

During **Physical Education (PE)**, the terraces in the school compound are used for jumping.

Teachers take their pupils to the shores of Lake Victoria to show different types of water plants. Field days and visits are also being organized (e.g. Maseno Farming Training Centre). Teachers also give students home assignments related to the natural resources around them. Teachers claimed that when pupils practice natural resource management and apply at home what they have learned in school, they tend to understand the subject matter better.

Teachers said that teaching about and with natural resources could be further enhanced by using illustrations of trees and animals and pamphlets or posters which show natural resource management practices, planting of more different types of trees in the school compound and using discs made from wood for counting (students usually like handling them). The headmaster said that having more practical exercises on natural resource management could enhance teaching and learning in the school. This would enable students to understand and remember what they have been taught. They would also be more interested in learning if more emphasis could be placed on other benefits like income generation.

Of the 50 students we interviewed, 80% is a member of a co-curricular club dealing with natural resource management issues. The 4-K club and Child-to-Child club are active **co-curricular clubs** that deal with natural resource management. Members of the 4-K club practice planting of bananas, maize, beans, vegetables, and trees,

establishment of nurseries for vegetables and trees, and rabbit-keeping. The Child-to-Child club deals with health issues, science and agricultural education, a clean environment, personal hygiene, HIV/AIDS, and horticulture (kales and indigenous vegetables). The Child-to-Child programme trains students in the upper grades (4 to 8), who in turn train students in the lower grades (1 to 3). Every student in an upper grade is assigned a lower grade partner child.

### **TEACHERS' CAPACITY TO USE NATURAL RESOURCES IN MAKING EDUCATION MORE RELEVANT TO THE LOCAL SITUATION**

Teachers said that the training they got in teacher training colleges was pretty general. Primary school teachers can be assigned any subject in school to teach; there is no specialization. They said there is **need for in-service training** on new natural resource management and teaching practices.

The headmaster said that during his education period in teacher training college he observed that trainees who had a prior teaching experience performed better than those without teaching experience. He also informed us that the teacher-training syllabus has no specific emphasis on how to use natural resources and is very theoretical.

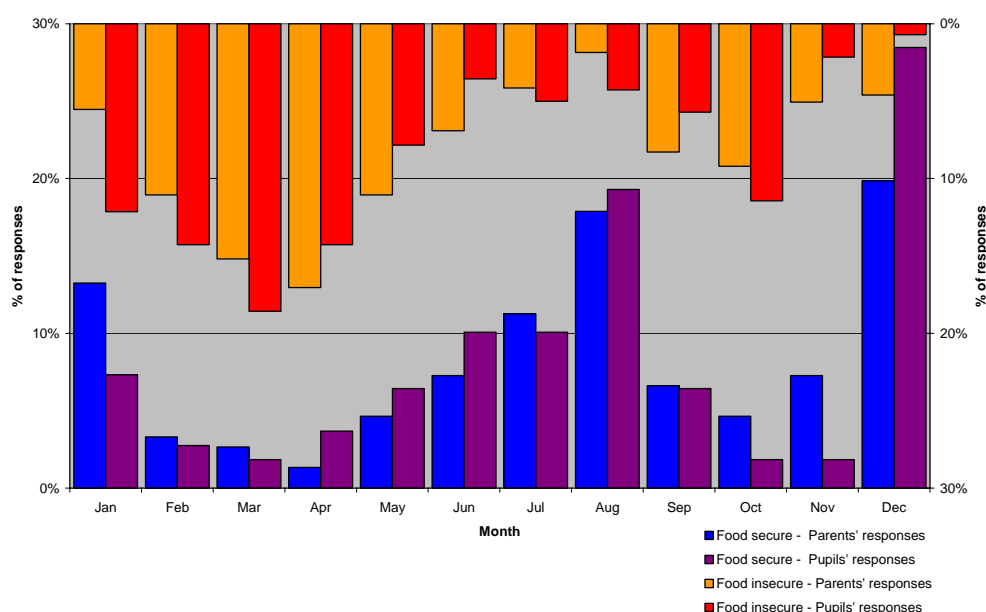
Several teachers and the headmaster have attended trainings and visits related to natural resource management. The headmaster visited Bukura College of Agriculture and Maseno Farmers Training Centre with the 4-K club members, where they were taught about horticulture. He has also visited an agricultural institution in the USA and was taught about double digging, organic farming, and the harmful effects of artificial fertilizers on the soil. While in the USA, he observed grass planted on the roadsides and trees planted on sloping areas to prevent soil erosion. Teachers have attended training by Africa Now in water harvesting, sanitation and management of water tanks. Teachers have also been trained in double digging by the Farmers Training Centre in Maseno and in livestock management by the Ministry of Agriculture. All these trainings focused on technical aspects of natural resource management, and not specifically on how to use the local environment and natural resource as a way of making teaching and learning more relevant to the local situation.

According to the teachers we interviewed, **teaching materials** in natural resource management are **not available or not adequate**. There is need for more manila papers, felt pens, agricultural tools, watering cans, and wall charts. The headmaster said that the use of locally available materials depends largely on the teacher's own initiative. Some teachers use local plants and animals and take children for a walk in the local community showing them different types of trees, seedlings, flowers, rocks, and plateaus. Teachers use banana fibres, flowers and leaves from the school compound in Art and Craft. Children are requested to bring hoes and machetes from home to use in the school garden and to make terraces. Agricultural extension officers have also been invited to the school.



### **PERCEPTIONS ON HOW RELEVANT EDUCATION USING NATURAL RESOURCE MANAGEMENT CAN HELP ADDRESS FOOD SECURITY AND SUSTAINABLE RURAL DEVELOPMENT**

The respondents were unanimous that there is often not enough food from January to June, and the worse months in terms of food insecurity are February, March and April (Figure 5). A significant proportion of students don't always take 3 meals per day (Table 10). Most parents said there is sometimes not enough food to eat in their household (Table 11).



**Figure 5: Parents' and students' perceptions on months with food (in)security (Ebussamba Primary School, Vihiga District, Kenya)**

**Table 10: Meals taken by students of Ebussamba Primary School (Vihiga District, Kenya)**

Meals	Every day	Sometimes	Never
Breakfast	66%	14%	20%
Lunch	74%	14%	12%
Dinner	96%	4%	0%

**Table 11: Parents' perceptions on the type of food consumed by their households in the past 12 months (Ebussamba Primary School, Vihiga District, Kenya)**

Type of food	% of responses (n = 50)
Always enough of the kind of food we want to eat	12%
Always enough food, but not always the kind of food we would like to eat	8%
Sometimes not enough food	76%
Often not enough food	4%

The **reasons** mentioned by different respondents **for food insecurity** and poor natural resource management practices were:

- During the second season (short rains) rainfall is unreliable and hence there is often little harvest
- Continuous farming for a long time without improving soil fertility makes the land unproductive
- Poor agricultural production, lack of proper farm management practices like use of little or no manure
- Poorly constructed terraces
- Small land sizes
- Lack of income, money is being used to pay school fees for secondary and tertiary education
- Laziness, idleness
- Destruction or theft
- Lack of casual labour jobs
- High prices of food
- Lack of relevant knowledge, illiteracy

According to the headmaster, gabions and terraces planted with Napier grass would be the best natural resource management practice available in the school to help in solving food security problems, because of the sloping land. Teachers, parents and students mentioned the use of compost manure as the best option, because it is locally available, cheap, stays long on the farm, is not harmful to plants like artificial fertilizer, and has a lot of nutrients from plants and animals waste.

The headteacher, teachers, students and parents identified the following **skills needed for food security and sustainable rural development** which children learn from school:

- Experimental skills
- Collection skills (e.g. seeds, insects)
- Information, observation, data collection, record keeping and interpretation skills (e.g. making of a weather chart based on recorded weather data)
- Estimation skills
- Reasoning skills

- Decision making skills
- Practical skills
- Income generation skills
- Measurement skills
  - Spacing skills
  - Weighing skills (e.g. in Napier grass growing, in tree nursery establishment, and in applying compost manure)
- Counting skills (e.g. counting of vegetables)

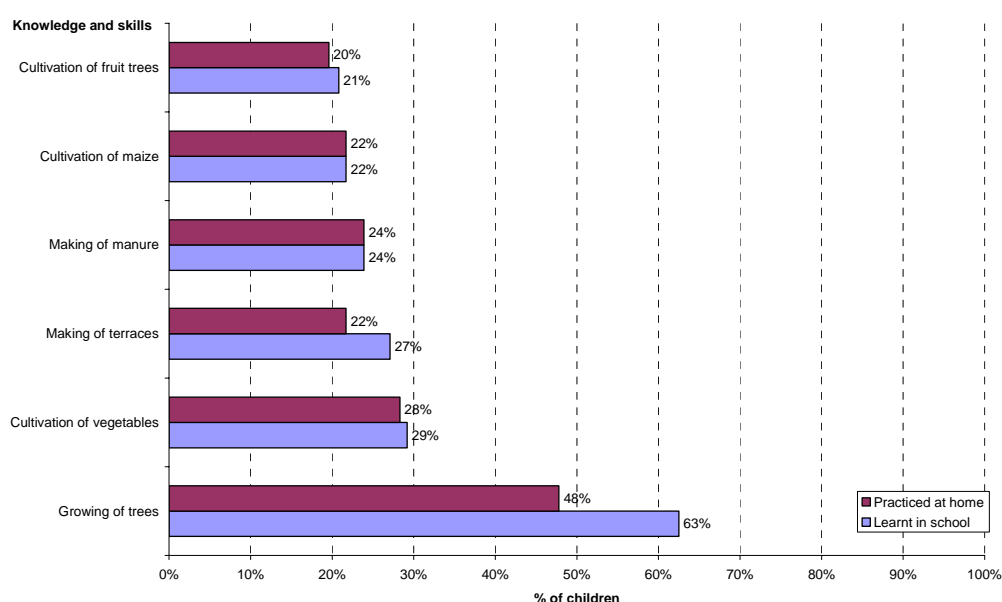
Children do practice the skills they learn from school in their daily lives at home and in the community, like recording skills when selling vegetables from their farms. The students said they would like to be taught more skills related to the planting of trees, correct spacing and measurement, management of compost manure, ways of using improved fallows, vegetables, and correct usage of artificial fertilizers. The headmaster and teachers suggested pupils to be taught more income generation skills and skills related to the measurement and location of terraces and transplanting of tree seedlings.

The headmaster and teachers said most of these skills are addressed in the curriculum and that practical sessions are being encouraged in most subjects. But the assessment of the acquisition of skills is only done theoretically through examinations and tests in class.

#### ***INTERACTIONS OF TEACHING AND LEARNING IN THE SCHOOL WITH NATURAL RESOURCE MANAGEMENT PRACTICES IN THE COMMUNITY***

Students said they had learnt different kinds of **knowledge and skills** related to natural resource management in school. Most of them also practice the knowledge and skills they learnt in school at home (Figure 6). 96% of the students said they practice at home some of the knowledge and skills they learn in school.

Students said they would like to learn more about the following natural resource management practices: tree growing (54%), cultivation of vegetables (28%), crop production (20%), growing of fruit trees (18%), soil fertility improvement (10%) and manure making (8%).



**Figure 6: Most important knowledge and skills related to natural resource management learnt in school and practiced at home (pupils' responses, Ebussamba Primary School, Kenya)**

Different respondents gave examples of students practicing at home what they had learned in school. The headmaster gave an example of his child who helps in ferrying of animal waste to make compost manure, construction of gabions and terraces at home. The teachers said pupils practice improved fallows, make compost manure, collect seeds, establish tree nurseries, plant vegetables and maize, and help in digging of holes and application of manure. The parents said children plant trees in correct spacing, plant flowers, cut grass around the homestead, and incorporate litter into the compost pit. They also use compost manure and *Tithonia* for planting bananas, maize, beans and kales. Some have planted Napier grass for feeding animals at home. The children said they make compost at home. Some have helped their parents in making of terraces, planting trees like cypress (*Cupressus* sp.), bottlebrush (*Callistemon rigidus*), jacaranda (*Jacaranda mimosifolia*) and blue gum or eucalyptus (*Eucalyptus* sp.) at home. They are also helping in establishing improved fallows and planting of vegetables using *Tithonia*, making of seedbeds and planting of bananas.

**Box 4: Josphat Ojuok (13) is getting skills from school, his home and his community**

Josphat Ojuok (13) is a student in Standard 6 at Ebussamba Primary School in Kenya. He has four sisters and one brother. He lives at home with his mother who is a widow. They live on a 0.5 acre (0.20 ha) farm. Josphat has planted blue gum or eucalyptus trees (*Eucalyptus* sp.) on the farm. He gained the skills needed for planting trees from school and from friends. They will use the eucalyptus trees for firewood and timber. *“Since I don’t have a father – when the trees are mature – I will sell them and get some money to buy food as well as things I might need in school.”* Josphat has also planted Napier grass and constructed terraces, which he also learnt in school. *“This is assisting in holding the soil together during the rainy season, so that there is less erosion.”* Other things which he learnt in school and which he is practicing at home include: cultivation of local vegetables, maize, soy beans and bananas. Josphat also has a lot of knowledge and skills in nursery establishment and management and making of compost manure. He got this information from a local NGO (Maseno Interchristian Child Health). Josphat is now also trying out another natural resource management practice (improved fallows), and he got the information from a neighbour.



**Picture 7: Josphat Ojuok (13) standing next to one of the trees he planted at home**

**Box 5: Schoolchildren are getting useful knowledge and skills from a farmer neighbouring their school**

Mr Aggrey Okutu (39) lives just next to Ebussamba Primary School. He has only partially completed his primary education. He has 3 children; one of them is currently in class four at Ebussamba Primary School. He has 6 cows and cultivates maize, beans, millet, cowpeas, kales and tomatoes in his farm. He has adopted a variety of agricultural technologies, such as improved fallows, biomass transfer<sup>8</sup>, use of compost manure, and establishment of terraces. He learnt about biomass transfer from his son in school. The terraces which have been established in the school compound are helping Mr Okutu in controlling the soil erosion on his own farm. And because Mr Okutu’s farm is located just next to the school, schoolchildren are also learning from him: they have learnt skills related to the cultivation of kales and the use of compost manure.

<sup>8</sup> **Biomass transfer:** Biomass refers to the green foliage from plants (green materials). Biomass transfer is a technology aimed at improving soil fertility. It involves cutting green manure from outside the farm or farm boundaries and hedges and bringing this onto the farm. The biomass transferred can be leguminous

78% of the students and 92% of the parents mentioned that students are sometimes given **homework** related to natural resource management by their teachers. 64% of the students and 92% of the parents said students revise their homework with members of their families. But according to the headmaster and the teachers, very few parents do actively revise students' homework. This is attributed to parents being illiterate and the current syllabus being different from what was taught when they were in school. Most of the parents who help their children with homework are educated. One student said her parent helped her in drawing a weather chart indicating rainfall. Other students were helped by parents in planting cassava, which they got from the school. Others were helped in tying of leaves with polythene bags to demonstrate the process of transpiration. Other students said their older brothers and sisters help them with their homework. The headmaster noted that household chores sometimes hinder children from doing a lot of homework.

Parents did learn something from students' homework. One parent learned about the usefulness of plant residues for soil fertility through his child's own demonstration plot. Another parent learned planting of bananas using compost manure and another using *Tithonia* as a liquid fertilizer. Another parent learned about the planting and management of Napier grass from his child. Parents said some of them fail to follow children's advice and ideas because they think they have nothing to gain. Students noticed that parents have learned ways of ploughing on slopes, planting trees, bananas and vegetables, preventing animals from getting diseases, applying compost, digging holes and pre-treating seeds.

**Box 6: Wilson Ayuyo (62) has learnt some useful farming skills from his son**

Mr Wilson Ayuyo (62) has been educated up to primary school level. He used to work in the city as a technician, but now he is a farmer. The land size of his farm is 0.75 acres. Mr Ayuyo has 7 sons and 5 daughters. Currently, he has one son in grade 7 at Ebussamba Primary School.

Wilson has become a successful farmer: he has five cows, keeps rabbits and poultry and cultivates a variety of crops, including maize, groundnuts, cassava, and sweet potatoes. He is practicing improved fallow technology, has established terraces and is growing Napier grass to feed his cows.

Wilson's son is making compost manure at home, which he was taught at Ebussamba Primary School. Wilson learnt from his son about measurements of holes, plant spacing, and the application of compost manure.

Wilson also indicated that the school is not benefiting fully from the community because the school is not often inviting interested parents.

Teachers gave examples of how the **school is promoting natural resource management practices in the community**. The schoolchildren present poems on farming and tree planting during parents' days. Homesteads neighbouring the school use water from the school tank. The school infrastructure is also used for social activities.

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plants or leaves or grasses. Non-leguminous plants such as *Tithonia diversifolia* (Mexican sunflower) can also be used. This has the capacity to improve soil fertility and increase crop yields. *Tithonia* easily gives away nutrients (including phosphorus) to plants. The decomposed green manure adds nutrients to the soil.

Some of the natural resource management practices in the community are contour farming, gabions and terraces, Napier grass, tree planting (e.g. fodder trees like *Calliandra*, fruit trees), establishment of improved fallows, *Tithonia*, use of compost manure, cultivation of maize, beans, vegetables, sweet potatoes and cassava and keeping of livestock.

The headmaster gave an example of how difficult it is to **involve parents** in natural resource management practices in the school. Parents were asked in 1997 to help build terraces in the school to demonstrate during the World Food Day, but only a few turned up to help the students and teachers. He further added that parents don't participate because they lack time due to other business at home. The students further said parents are not actively involved because they have a lot of work to do like farm work, petty business, and house chores, and they are not informed when there are activities taking place in school. One student said "pupils are the ones taught in school", so that's why parents are not involved. The parents and teachers said they help indirectly by giving agricultural tools to students to take to school.

The headmaster suggested that parents could help in enhancing natural resource management practices in school, for example by providing dairy animals for teaching and learning as well as income generation. He noted that free primary education has discouraged parents from contributing to activities in the school: "It is hard to encourage the community to participate in school activities because they are told that primary education is free". The teachers and parents said there should be regular meetings in school with extension officers and NGO's to learn more about natural resource management. There should also be more natural resource management projects in the school. Parents should be encouraged to learn from these projects and farmer field days should be organized in the school.

### 6.1.2.3 EKWANDA PRIMARY SCHOOL

#### **INTRODUCTION**

Ekwanda Primary School is situated in Vihiga District, Luanda Division and Ekwanda Village. The school is located about 5 kilometres from the Kisumu-Busia road, next to Ekwanda market along the Emutswi-Maseno road.

The school was established in 1943. The school land is 3 ha. In March 2004, the school had 11 male and 10 female teachers and all the teachers were trained. The total number of students was 765 and the average pupil/teacher ratio in the school was 36. The distribution of students per class was as represented in Table 12.

**Table 12: Distribution of students per class at Ekwanda Primary School (Kenya) in March 2004**

Grade	St.1	St.2	St.3	St.4	St.5	St.6	St.7	St.8	Total
Number of classes	3	3	2	2	2	2	2	2	18
Number of students	118	113	93	95	95	95	91	66	765
Average number of students per class	39	38	47	48	48	48	46	33	43

The ethnicity of majority of the students is Luhya; a minority is from the Luo ethnic community.

Students in grades 7 and 8 have lunch in school. The parents contribute a certain amount of grains every term.

At the time of the study, the school had been affected by strong torrential rains, which blew off the roofs of 10 classrooms - including the headmaster office. Some of the students were learning under a tree.

### ***THE SCHOOL ENVIRONMENT AND NATURAL RESOURCE MANAGEMENT PRACTICES AND HOW THEY ARE USED AS TEACHING AND LEARNING RESOURCES***

Natural resource management practices demonstrated in the school include the following:

- construction of terraces
- a tree nursery
- tree planting in the school compound
- a woodlot
- cultivation of maize, beans, bananas, kales and local vegetables
- planting of flowers and grass
- planting of Napier grass
- biomass transfer
- double digging
- mulching
- use of compost manure
- rainwater harvesting.

The use of compost manure is a continuous activity and has always been there. The construction of terraces was started in the early 1990s, and the most recent ones were established in 2001. Napier grass was planted in 1996/97. Grass was planted in 2000. The tree nursery was started in 2001 and upgraded in 2003. The practice of double digging started in 2002. The woodlot was started in 2003. Parents were not sure about the exact timing different natural resource management started in the school. They said they have been continuous activities since the school started in 1943; the most recent being the planting of trees in 2003. The school is particularly encouraging girls to plant trees – hence breaking the local traditions where women are not allowed to plant trees.

**Trees** in the school are used for firewood, fuelwood, making desks and building classrooms, poles, fencing, windbreaks, beautification, prevention of soil erosion, restoration of soil fertility, and for shade. Terraces are used for the prevention of soil erosion, and for subdividing the land. Compost manure is being used when planting kales and local vegetables. Vegetables, maize, grass and Napier grass are planted on terraces for income generation and soil erosion control. The farm produce is also used for feeding in the school.



According to the headmaster, teachers and pupils the natural resource practices available in the school are used as learning resources in teaching topics in the following subjects: Science, Geography, History and Civic (GHC), Art and Craft and Christian Religious Education (CRE).

Trees are used in **Science** for teaching parts of trees, types of roots, how roots hold the soils, and the process of photosynthesis (e.g. by tying the leaves with polythene bags). Also in Science, terraces are used for teaching and learning about prevention of soil erosion. According to the headmaster, Science is the best-performed subject since 1999 in the Kenya Certificate of Primary Education (KCPE) because it has been taught practically by using the school environment. He was also of the opinion that these practical exercises increase children's interest in learning and in applying at home what they have learnt in school.

The pupils had to bring different types of flowers from the community to the class, as well as razor blades for a Science lesson on the topic of "reproduction in plants" and the subtopic of "parts of a flower" (Picture 8). Hand lenses were borrowed from the neighbouring secondary school. The flowers were used in teaching and learning about the different parts of a flower. The students worked in groups to dissect the flowers with the razor blades and observed the various parts of the flowers using the hand lenses. Some students had to make drawings of the dissected flowers on the blackboard and name the different parts. The lesson was a good example of using the local environment and locally available resources to make teaching and learning more relevant.



**Picture 8: Pupils observing parts of a flower in a Science lesson**

We observed another Science lesson on the topic of "our environment". Students had been asked to carry different natural and man-made objects from the community (e.g. leaves, wood, stones, tins, glass, and plastic). They then had to group them into living and non-living things in the classroom. The lesson gave a practical touch to theory and again was an example of using the local environment and locally available resources to make teaching and learning more relevant.

Trees are used in **Art and Craft** for teaching and learning about texture. In **Christian Religious Education (CRE)**, tree branches and fruits are compared with the gift of the Holy Spirit in the bible.

The teachers were of the opinion that more emphasis should be put on practicals: "Practical exercises remain in the mind of a child for a very long time" and "When they grow up they will know how to utilize their own farms better".

Of the 50 students we interviewed in the upper grades, 84% is a member of a co-curricular club and 52% is a member of a club dealing with natural resource management issues. The school has three **co-curricular clubs** that deal with natural resource management: 4-K club (activities like rabbit keeping and vegetable cultivation), Child-to-Child club (activities like dance, drama and hygiene), and the Scouting Club (activities like managing tree seedlings and working in the school farm).

**Box 7: Ekwanda Primary School Special Unit is using locally available resources in teaching and learning**

The Special Unit at Ekwanda Primary School was started in 1999 by the Anglican Church of Kenya. The Special Unit caters for students with special educational needs, difficulties or impairments. There are currently 20 students (15 boys and 5 girls) and 2 teachers (1 male and 1 female) in the Special Unit. The teachers have attended workshops and seminars on natural resource management education.

Children at the Special Unit are learning a variety of competencies and skills, like basket weaving, drawing, modelling, cooking, knitting, counting, colours, sizes, association of objects to numbers, measurement and identification of shapes. They have walks in the surrounding community where they learn things like how to locate shops, hospitals, hills and valleys, how to cross a river, and environmental studies.

Most of the teaching aids used in the Special Unit are available or made locally: they include wooden blocks, bottle tops, charts, sorting trails, puzzles and number cards.

The Special Unit also has its own kitchen garden where they grow fruit trees, tomatoes, local vegetables and maize. Products from the garden are used to feed the children. Children are also given vegetable and tree seeds to plant at home.

**TEACHERS' CAPACITY TO USE NATURAL RESOURCES IN MAKING EDUCATION MORE RELEVANT TO THE LOCAL SITUATION**

According to the teachers and the headmaster, pre-service teacher training is not adequate for teaching about and with natural resources effectively. They were only taught about theory and not much about practical application. They also emphasized the need for in-service teacher training to learn more about new developments in education and natural resource management.

The deputy headmistress has attended seminars of the Christian Churches Services (CCS) of the Mothers Union (a church group that addresses women development

issues), which are organized every year. She learnt about double digging, biomass transfer by use of Tithonia, and pest and disease controlling. She also participated in a seminar organized by the Kenya Agricultural Research Institute (KARI) about livestock management. She also attended a training activity at Maseno Regional Research Centre in December 2003 about tree nursery establishment and management.

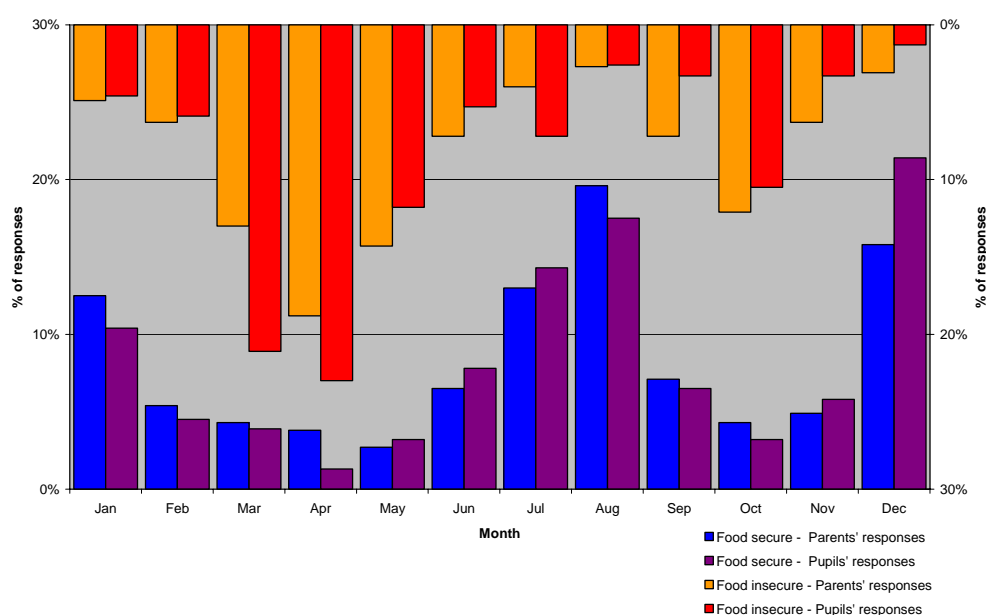
Some teachers participated in trainings at Maseno Regional Research Centre about the use of biomass transfer and improved fallows. Some teachers also went on a field visit to Bungoma organized by Africa now to learn about natural resource management practices.

The deputy headmistress informed us that the school has inadequate teaching materials in natural resource management. They mainly lack books and charts. She said that "The money they get from the free primary education programme has been allocated to specific activities in the school and cannot be diverted to other uses." She also added that local materials used to substitute for the inadequacy are leaves, flowers, and seeds from the school environment.

The teachers said they were lacking wall charts, financial resources for buying things like tomatoes for teaching, farm tools, weather instruments like rain gauges and thermometers, poultry and dairy units, seeds, and ponds for showing water plants. Teachers sometimes carry samples to school and they also ask students to carry some from home.

***PERCEPTIONS ON HOW RELEVANT EDUCATION USING NATURAL RESOURCE MANAGEMENT CAN HELP ADDRESS FOOD SECURITY AND SUSTAINABLE RURAL DEVELOPMENT***

The months with the highest food insecurity are March to May, and October (Figure 1). A significant number of students don't always take 3 meals per day (Table 13). Most parents said there is sometimes not enough food to eat in their household (Table 14).



**Figure 7: Parents' and students' perceptions on months with food (in)security (Ekwanda Primary School, Vihiga District, Kenya)**

**Table 13: Meals taken by students of Ekwanda Primary School (Vihiga District, Kenya)**

Meals	Every day	Sometimes	Never
Breakfast	56%	24%	20%
Lunch	92%		
Dinner	96%		

**Table 14: Parents' perceptions on the type of food consumed by their households in the past 12 months (Ekwanda Primary School, Vihiga District, Kenya)**

Type of food	% of responses (n = 46)
Always enough of the kind of food we want to eat	11%
Always enough food, but not always the kind of food we would like to eat	24%
Sometimes not enough food	63%
Often not enough food	7%

The **factors negatively influencing sound natural resource management** practices and reasons for food insecurity mentioned by the headmaster, teachers, parents and pupils include the following:

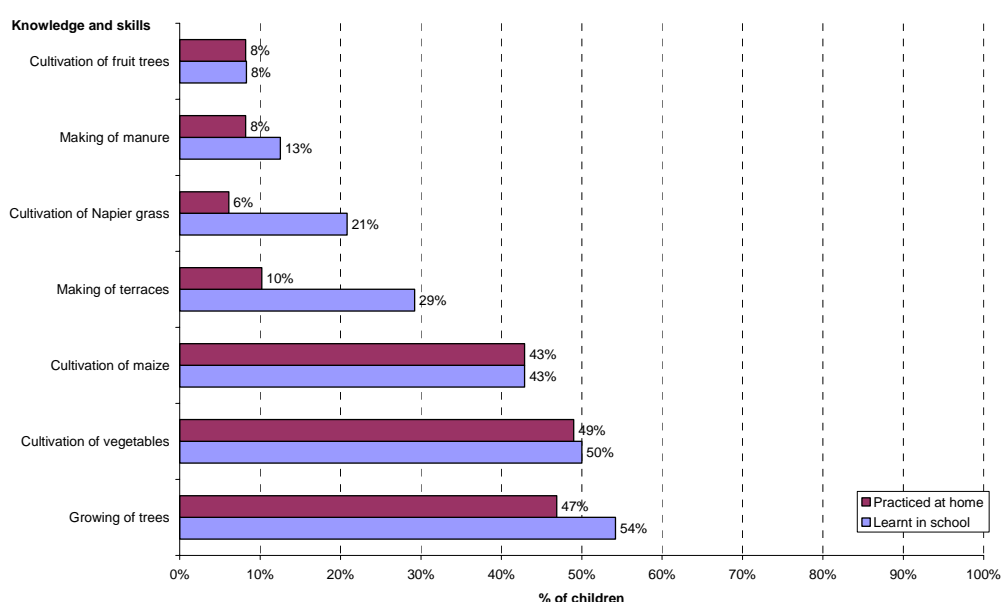
- Small land sizes
- Low agricultural production during second season (short rains)
- Illiteracy, lack of knowledge and information resulting in poor planting techniques due to (e.g. spacing, timing, not improving soil fertility, not practicing crop rotation, use of uncertified seed)
- Destruction of crops by heavy rains
- Lack of income, poverty (caused by unemployment and unproductive land)
- Little use of farm inputs and agricultural tools
- Theft
- Laziness
- Traditional beliefs (e.g. a girl is not allowed to make a terrace or plant a tree; belief that land is unproductive because it is bewitched)
- Lack of seeds and seedlings.

According to the teachers, hunger affects students' learning by poor concentration in class and high absenteeism (students tend to avoid afternoon sessions), and cases of indiscipline. The parents said during the time of food insecurity some students pretend to be sick hence absent from school; others loose concentration or fall asleep - hence affecting their performance.

According to the deputy headmistress and the teachers, the use of compost manure is the most important natural resource management practice for addressing food security and sustainable rural development, because it is easily available, cheap, has a lot of nutrients and humus, stays in the soils for long, and does not leach. Parents were of the opinion that the establishment and management of terraces is the most important to increase food productivity. Students found the use of artificial fertilizer and compost manure to be the most important.

### ***INTERACTIONS OF TEACHING AND LEARNING IN THE SCHOOL WITH NATURAL RESOURCE MANAGEMENT PRACTICES IN THE COMMUNITY***

Students said they had learnt different kinds of **knowledge and skills** related to natural resource management in school. Most of them also practice the knowledge and skills they learnt in school at home (Figure 8). 98% of the students said they **practice at home** some of the knowledge and skills they learn in school.



**Figure 8: Most important knowledge and skills related to natural resource management learnt in school and practiced at home (pupils' responses, Ekwanda Primary School, Kenya)**

The deputy headmistress gave an example of her son who cultivates kales at home using compost manure, which he is even selling to the teachers. She has seen in the community some of the students cultivating potatoes and keeping local chicken. The teachers said some students apply some of the natural resource management practices demonstrated in school at home, e.g. planting of Napier grass, trees, use of compost manure, and establishment of terraces for water management. The students also confirmed that they make terraces, plant trees (*Eucalyptus* sp., *Cupressus* sp. and *Pinus* sp.), use compost manure for planting maize and vegetables, and plant Napier grass from cuttings. The parents said the students plant trees, kales, tomatoes and bananas at home and use compost manure, artificial fertilizer and Tithonia in planting of vegetables. One parent said: "My son is keeping rabbits; the activities keep the students busy - hence they are not engaging in improper behaviour - and this also allows them to earn some income". Another parent said: "Practicing natural resource management in school and at home is preparing students to become agricultural and veterinary officers".

72% of the students and 94% of the parents mentioned that students are sometimes given **homework** related to natural resource management by their teachers. 60% of the students and 89% of the parents said students revise their homework with members of their families.

According to the deputy headmistress, few parents help their children with their homework. The majority don't because they don't care a lot about their children's primary education. "They have some children who finished school and they are just at home doing nothing - so they are not motivated". She further said that most parents are not able to send their children to secondary school because they cannot afford the school fees.

The teachers said many parents don't help their children with homework because they are illiterate or semi-literate. Parents believe teachers have to do everything related to school. Many students are not allowed to practice at home the agricultural techniques they have learnt in school due to the small pieces of land parents have.

Most of the parents in the discussions said they don't help their children directly, but they buy them paraffin for their lighting when studying in the evening. They also cited differences in the curriculum (parents went through a different curriculum as compared to what their children are learning today) as a reason why they are not able to help their children. Most of the parents said the current education is difficult for them to understand. They said some children do not like their work to be seen by their parents and they help only if the child asks for help.

One of the parents realized that he could generate income from the sale of onions and tomatoes after his children had planted the crops as taught in school. They used part of the harvest for home consumption and they were able to sell the other part. He also learned about staking and about the application of pesticides on tomatoes. Other parents learned how to mulch from their child.

The students informed us that their parents had learned about planting trees, and making of terraces to control soil erosion. One student mentioned that his sister learned to plant maize using fertilizer. Another said she could advise her parents on the number of poles or trees to use for fencing.

People in the community around the school mainly cultivate maize, beans, bananas, cassava, kales and local vegetables. The natural resource management practices are tree nursery establishment and management, tree planting, growing of Napier grass, biomass transfer (using *Tithonia diversifolia*), terracing, use of compost manure, intercropping, crop rotation, contour ploughing, and mulching.

The headmistress noted that the parents don't actively promote natural resource management activities in school, because they lack a sense of ownership. Parents would have to be sensitized more. *"Some parents are very busy with other things and they don't see any direct benefit to them"*.

The teachers and parents said parents do participate indirectly by giving farm tools, seeds, seedlings and money to students to take to school. The parents have not been mobilized to do activities in school apart from a tree-planting day which was held in the school. Some parents think natural resource management activities are the duty of the teachers. One student said: *"Parents think that teachers will teach about natural resource management to students in school"*. Another student said parents participate indirectly, e.g. by buying Napier grass from school.

The deputy headmistress had some suggestions on ways parents could improve natural resource management in the school. *"Parents should help with activities that need a lot of labour like making of terraces. Parents can give advice on how terraces should be constructed, e.g. where to construct, type, direction and size. Parents could also finance some natural resource management activities, e.g. contribute money for labour and security."*

The teachers said the school could be used as a learning resource center for the community. There should be proper mobilization of parents to come and learn in the school.

Parents suggested they could give funds to the school to buy seeds or seedlings and the school could also source independent funding from other organizations to support natural resource management.

### 6.1.3 DISCUSSION

The Government of Kenya has started to implement some major reforms in the education sector. In particular, it has introduced **"free" primary education**. Provision of instructional materials including textbooks has been identified as one of the major achievements of the free primary education programme.

There are mixed views about the impact of the introduction of free primary education on **education quality** in Kenya. On one hand, there is a consensus that education quality has improved because of the provision of teaching and learning materials and because students are no longer missing lessons due to lack of school fees. On the other hand, quality has gone down due to large numbers of students in classes which makes it difficult for teachers to give personalised attention to all learners. Hence teacher-pupil interaction is not optimal.

The headteacher of Ebussamba Primary School said: *"Science is our best subject in the examinations since 1999 because we are teaching it practically in our school making use of natural resources"*. He further said: *"The natural resource management practicals increase children's interest in learning and they are also practicing these techniques at home"*. He also indicated that teaching and learning activities using natural resource management will finally lead to better nutrition and income generation both at school and at home. It also makes students to be more interested in school work. This is a clear illustration of the potential benefits of relevant basic education for food security and sustainable rural development.

Integrating natural resource management in teaching and learning in school encourages school-community linkages. Parents see primary education to be of immediate meaningful use to their children when they practice the skills learnt in school at home. This also encourages more parents to send their children to school as they get convinced of the quality and relevance of the education offered.

Many teachers in Kenya are already using agricultural and environmental experiences in their teaching. This is mainly done through their own initiatives as there are no clear policies and coordinated efforts from the government yet. The school curriculum and examinations still put much more emphasis on knowledge than on skills. Teacher training curricula would also need some more specific emphasis on the use of natural resource management practices in teaching. There is as well a need for adequate in-service teacher training on the same.

Lack of knowledge and information on improved agricultural practices is still a big obstacle to sustainable rural development in many Kenyan communities. Extension officers and role models of successful farmers in the community could be invited to local schools to lecture and demonstrate good practices. Schools could act



as demonstration sites for natural resource management practices because they are centrally located, accessible, communally owned, neutral and most of them have land available.

Linkages between different organizations imparting skills to schoolchildren should be encouraged. Ministries of Agriculture and Education could have joint programmes in schools.

## **6.2 ZIMBABWE**

### **6.2.1 INTRODUCTION TO ZIMBABWE**

#### **6.2.1.1 ZIMBABWE: BASIS FACTS AND INDICATORS**

Zimbabwe is a land-locked country in Southern Africa with an area of 390,757 square kilometres. The population of Zimbabwe was 11,634,663 in 2002, constituting 2,653,082 households with an average of 4.4 persons per household (Central Statistical Office, 2002). Zimbabwe has an average population density of about 30 persons per square kilometre. Forty percent of the people are living in cities and this percentage is expected to rise.

In 1965, Ian Smith declared independence from the British Crown and, for 15 years, Rhodesia was governed under an apartheid white colonial rule. In 1980, after a civil war, the black majority took over and renamed the country Zimbabwe.

For the last 20 years Zimbabwe has been one of Southern Africa's most prosperous countries: it was the world's third biggest source of tobacco and a bread basket for surrounding countries which often depended on food imports. However, the fast track land reform implemented by the Government implying the seizure of almost all white-owned commercial agricultural land, with the stated aim of benefiting black farmers, led to sharp falls in production. By 2003, more than 1/3 of Zimbabweans were thought to be at risk of famine.

The country's current challenges include the need to address political stalemate, the economic crisis and one of the world's highest rates of HIV/AIDS infection.

In 2001, 33 percent of the adult population and 240,000 children were living with HIV/AIDS and these numbers are still increasing (UNDP, 2003). The pandemic has caused life expectancy in Zimbabwe to go down from 56 in 1975 to 33 in 2005.

#### **6.2.1.2 ZIMBABWE: THE CURRENT HUMANITARIAN CRISIS**

The current humanitarian crisis in Zimbabwe is complex and continues to deteriorate. The situation is a result of natural disasters (severe flooding and drought), poor economic performance, one of the world's highest HIV/AIDS infection rates, declining basic social services, a destabilising land reform programme and human rights abuses. These developments combined have exacerbated the humanitarian situation and continue to hinder recovery. Zimbabwe has entered official low income country status, and in one year Zimbabwe dropped from a ranking of 128 to 145 (out of 173 countries) in the human development index (HDI) calculated by the United Nations Development Programme (UNDP).

Today Zimbabwe has one of the world's fastest crumbling economies. HIV/AIDS is killing over 2,600 people every week and has left more than one million orphans. 'Forgotten' diseases such as cholera and dysentery are again showing epidemic dimensions due to the rapid deterioration of water, sanitation and health services. Agricultural production has fallen significantly and the country faces a massive food deficit. An estimated 7.5 million people are affected by the food crisis. People are

being forced to leave their homes in search of food and employment. Violence threatens to increase food insecurity and internal displacement.

### **6.2.1.3 BASIC EDUCATION IN ZIMBABWE**

#### ***PURPOSE OF EDUCATION IN ZIMBABWE***

Since independence in 1980, Zimbabwe has remained committed to the provision of education as one of the basic rights of every child. Education – formal, informal and non-formal – has also been viewed as a pillar of national development. Education has been regarded as an investment in human capital for economic development, as well as a major investment in broader social development and change through reducing inequalities of opportunity, and acting as a “social vaccine” to disease, hunger and poverty. The mission of the Ministry of Education, Sport and Culture (MOESC) is: “*To provide high quality and relevant primary, secondary and non-formal education.... to enrich the lives of the people of Zimbabwe.*”

#### ***STRUCTURE OF ZIMBABWE'S EDUCATION SYSTEM***

The education system involves 13 years of schooling. Seven years of basic education lead to the Grade 7 Examination. Secondary schooling has two years leading to the Zimbabwe Junior Certificate (ZJC) and then two years to ‘O’ Level examinations. Most youth leave formal education after ‘O’ Levels, and enter the job market, apprenticeships or training colleges of various types. High school is essentially preparation for university or college.

#### ***ACCESS TO EDUCATION IN ZIMBABWE***

Government's most urgent priorities after independence were policies and programmes to promote access to, and participation in, education. Key thrusts were construction of schools, suspending age restrictions on entry into various programmes, abolition of primary school tuition fees and strategies to enhance access by previously disadvantaged groups (e.g. girls, blacks, remote, rural communities, minority ethnic groups). To meet short term personnel requirements, untrained and retired teachers were recruited, but large numbers of teachers were trained to meet future demand. Successes were sustained by (HIV/AIDS in Education Assessment Team, 2002):

- (a) Government leadership
- (b) Commitment of many other players (e.g. rural district and urban councils, churches, private individuals, trusts, and private companies) to provide infrastructure
- (c) Communities' investment in school construction and other costs of children in school
- (d) Dedication of personnel, including management, teachers and support staff.

Impressive achievements in expanding **access** to education made Zimbabwe an internationally acclaimed “flagship” country. Between independence and 2000, the number of primary schools almost doubled and the number of secondary schools increased over eight-fold, with massive increases in enrolment rates in both sub-sectors. Access rates to early childhood education and care centres increased from

close to zero at independence to 20% in 1990, and to 35% in 1999. Gross Enrolment Ratios (GERs) at primary school level shot from around 55% in 1980 to an estimated 110% for 2000, and from 12% and just over 58% for the secondary schooling. By 2000, Net Enrolment Ratios (NERs) stood at around 92% for primary and 40% for secondary schooling.

The National Action Plan (2002) indicates that in terms of access to both primary and secondary education, Zimbabwe has made great strides. At primary level, the Gross Enrolment Ratio (GER) stands at slightly over 100% while the Net Enrolment Ratio (NER) stands at 94%. The secondary level has a Net Enrolment Ratio (NER) of 45%. As a result of massive expansion at secondary level at independence in 1980, the transition rate from primary to secondary leaped from 12.5% to 70%. However, from 'O' to 'A' Level, the transition rate stands at 8%. While there has been improvement in access, Zimbabwe faces a major challenge in the area of quality and relevance of the education system (Ministry of Education, Sport and Culture and Ministry of Higher and Tertiary Education, 2004).

The education system also proved its ability to address other major challenges to expand its capacity as an agent of social change and transformation. The school curriculum was overhauled to reflect a new epistemological base, socio-cultural values and socio-economic order. This major undertaking required re-drafting of educational goals and objectives, revision of materials, re-orientation of teachers, new pedagogical practices, and re-design of assessment systems. Many other innovations enhanced transformation. These included localizing teaching materials and examinations, introducing vocational/technical subjects, introduction of HIV/AIDS and life skills education in the 1990s, and new pre- and in-service teacher training and support programmes (e.g. Zimbabwe Integrated National Teacher Education Course (ZINTEC), Teacher Management and Support (TMS) programme, managerial skills training programme for headteachers, and in-service and distance education programmes designed to upgrade teachers and school heads).

Unfortunately, the gender parity and the universal literacy that Zimbabwe achieved after independence are now slowly eroding. The prohibitively high cost of living, staff attrition rates, user fees, inadequate supplies, HIV/AIDS and land reform are amongst the basic and most detrimental causes of poor access to quality education. The education system has been undermined by under-funding and the loss of qualified teaching and management staff to HIV/AIDS and emigration such that the quality and delivery of education is very poor in many schools. The general decline is particularly severe in areas receiving influxes of vulnerable people who are forced to migrate because of food insecurity or are adversely affected the land reform process. The education system has been unable to respond to increased demand in these areas, meaning that basic education is not accessible to significant number of children.

### **QUALITY OF EDUCATION IN ZIMBABWE**

When enrolments began to stabilise around 1987, the Government of Zimbabwe shifted from quantitative expansion to consolidating quality, equity and relevance of education.

Improving quality of education has been a key policy thrust. Efforts to enhance quality have taken several forms, among them adding to school infrastructure, increasing teaching and learning resources, ensuring the supply of qualified teachers, improving

qualifications of teachers already in service, and ensuring that the curriculum addresses the needs of the learners as well as the challenges of the contemporary world.

Quality of education has improved in many respects, although assessment of quality has been a relatively controversial area, mainly because different stakeholders adopt different perspectives of quality. A major emphasis was on improving outputs, in the hope that level and relevance of learning outcomes would then be enhanced. Some hold that, from the input perspective, quality has suffered due to declining capacity of government, households and some responsible authorities which have led to fewer resources in schools. But studies have shown that, in primary schools, the levels of resource provision actually improved between 1991 and 1995 and the system has performed well in terms of input indicators such as quality and relevance of learning materials (Murimba et al., 1995 and Machingaidze et al., 1998). In addition, the proportion of qualified teachers has risen markedly. Process variables that affect quality in education are not well understood in Zimbabwe but there has been improvement in indicators such as teachers' pedagogical practices and the system's internal efficiency. Output indicators (e.g. the number of graduates the system has produced) have also showed progress. Trends in outcomes in the form of pupil achievement have been difficult to interpret, partly because the nature, form and scope of examinations, which also respond to changing syllabi, have changed over the years.

Community participation in school affairs is seen as an important way to maintain and add to education gains. Policy has encouraged formation, and direct participation in school management, of School Development Committees (SDCs) and School Development Associations (SDAs) - for non-Government and Government schools respectively. Policy aims to strengthen mutual support between communities and schools, to enhance schools' accountability to communities and community ownership, and thus to increase sustainability of school development processes.

### ***LANGUAGE OF INSTRUCTION***

Zimbabwe has three official languages: English, Ndebele and Shona. Ndebele and Shona are the official languages of instruction, in those areas where they are predominant, during the first three years (Grades 1-3) of primary education, after which English becomes the official medium of instruction.

### ***EDUCATION AND GENDER EQUALITY IN ZIMBABWE***

Zimbabwe boasts of having achieved parity in terms of the enrolment of boys and girls at primary level. In the year 2000, 49.2% of primary school enrolees were girls. For the same year, 44% of all the pupils enrolled in secondary schools were girls. However, at 'A' Level, girls constitute 30% of the enrolment.

At secondary level, girls' enrolment declines due to a number of reasons. Among them are cultural beliefs and practices, poverty, pregnancy, early marriages particularly in mining and commercial farming areas, long distances to school and abuse of girl children. Another challenge in gender equality is the incidence of the HIV/AIDS pandemic. It has been observed that girl children drop out of school in

order to take care of the sick, siblings and orphaned children (Ministry of Education, Sport and Culture and Ministry of Higher and Tertiary Education, 2004).

### **PRIMARY SCHOOL CURRICULUM**

In terms of **learning outcomes** by the end of primary school, learners are expected to (Ministry of Education, Sport and Culture, 2002):

1. Communicate effectively in both the written and spoken forms of either Shona or Ndebele and English
2. Solve numerical problems and apply numeracy to daily life situations
3. Appreciate and apply science and technology and demonstrate creativity in the application to their daily lives and in the utilisation of local resources
4. Express and value the beauty and complexity of works of art and design
5. Appreciate the basics associated with enterprise, creation and development
6. Demonstrate an understanding of ethical principles of conduct including nationhood, good neighbourliness, citizenship and respect for humanity and sustainable use of the environment
7. Appreciate the value of sport and culture
8. Demonstrate and appreciate a healthy lifestyle.

In view of the above, all primary schools in Zimbabwe should offer the following **subjects** from grades 1 to 7 (Ministry of Education, Sport and Culture, 2002):

- Language and Communication
  - Shona or Ndebele
  - Sign language for the hearing impaired
  - English
- Numeracy
  - Mathematics
- Science and Technology
  - Environmental Science
  - Technology and Computers (where facilities are available)
- Ethics and Citizenship
  - Social Studies
  - Religious and Moral Education
- Practical Subjects
  - Art and Craft
  - Home Economics
  - Music, Physical Education and Theatre Arts.

The primary school curriculum and examination system in Zimbabwe seems to focus more on theoretical knowledge than on practical knowledge, skills and attitudes.

### **TEACHERS**

Teachers make up the largest group of civil servants in Zimbabwe. They are generally poorly paid. Teachers' training takes three years after O-levels. Newly graduated teachers can not choose their station themselves; they are appointed a post in a school, which is often a school where more experienced teachers prefer not to teach because of the harsh conditions. Most teachers prefer to teach in a school

with water, electricity, good infrastructure, preferably in a city or close to their place of origin. Teacher turnover rates and teacher shortages in isolated rural schools are high. In these areas, schools often have to resort to hiring teachers without a diploma.

HIV/AIDS has also had a significant negative effect on the numbers of teachers. Their higher socio-economic status, greater mobility and postings away from their homes and families can lead to more sexual contacts and therefore increased risk of infection.

### **EDUCATION FOR SUSTAINABLE DEVELOPMENT IN ZIMBABWE**

The primary (and secondary) school curriculum in Zimbabwe is in line with the ideals of the UN Decade of Education for Sustainable Development (2005-2014). In Social and Environmental Studies at primary level and Geography at secondary level, children learn about how natural resources such as water, soil, grass, and trees can be conserved (Ministry of Education, Sport and Culture, 2004). There is however no policy framework to promote the use of natural resource management and sustainable development issues in schools. Some organisations in Zimbabwe are currently pushing and lobbying for the inclusion of environmental education in the school curricula.

Several co-curricular clubs in Zimbabwean schools are dealing with activities related to natural resource management and sustainable development: permaculture clubs, environment clubs, Action 21 clubs, CAMPFIRE clubs, Environment Africa clubs, drama clubs and Tree Growing Tree Care (TGTC) clubs (Box 8).

#### **Box 8: The Tree Growing and Tree Care (TGTC) Programme in Zimbabwe**

Zimbabwe's Tree Growing and Tree Care (TGTC) Programme was started in 1985 by the Forestry Commission and the Ministry of Education, Sport and Culture. The aims of the programme are to educate children and young people in environmental management issues, to help solving environmental problems in communities, and to assist in food production and income generation.

The programme is active in primary and secondary schools, teacher training colleges and agricultural universities. As part of this programme, schools are raising tree seedlings, establishing tree orchards, woodlots, vegetable gardens and flowerbeds, and are active in beekeeping.

Activities of the Tree Growing and Tree Care (TGTC) Programme are used in teaching and learning of Environmental Science. Annual competitions are organized at different levels and in different categories. An outreach programme is encouraging schools to initiate similar activities in the neighbouring communities.

Currently, the Tree Growing and Tree Care (TGTC) Programme is not doing very well due to lack of funds as most sponsors pulled out.

### **CHALLENGES IN ZIMBABWE'S EDUCATION SECTOR**

Zimbabwe's post-independence education sector is regarded as a success story that has many lessons for Africa and the rest of the world, but it still faces a number of key challenges which include the following (HIV/AIDS in Education Assessment Team, 2002):

- Increasing and sustaining access. Zimbabwe had removed most barriers to Universal Primary Education (UPE) by the mid-80s, but Net Enrolment Ratio (NER) has not risen to 100%, implying that a percentage of children do not get access to education. About 24% of children still failed to complete primary school in the 1990s. Primary school dropout rates for both primary school boys and girls have been on the increase since 1996. At Grade 6 level, dropout rates of 5.5% and 8.3% for boys and girls respectively have reached the highest levels recorded since 1980. Particular issues in improving access include:
  - Remaining urban-rural and inter- and intra-regional inequities in quality and access. Particular challenges remain to create and enforce access for children in specific geographical locations and social groups such as those on commercial farms, in remote rural areas, and in newly resettled areas.
  - Addressing the influence of poverty and economic circumstances. The Net Enrolment Ratio (NER) has tended to reflect the trends of poverty, with the lowest enrolment rates recorded during years of stresses such as severe drought. User fees present a specific challenge to universal and compulsory education.
  - Expansion of effective access to secondary education and reducing dropout. Around 25% to 30% of Grade 7 learners do not make the transition to Form 1. Dropout rates at Form 4 ('O' level) are 95% respectively, leaving a small minority to progress to 'A' Level.
- Gender equity. Steady progress towards achievement of gender parity in access and participation has been achieved. However, there are still challenges to equitable female participation, particularly in secondary schooling. The primary school gender parity index rose from 0.91 in 1980 to 0.97 in 1999 and from 0.76 to 0.88 for secondary schools. Achievement by girls tends to be better than boys in primary school, but worse in secondary school.
- Relevance. One of the far-reaching innovations in Zimbabwe's education sector has been curriculum reform to make it more responsive to the needs of learners and society. However, there are still challenges to improve the relevance of education so that school leavers and graduates are well equipped to participate fully in society and the world of work.
- Enhancing quality of education. This remains a Ministry priority and is even more challenging due to rising poverty that is likely to inevitably affect schooling, through e.g. impacts on pupils' socioeconomic background, regularity of meals, availability of books at school and at home, and the availability of classroom furniture.



- Consolidating management efficiency and capacity at all levels of the education sector. All role players acknowledge that factors such as bureaucratic systems and practice and skills leave room for improvement.
- Sustaining employee motivation and morale. Morale is generally reported to be low and the Ministry has to manage this and reported tendencies of employees to leave the sector for alternative employment locally or internationally.

These challenges of maintaining and enhancing education system performance and accessibility are particularly daunting in the context of declining real education expenditure and general economic decline.

#### **6.2.1.4 FOOD SECURITY AND RURAL DEVELOPMENT IN ZIMBABWE**

##### ***GENERAL BACKGROUND TO THE AGRICULTURAL SECTOR IN ZIMBABWE***

Agriculture is a vital sector of the Zimbabwean economy providing employment and livelihoods for 70% of the population, including many of the poorest. Depending on weather conditions, the sector also contributes between 40% and 50% of total export revenues. Agricultural performance varies dramatically year-to-year depending on the rainfall and these vagaries impact more powerfully on the lower potential areas.

The agricultural sector in Zimbabwe is highly dualistic. In the commercial sector, land is privately owned, production is for the market and farms are run as commercial profit-seeking enterprises. By contrast, in the smallholder sector, households do not have title to the land they farm, much of the production activity is family-based and subsistence production remains an important part of livelihood strategies.

The agricultural sector has not yet, in practice, made a significant or sustained contribution to poverty reduction in Zimbabwe (Poulton et al., 2002). Forty percent of the population in Zimbabwe is undernourished.

New crops such as **maize** were introduced to the coast of Africa by the Portuguese from the sixteenth century onwards and these soon found their way to Zimbabwe. The taste for maize has thus been enjoyed by Zimbabwe for some centuries but it was not until white settlers began to increase its cultivation as a commercial crop in the early twentieth century and the exigencies of the First World War demanded increased production that its consumption became widespread. With the onset of the 'green revolution' in the 1950s and 60s and the development of high yielding and disease resistant hybrid maize varieties, increasing maize production was not only encouraged by international development agencies but became enshrined in Government policy. With the establishment of the newly independent administration in the 1980s, the whole cereal marketing structure became based upon the production, across the country, of cheap maize for the population as well as for export. Maize thus became the staple for the whole population for whom its *sadza* (or porridge) represents a fundamental dietary need almost to the point of addiction. Maize not only requires very good growing conditions but is also a risky crop because of the (approximately 10 day) window of opportunity for pollination in which conditions must be ideal and in the absence of which the crop will fail completely.

The small grains, sorghum and particularly millet, however, are crops which are physiologically adapted towards drought tolerance. **Sorghum** has a mechanism which enables the plant to 'shutdown' during moisture deficient periods and then 'restart' growth on the return of precipitation. Sorghum, requiring precipitation of approximately 275 mm per annum, has a particular ability to survive physiological drought caused by water-logging when root functions are temporarily impaired. This capacity makes sorghum an almost ideal crop to take advantage of good rains when they occur and to give some guarantee of a harvest in years when there is poor rainfall distribution. Sorghum is, however, reported to fail as often as maize on a five year average and is prone to attack by the Quelea bird.

Bulrush (or Pearl) **millet**, requiring precipitation of about 250 mm. per annum (or less if there is good rainfall distribution), is the crop which can be most relied upon to produce a harvest. Too much rainfall at flowering can, however, cause failure and the crop is again susceptible to bird attack.

The farmer's planting strategy is thus based upon very clever gambles, fine-tuning of the choice of crop type as the season progresses and always with an almost addictive desire to plant some maize to satisfy the family's taste.

## **CLIMATE**

Zimbabwe has a sub-tropical climate that is influenced by altitude. It lies within the tropics. Tropical conditions are only experienced in the low lying areas of the Zambezi and Limpopo valleys. The remaining parts experience subtropical climate with one fifth of the terrain above 1,200 meters and three fifths lying between 600 and 1,200 above sea level.

There are four distinct seasons: a warm wet season from November to March, transitional season in April and May, a cool dry winter season from May to August and a warm dry season from August to October. Rainfall in the rainy season varies widely both temporally and spatially. The reliability of rainfall increases with altitude, and from south to north. Coefficients of variability range from >40% in areas south of Bulawayo to <20% in some parts of the Highveld and Eastern Highlands. Rainfall is highest on the Highveld with an average annual precipitation of up to 1 020 mm (40 inches) while the Middleveld receives 410 mm to 610 mm (16 to 24 inches) and the Lowveld receives less than 400 mm (12 inches).

## **SOILS**

Zimbabwe's soils are mostly sandy. Heavier loamy and clay soils are found in patches across the country. Granitic sandy soils are most common in communal areas. These are often highly leached and thus depleted of base nutrients.

## **AGRO-ECOLOGICAL REGIONS**

Zimbabwe has a total land area of 390,757 km<sup>2</sup> divided into five agro-ecological regions (Figure 9 and Table 15), which provide the basis for land-use planning analysis.

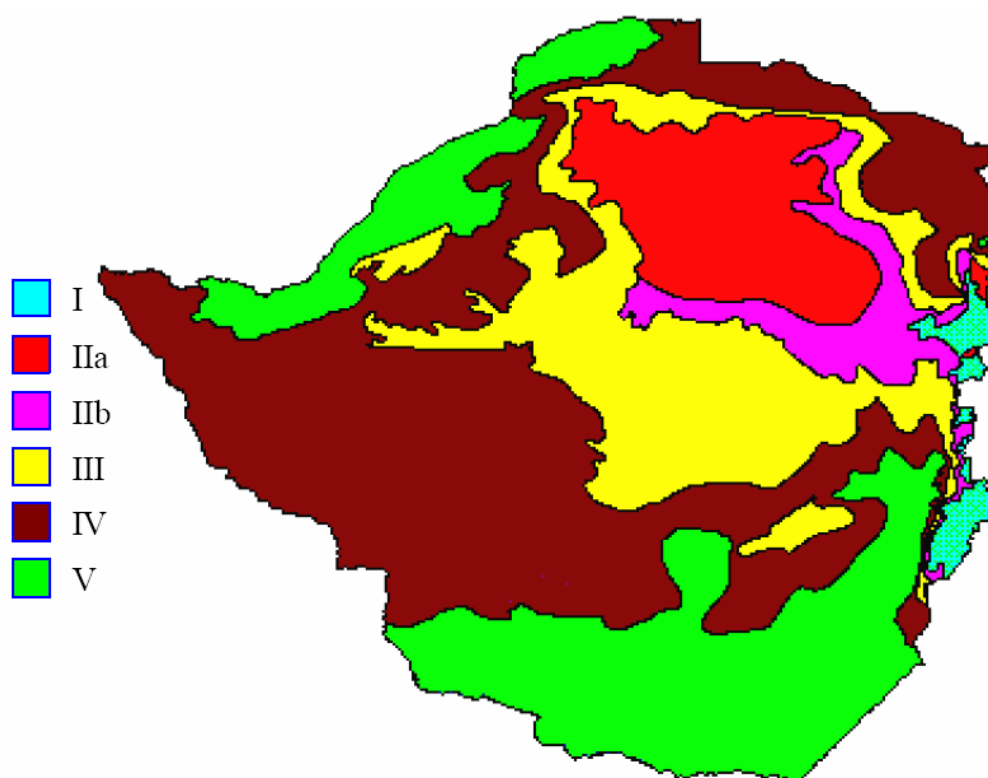


Figure 9: Agro-ecological regions of Zimbabwe (Mkwanda, 1999)

Table 15: Agro-ecological regions of Zimbabwe (Mkwanda, 1999)

<p><b>Region I: Eastern highlands</b> (&lt;2% of Zimbabwe). Annual rainfall: &gt;1000 mm. A combination of high rainfall, low temperatures and high altitude make the region suitable for afforestation and intensive diversified agriculture, including tea, coffee, deciduous fruit, and intensive livestock production.</p>
<p><b>Region II: North-eastern high-veld</b> (16%). Annual rainfall: 750-1000 mm. The rainy season between November and March is reliable. The area is suitable for intensive cropping and livestock production.</p>
<p><b>Region III: Midlands</b> (18%). Annual rainfall: 500-750 mm. Characterised by mid-season dry spells and high temperatures, the region is suitable for drought-resistant crops and livestock. Farming is semi-intensive.</p>
<p><b>Region IV: Low-lying areas in the north and south</b> (37 %). Annual rainfall: 450-650 mm. With periodic seasonal droughts and severe dry spells during the rainy season, the region is unsuitable for dryland cropping but suited to livestock production.</p>
<p><b>Region V: Lowland areas of altitude &lt;1 m</b> (27 %). Annual rainfall: &lt; 650 mm. With erratic rainfall, this region is suited to extensive livestock production or game-ranching.</p>

### **DOMESTIC AGRICULTURAL PRODUCTION**

In most years food availability can be met through domestic production; with cereals, and above all maize, providing the bulk of staple food. Total cereals production since Independence in 1980 does not show a clear trend for the most part, although there are signs of downward movement since the late 1990s. Instead, the harvest varies considerably, largely in tune with the weather. Since Zimbabwe's population has risen from just over 7 million in 1980 to more than 13 million by 2003, overall cereal production per person has tended to decline. Since 1985-86 agricultural production growth has not kept pace with population growth in the communal and resettlement areas.

In recent years Zimbabwe has consumed around 1.8 million tons of cereals as food, and another 0.4 million tons as animal feed, making total domestic consumption some 2.2 million tons. In slightly more than half the years of the 1980s and 1990s this amount was produced domestically (Forum for Food Security in Southern Africa, 2004).

### **TRADE IN FOOD**

Trade in cereals is very much a residual of production. In most years until the late 1990s, a net surplus on trade in cereals has been typical, the great majority of the exports by weight being unmilled maize. Between 1990 and 2002, Zimbabwe exported over 5 million tons of cereals. Of this quantity, some 55% went to the neighbouring states of Malawi, Mozambique, South Africa, and Zambia – in that order of magnitude; and a further 17% went to other states within Southern and East Africa. Zimbabwe has, until its recent run of harvest failures, thus played a significant role in supplying the import needs of its neighbours.

Cereals imports have in most years, again until recently, run at low levels, mainly being wheat to make bread and pasta, and grains for specialist purposes such as brewing. In years of low domestic production, however, imports have been substantial – as seen in the years 1984, 1992 & 1993, 1996, and 2002–04.

Food aid shipments to Zimbabwe have been limited in large part to responses to the main harvest failures. Since 1980, some 1.6 million tons of cereals food aid in total has been received, but more than 80% of these shipments arrived in just four marketing years: 1984–85, 1992–93, 1998–99, and 2002–03. The bulk of cereals aid has come from the USA (Forum for Food Security in Southern Africa, 2004).

### **RURAL POVERTY IN ZIMBABWE**

Poverty in Zimbabwe is primarily a rural phenomenon, although urban poverty has risen alarmingly in the 1990s.

Poverty is closely associated with lack of access to land in rural areas, and with low levels of **education**. Typically those with little land or education are also lacking other assets, such as livestock. Living in remote areas tends to make matters worse: there are fewer options for livelihoods and coping. Those who are unable to work, owing to age, disability, and sickness – including those living with HIV/AIDS – are also often poor.

The poor cope partly by being prepared to restrict consumption of food – reducing meal frequencies and portion sizes, switching to the cheapest possible foods – and consumption of other goods and services, including taking their children out of school. Similarly, they often struggle to maintain some income by taking on arduous work that is low paid – including brewing, construction, gathering wood, etc. But such measures offer survival, rather than the means to escape poverty (Bird and Shepherd, 2003).

Poverty is most highly concentrated in the so-called communal and resettlement areas, and the incidence of poverty also increases on one moves into the lower potential agro-ecological regions (agro-ecological regions IV and V). More rural people live in agro-ecological region IV than in any other agro-ecological region, so consequently the largest number of rural poor is found in this region (Poulton et al., 2002).

### ***THE RECENT FOOD SECURITY PROBLEMS IN ZIMBABWE***

In April 2002 the government of Zimbabwe declared a “national drought disaster”, as it became clear that the harvest due in April-May 2002 was to be poor. The previous harvest had also been low, at 74% of the previous five year average: the 2002 harvest was to be just over half of that mean. In the hungry season of the ensuing crop marketing year, 2002–03, around 6 million persons were assessed as needing emergency food relief, with 705,000 tons of food aid in cereals planned for distribution by donors.

This was hardly the end of the crisis: the 2003 harvest proved to be even lower than the previous two, at just 41% of the average for 1996–2000. The World Food Programme (WFP), as well as other donors, continued emergency feeding in Zimbabwe in the 2003–04 marketing season, planning to feed 3.5M people with 330,000 tons of cereals.

Food prices have soared dramatically with the July 2005 devaluation of the local currency. The Zimbabwe Vulnerability Assessment Committee indicates that that 2.9 million Zimbabweans would require food assistance and the Government would import 1.2 million tonnes of maize to address the country's food needs. However, the rising prices indicate that the number of food insecure people is likely to be higher than the national VAC's preliminary estimate of between 2.9 and 3.9 million. Additionally, given the ongoing severe foreign exchange reserve constraints in Zimbabwe, the expected level of maize importation will be a challenge. WFP is preparing to feed 4 million people before the next harvest in 2006.

The run of poor harvests is exceptional. While some of the problems can be blamed on poor weather in the cropping season, the manner of implementation of the fast-track resettlement programme, other food policies, and the context of a failing economy clearly play a substantial role in the crisis.

The current problems bring issues of food insecurity into sharp relief, but well before these events, a large fraction of Zimbabwe's citizens were food insecure. In 1999–2000, FAO estimated that food in Zimbabwe was, on average, available to the value of 2,100 Kcal a person a day – just about the minimum required to meet average energy needs. But that does not mean that all Zimbabweans were adequately fed. Some 39% of Zimbabweans were not sufficiently well nourished. This figure is above

the average for Sub-Saharan Africa as a whole, and more than twice the developing world average.

Although some progress was made in the 1990s towards reducing the share of the population under-nourished, absolute numbers rose to reach 4.9 million by the end of the decade. Since then, most of the factors affecting food security have moved adversely.

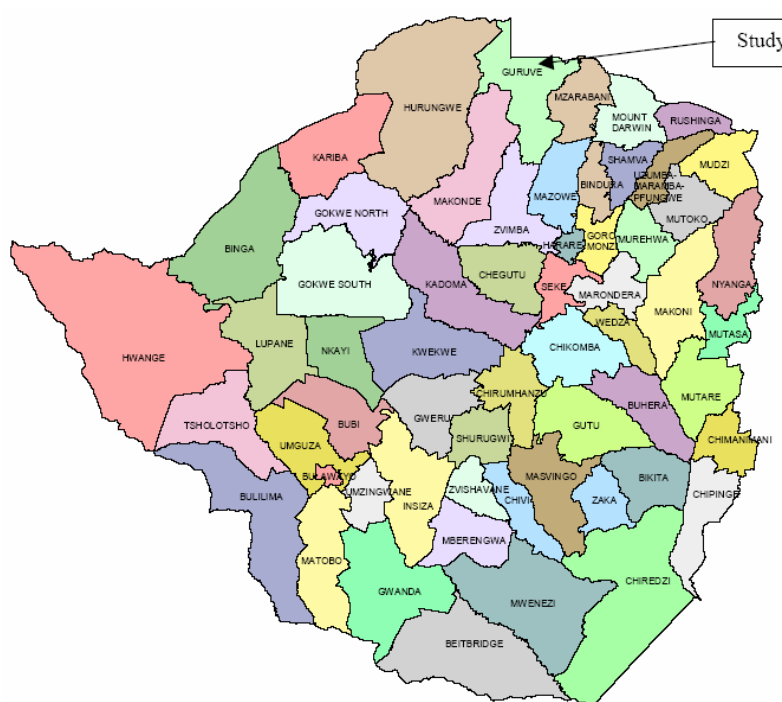
Child malnutrition statistics show that just over one quarter of young children are stunted, indicating long-term malnutrition; and one sixth are underweight showing short-term under-nutrition as well as longer term deficits. Trends during the 1990s are not clear, but there is little evidence of any progress being made in reducing child malnutrition. It is apparently not known to what extent the malnourished children owe their status to low food intake, and how much to the effects of disease. That said, there are indications that HIV/AIDS may be playing a role in worsening nutrition indicators (Forum for Food Security in Southern Africa, 2004).

## 6.2.2 STUDY SCHOOLS IN ZIMBABWE

### 6.2.2.1 LOCATION OF THE SCHOOLS: GURUVE DISTRICT

#### **LOCATION**

Both study schools are located in Guruve District, which lies in the Zambezi Valley. Guruve district is found in Mashonaland Central Province in the northern of part of Zimbabwe (Figure 10).



**Figure 10: Location of Guruve District (Hofisi, 2003)**

## **GEOGRAPHY**

Altitudes in Guruve District range from about 400 to 1500 m above sea level. There is an undulating landscape, occasionally broken up by rivers and large granite outcrops, hump-backed domes (*“dwalas”*) and kopjes which rise above the rest of the countryside. Guruve District is geographically divided into Upper and Lower Guruve by the Zambezi escarpment. The latter is part of the Zambezi Valley because it falls in the Zambezi basin. These two parts of the district are very different both in the type of landscape and climate, and therefore, the agro-ecological region<sup>9</sup> they fall into. Upper Guruve is at an altitude of about 1300m above sea level with a rugged terrain. Maximum daily temperature in summer is 26 degrees Celsius. The average annual rainfall is 700mm. Most of Upper Guruve falls under agro-ecological zone III. Lower Guruve is low, with an altitude of about 400m above sea level and has a gently sloping terrain. It falls under agro-ecological zones IV and V. Temperatures are generally high, and maximum daily temperatures in summer are 36 degrees Celsius. Rainfall is generally low, from 1,000mm to 400mm average annual rainfall and in some areas down to 300mm. Effective rainfall is even lower as evaporation is extremely high because of high temperatures. Lower Guruve and Upper Guruve fall under the same administration. Upper Guruve has been the most developed part of the district and has developed infrastructure, and so the local government offices and rural district council offices are found there.

## **POPULATION STATISTICS**

Mashonaland Central Province has a population of 998,265 or 8.58% of the total population in Zimbabwe, as recorded at the 2002 census. The population in Mashonaland Central Province was 875,318 in 1992. Guruve District had a population of 184,828 in 2002 and 135,637 in 2002.

## **THE PEOPLE**

People of different ethnicities inhabit the Zambezi Valley area. Originally the area was home to the Korekore and the Chikunda ethnic groups. Low rainfall, high temperatures and tsetse fly infestation discouraged many people from settling in the area. The rainfall aspect is an important factor because most Zimbabwean villagers depend on farming for their livelihood. Tsetse fly infestation was a hindrance to farmers who keep domestic animals, mainly cattle. Roads and bridges and other communication infrastructure were underdeveloped, while schools and health centres were limited. As a result this area was home to relatively few people.

These people did both dry land farming as well as stream bank cultivation on the fertile banks of the two major rivers, Zambezi and Hunyani when water levels went down in the dry months. Because farmers did not have implements to open up land, the land under cultivation was as low as four acres per farmer. Most of the farmers only grew crops such as maize, sorghum and millet, and beans and cowpeas were grown to a lesser extent for family consumption, with the little surplus being sold or exchanged with neighbours. Historically it is believed that they grew cotton and made

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<sup>9</sup> Zimbabwe is divided into five agro-ecological zones, which are demarcated according to agricultural productivity of the area. Zone one is the most productive with highest rainfall and deep fertile soils while zone five is the least productive with very little rainfall and poor soils. See section 6.2.1.4 for more information on agro-ecological regions in Zimbabwe.

their own clothes (Ruwitah, 1994). The majority of the residents who came in after 1980<sup>10</sup> are immigrants mostly of Zezuru ethnic group who came from Upper Guruve and, the Karanga ethnic group from Masvingo Province. These groups came in after the villagisation programme of the Mid Zambezi project and the eradication of tsetse flies.

## **SOILS**

Information gathered from the 1:1,000,000 soil map of Zimbabwe indicates 7 major soil classes coded as 2, 3X, 5E, 5G, 5S, 6G and 7G (Table 16). The most common soil classes are 5E; 5G, 5S; 6G and 7G.

**Table 16: Soils in Guruve District in Zimbabwe**

<b>Soil class</b>	<b>Description</b>
Class 2	These soils have very feeble development of genetic horizons. Class 2 soils are generally shallow, less than 25cm deep with overweathering rock or gravel.
Class 3X	These are unleached soils with large weatherable minerals, are dark brown to black vertisols without appreciable water-soluble salts. These often have qualities of toxic heavy metals.
Class 5E	These are moderate to strong leached soils, moderate deep to deep reddish brown granular clays, formed on mafic rocks.
Class 5G	Moderate shallow, grayish brown, coarse grained sands throughout the profile, to similar sandy loams over reddish brown sandy clay loams formed on granite rocks.
Class 5S	Moderate shallow to moderate deep, reddish brown to grayish brown, relatively silty sandy clay loams and clay loams over reddish brown to yellowish brown similar clay loams and clays.
Class 6G	Constitutes mainly sandy soils that are moderately deep to deep, grayish coarse grained sands over pale loamy soils to similar sandy loams over yellowish red sandy clay loams or occasionally sandy soils.
Class 7G	Moderate deep to deep reddish brown coarse grained sandy loams over yellowish, red to re similar clay formed on granite rocks.

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<sup>10</sup> Zimbabwe attained independence from the British colonial rule in 1980.



## VEGETATION / LAND USE

Vegetation information was extracted from the 1:250,000 land vegetation cover map and estimate maps of Guruve District compiled by Forestry Commission and produced by the Surveyor General's Office. The following are general classifications and their respective percentage:

- Cultivation: 41.93%
- Woodland: 34.30%
- Wooded grassland: 15.50%
- Grassland: 3.64%
- Bushland: 3.30%
- Plantations: 0.68%
- Settlements: 0.29%
- Rock outcrop and mine dump: 0.23%
- Water bodies: 0.12%

Common tree species in Guruve District include bean-pod tree or zebrawood (*Brachystegia spiciformis*), strangler-fig (*Ficus sycomorus*), wild loquat (*Uapaca kirkiana*), water pear (*Syzygium guineense*), baobab (*Adansonia digitata*) and Prince of Wales feathers (*Brachystegia boehmii*).

### 6.2.2.2 NYANDORO PRIMARY SCHOOL

#### INTRODUCTION

Nyandoro Primary School (see Picture 9) is located in Guruve District (Upper Guruve) in Mashonaland Central Province in Zimbabwe about 170 km away from Harare. The school was established in 1943. The school is run under the Guruve Rural District Council, but the council has given this responsibility to the parents, who are now actively involved in the day-to-day running of the school.



Picture 9: Welcome board at Nyandoro Primary School (Zimbabwe)

Nyandoro Primary School had an enrolment of 752 pupils (380 girls and 372 boys) in June 2004. There are 19 teachers (see Picture 10; 4 female teachers and 15 male; 4 with a degree in education, 14 with a diploma in education, and 1 untrained teacher). Most of the teachers joined the school after 1996. Before 1996, there used to be mainly untrained teachers in the school. 17 teachers stay within the school compound and 2 teachers stay elsewhere.



**Picture 10: Teachers at Nyandoro Primary School in Zimbabwe**

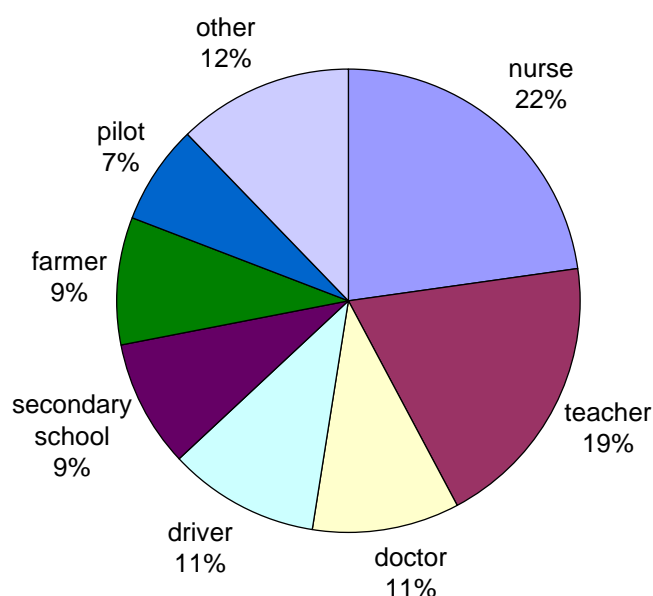
There are 18 classes in the school with an average of 42 students each (Table 17). There are only 13 classrooms, so 5 of the classes always have to take place outside.

**Table 17: Distribution of students per class at Nyandoro Primary School (Zimbabwe) in June 2004**

Grade	1	2	3	4	5	6	7	Total
Number of classes/streams	2	2	3	3	2	3	2	18
Number of students	137	105	119	112	96	103	80	752
Average number of students per class	69	53	40	37	48	34	40	44

Children at Nyandoro Primary School come from as far as 10 km, but the average distance from home to school is around 3 km.

50 students (25 boys and 25 girls) randomly selected in Grades 5, 6 and 7 were asked what they would like to do after they have finished school. Their aspirations are summarized in Figure 11. One of the students at Nyandoro Primary School would like to become a Minister of Education.



**Figure 11: Future aspirations of students in Grades 5, 6 and 7 at Nyandoro Primary School in Zimbabwe (% of responses)**

### ***THE SCHOOL ENVIRONMENT AND NATURAL RESOURCE MANAGEMENT PRACTICES AND HOW THEY ARE USED AS TEACHING AND LEARNING RESOURCES***

The school established 2 woodlots with gum tree or eucalyptus (*Eucalyptus* sp.) and cypress tree (*Cupressus* sp.) in 1992. The woodlots produce poles for roofing, fencing and building classrooms and part of the products are sold to raise money for the school. The leaves of eucalyptus (*Eucalyptus* sp.) are being used to treat common colds. The woodlots are also a habitat for birds.

A fruit orchard was established in the school compound in 1994. The fruit orchard includes banana (*Musa* sp.), pawpaw (*Carica papaya*), citrus, Mexican apple (*Casimiroa edulis*), guava (*Psidium guajava*), passion fruit (*Passiflora edulis*), avocado (*Persea americana*), mango (*Mangifera indica*), tree tomato (*Cyphomandra betacea*) and mulberry (*Morus alba*). The fruits are eaten in school and some of them are also sold. Another area has been prepared for the planting of indigenous fruit trees and *Azanza garckeana* has already been planted.

A school vegetable garden was started in 1996. The garden produce is consumed by school members and part of it is being sold.

The previous headmaster of the school was very enthusiastic about natural resource management projects in the school. He started working with Environment Africa and the Forestry Commission in 2000. The school started entering environmental competitions such as the Tree Growing and Tree Care programme (TGTC), which is run by the Forestry Commission's Extension Services. When the current head joined the school in 2002 he took over the work that had already started.

The school started an herbal garden in 2003 (see Picture 11). The herbal garden consists of 38 different herbs and spices, but some of them are not doing very well because of the infertility of the soil. The school is now trying to solve this problem by using organic manure in the herbal garden. The herbal garden provides medicinal plants for curing diseases.



**Picture 11: Herbal garden at Nyandoro Primary School (Zimbabwe)**

Tree nurseries were established in 2003. Seedlings from the nursery are planted in the school compound and also being sold.

Permaculture activities were also started in 2003. Permaculture is practised to cover the ground, to conserve soil moisture and to prevent dust.

A banana plantation was established in 2003.

A school farm has been in the school for as long as they can remember and they currently cultivate maize, beans and sunflower. Cut-off drains in the school farm were dug in 2003. Agricultural produce from the farm is consumed by pupils and teachers and part of it is sold. The school farm is a major source of income for school. In 2003, 22 school benches were bought from the income from the school farm.

Cut off drains and trenches were dug near the teachers' houses and classrooms and are used for water harvesting. One of the problems experienced at the school was soil erosion, which led to gully formation. The solution to this problem was seen to be water harvesting and this was done by formation of channels and ridges to slow down the movement of water and divert it to flower bed and trees. Bananas and vegetables were planted close to the classrooms so that they utilize water harvested from the roof.

According to the headmaster, the main purpose of the natural resource management activities in the school is *"for pupils' self reliance in the future by giving them skills and knowledge"*.

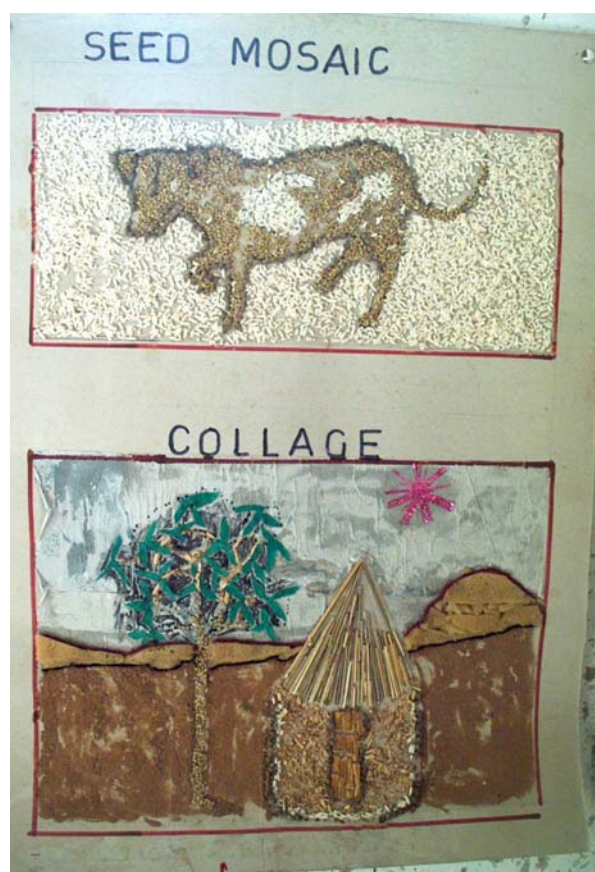
Each pupil is involved in at least one of the natural resource management projects. Pupils can choose their own area of interest. There is one hour allocated every



Monday for the students and teachers to be actively involved in the natural resource management projects.

The natural resource management projects are also used for teaching in learning. Children are taken out during club activities and during formal lessons. The natural resource management projects are used for integrating practical and real life examples in different subjects and topics across the curriculum:

- Arts: e.g. using seeds and other natural materials in artworks (see Picture 12)
- English: e.g. trees and their uses (see Box 9 and Picture 13); compositions with trees and conservation messages
- Environmental Science: e.g. soil erosion and soil fertility (water harvesting projects); tree growing and tree care (teaching how to raise seedlings, see Picture 14)
- HIV/AIDS education: e.g. visits to the herbal garden
- Home Economics: e.g. food and health (children visit the herbal garden and banana plantation, children do food storage and processing); protective foods (see Box 10 and Picture 15)
- Mathematics: e.g. shapes (determining the shapes of trees; use of locally available resources to teach about shapes, see Box 11)
- Social Studies: e.g. wealth and money (natural resources as a source of money); rural health in Zimbabwe (see Box 12, Picture 16, and Picture 17)



**Picture 12: Use of seeds and other natural materials in Arts**

### Box 9: Using trees in English

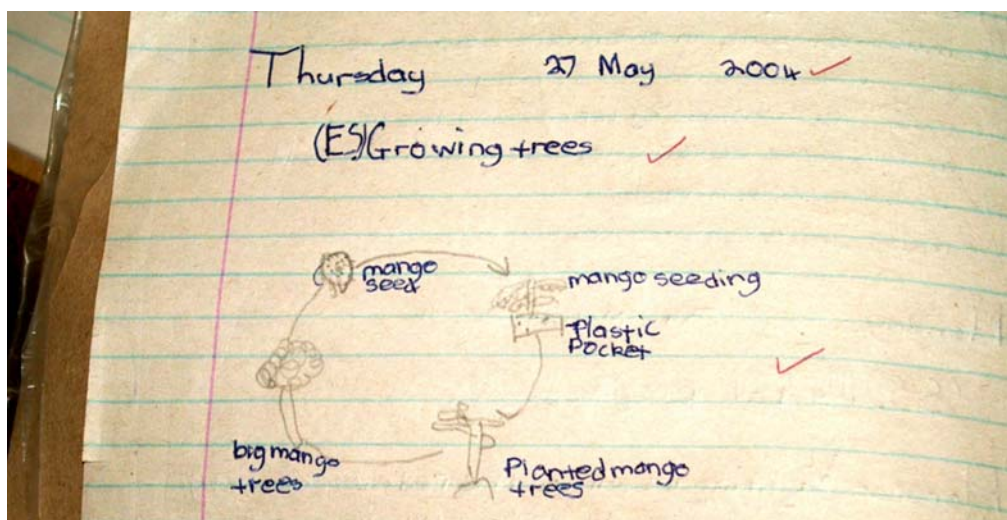
Natural resources (in this case: trees) were used to illustrate the topic ‘trees and their uses’ in a lesson in “English”.

A variety of teaching and learning methods were used: lecturing, group discussion, oral questioning, practical demonstration, poetry, and outdoor teaching. Materials used included the blackboard and locally available natural resources such as tree leaves.

Children had to identify and name trees and their uses, discussed differences between indigenous and exotic trees and recited poems on trees.



Picture 13: English lesson on “Trees and their Uses”.



Picture 14: Teaching about the growing of trees in Environmental Science

### **Box 10: Using natural resources in teaching Home Economics**

Locally available natural resources were used during a lesson in “Home Economics” on “Protective Foods”. A variety of teaching methods was used, including lecturing, group discussion, oral questioning, practical demonstration and outdoor learning. Teaching materials used included the blackboard, real materials, posters, pictures and charts. The visual aids were very appropriate and were considered important in linking theory to practice.

The teacher started the lesson by referring to the students’ own experiences (e.g. roofs on our houses protect us from the weather; clothes and an umbrella protect us from the rain). The teacher started from concrete experiences to explain the abstract concept of protective foods.

Students had to identify different fruits and vegetables in the school compound. The teacher then asked them which fruits and vegetables can help preventing diseases.

The teacher also encouraged children to cultivate fruits and vegetables at home and offered them seedlings to take home.



**Picture 15: Learning about “Protective Foods” in “Home Economics” in the tree nursery at Nyandoro Primary School in Zimbabwe**



### **Box 11: Using locally available objects to teach about shapes in Mathematics**

Locally available objects were used as a means of contextualizing the topic of “Solid Shapes” in Mathematics. The teacher used a variety of teaching methods: lecturing, group discussion, oral questioning, practical demonstration and outdoor learning. Materials used included the blackboard, real materials, plastic lids, chalk boxes, a bucket, pots, seeds, tins, a football, a matchbox, a hosepipe, bricks, and different shapes made from carton (cube, cylinder, prism, etc.) hanging on the ceiling of the classroom.

The students were allowed to collect some of the shapes from outside, which they found very exciting. There was good participation of the children in the classroom. The use of real materials enabled the students to grasp the concept of different types of shapes quite easily. During group work the teacher gave responsibility to members of the group to act as ‘secretary’ and to take notes and report on the various shapes collected. The methods and materials used were appropriate to achieve the learning outcomes of the lesson.

### **Box 12: Using natural resources to teach about rural health**

Locally available materials and natural resources were used as illustrations during a lesson on “rural health in Zimbabwe” in “Social Studies”.

The teacher used a wide variety of teaching methods, including lecturing, group discussions and group work, oral questioning (e.g. which foods give us energy, name a food which gives us protein, what are causes of water pollution), practical demonstrations, outdoor teaching (students were taken outside to look at various crops in the school garden and toilets) and individual assignments.

There was a good interaction between the students and the teachers. Materials used during the lesson included the blackboard, natural materials (such as garden plants, beans, cucumbers, and sugar cane), cards (for answering questions in groups), and charts.

The use of natural materials appeared to be very appropriate as students were seeing things which to know from experiences in their own lives and therefore seemed to understand the lesson better.



**Picture 16: Teacher using school garden to illustrate a lesson on “rural health in Zimbabwe”**



**Picture 17: Children doing group work on “rural health in Zimbabwe”**



The students said the natural resource management projects have helped them learning about waste management and soil conservation (not to cut trees, not to dig holes and burn grass). They have also learned about tree planting, conservation of medicinal plants and use of herbs, growing vegetables, fruit trees and crop rotation. Teachers encourage children not to cut tree branches as toothpicks.

Different **co-curricular clubs** at Nyandoro Primary School are dealing with natural resource management: Permaculture Club, Environment Africa Club, Tree Growing and Tree Care (TGTC) Club, CAMPFIRE<sup>11</sup> Club, and Drama and Poetry Club. The clubs involve students of grades 3 to 7. The most active clubs in the school are CAMPFIRE Club, Environment Africa Club, and Permaculture Club. These clubs have their own projects, e.g. Environment Africa Club is involved in land conservation, tree growing and care, Permaculture Club deals with the herbal garden, intercropping and land utilization and the CAMPFIRE club is involved in the management of natural resources.

A random sample of 50 students in Grades 5, 6 and 7 showed that 52% of the students are member of a co-curricular club with activities related to food security and natural resource management.

At Nyandoro Primary School a statistically significant relationship was found between “students’ performance in school” and “membership of a co-curricular club with activities related to food security and natural resource management”: students with average and above average performance in school are more likely to be a member of a co-curricular club with activities related to food security and natural resource management than students with poor performance in school.

### ***TEACHERS’ CAPACITY TO USE NATURAL RESOURCES IN MAKING EDUCATION MORE RELEVANT TO THE LOCAL SITUATION***

Teachers indicated that natural resource management is not adequately taught in teacher training. They are mostly trained to teach theory only and their training is not specifically focusing on the use of natural resources in making education more relevant. Teachers suggested natural resource management and the use of local resources in making education more relevant to be included in the teacher training curriculum. They also suggested regular in-service training courses on the same.

There have been no trainings or workshop from the Ministry of Education on the use of natural resources in education. Some teachers attended workshops organized by SCOPE and CAMPFIRE and they also got pamphlets and reading materials from those organizations. Through SCOPE, 5 teachers and 9 pupils, a village headman and a farmer were trained for a week on permaculture. CAMPFIRE organized a workshop which one teacher attended as the representative of Guruve district. Teachers indicated that those workshops have been useful in terms of getting some of the skills required to integrate local natural resource examples in teaching.

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<sup>11</sup> The Communal Areas Management Programme for Indigenous Resources (CAMPFIRE) in Zimbabwe aims to give local communities an alternative to destructive uses of the land by making wildlife and other natural resources valuable. Through CAMPFIRE, Zimbabwe seeks to involve rural communities in conservation and development by returning to them the stewardship of their natural resources, harmonizing the needs of rural people with those of ecosystems.

The headteacher said natural resource management should be a subject both in primary schools and teacher training colleges. The headteacher added that the teachers are willing to do what benefits the pupils. Therefore they will be ready to accept more responsibilities on natural resource management subjects if added to the curriculum.

Another hindrance to the teaching of natural resource management the inadequacy of teaching materials like teacher guides, flip charts and reference books. The headteacher said that the government allocates minimal funds. Sometimes parents assist with funds to acquire teaching materials, but this is still inadequate.

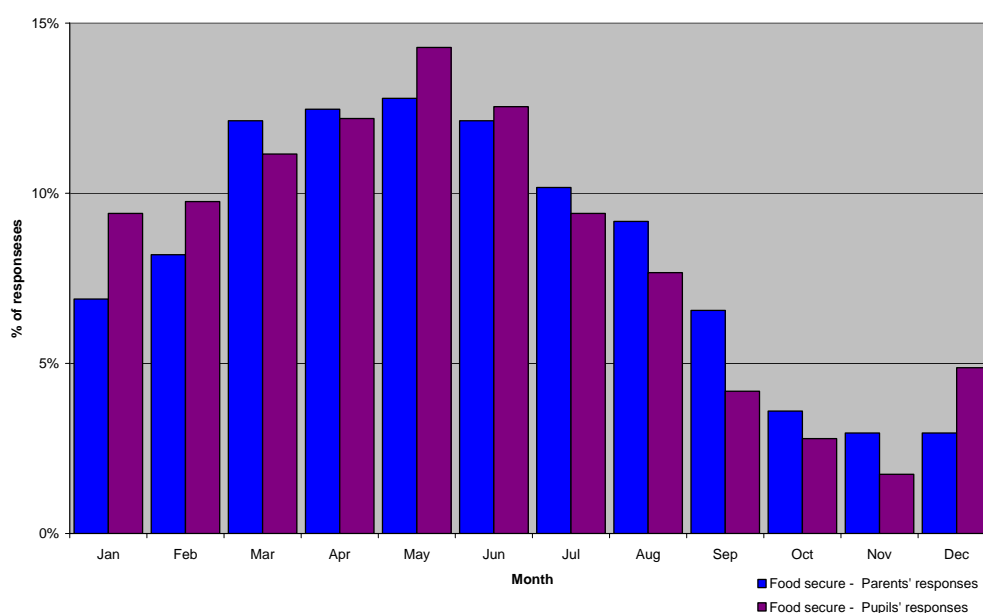
The headteacher encourages teachers to use locally available resources. Examples include:

- Going outside the classroom with the pupils to see the different types and parts of flowers
- Showing where gully erosion is happening during teaching of soil erosion
- Applying plastic bags on the tree leaves to show photosynthesis.

Trees shades are also used for teaching and learning as outdoor classrooms due to the lack of enough classrooms.

***PERCEPTIONS ON HOW RELEVANT EDUCATION USING NATURAL RESOURCE MANAGEMENT CAN HELP ADDRESS FOOD SECURITY AND SUSTAINABLE RURAL DEVELOPMENT***

The months from September to December are experienced as the most food insecure around Nyandoro Primary School, while the months from March to June appear to be the months which are most food secure (see Figure 12, based on individual responses of parents and students and verified during group interviews with teachers, parents and students).



**Figure 12: Parents' and students' perceptions on food security throughout the year (Nyandoro Primary School, Zimbabwe)**

All the students mentioned that they take breakfast and dinner every day. 78% of the students said they also take lunch. Most parents said there is not always the kind of food they would like to eat or sometimes not enough food to eat in their household (see Table 18).

**Table 18: Parents' perceptions on the type of food consumed by their households in the past 12 months (Nyandoro Primary School, Zimbabwe)**

Type of food	% of responses (n = 50)
Always enough of the kind of food we want to eat	18%
Always enough food, but not always the kind of food we would like to eat	34%
Sometimes not enough food	30%
Often not enough food	18%

The reasons given for food insecurity by different respondents include the following:

- Not enough agricultural produce from the farm
- Diminishing food stocks
- Lack of enough rainfall, drought
- Food expensive
- No animals for ploughing
- Small field sizes
- Not enough money to buy fertilizer and other farm inputs, seed expensive
- Lack of knowledge.

In a ranking exercise during group interviews and in individual interviews, parents identified lack of enough rainfall, lack of knowledge and lack of income for buying fertilizer as the major reasons for food insecurity.

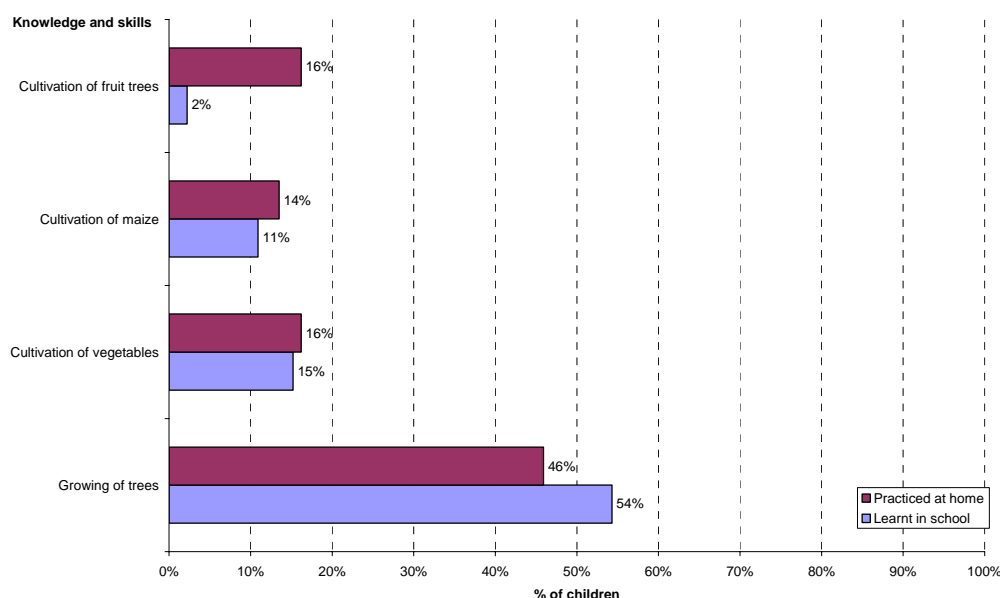
The **effects of hunger on children's learning** in school were identified by different respondents as high absenteeism, poor concentration in classroom, sleeping in class, complaints about weakness and sickness, tiredness, poor health, deviant and delinquent behaviour, stealing other people's food and waking up late. In a ranking exercise, pupils identified health problems to be the most important, followed by absenteeism, lack of concentration and sleeping in class. The headmaster said that *"some students go to the forest to search for indigenous fruits to eat and hence don't attend classes"*. Teachers said that some students go to pan for gold to supplement their family income. One pupil said *"you will be thinking about food and feeling sleepy"*. A parent summed it by saying: *"when one's health is affected due to hunger, one's brain is also affected"*. School children's hunger also affects teachers: it lowers their motivation because of low concentration of the pupils, and it affects examination results of pupils and hence also teachers' appraisals. Teachers noted that their own children perform better than other children because they are generally well fed and have reading materials.

The school farm with the maize fields was perceived to be the most important school resource for food security and creating wealth in the school by all the respondents. It is the most important because it helps to feed school pupils (especially during school outings), the school gets income to buy school equipment, and teachers are able to buy maize at cheap prizes. The gum tree or eucalyptus (*Eucalyptus sp.*) woodlot was also mentioned as important in terms of rural development. Few people in the community have such plantations so they rely on the school for firewood and poles. The woodlot also provides income to school.

The teachers said that students appreciate their environment and they now plant trees. Examples were given of students planting mango trees in their homesteads which they got from school. A teacher said his pupils showed him a traditional herbal plant that cures headache, which he used and his headache disappeared. Parents said that some of the activities which their children practice at home include the following: vegetables planting, mulching and application of manure, land preparation for planting of trees, watering of trees and crops, and crop rotation. The pupils said they plant trees; cultivate maize, cotton and vegetables; and practice nursery bed management, water harvesting, land preparation, and spacing techniques.

### **INTERACTIONS OF TEACHING AND LEARNING IN THE SCHOOL WITH NATURAL RESOURCE MANAGEMENT PRACTICES IN THE COMMUNITY**

Students said they have learnt different kinds of **knowledge and skills** related to natural resource management in school. Most of them also practice some of the knowledge and skills they learnt in school at home (Figure 13). 76% of the students and 92% of the parents said children practice at home some of the knowledge and skills they learn in school. 74% of the parents said they have learned something from the knowledge and skills practiced by their children at home.



**Figure 13: Most important knowledge and skills related to natural resource management learnt in school and practiced at home (based on 50 individual pupils' responses, Nyandoro Primary School, Zimbabwe)**

At Nyandoro Primary School we found a statistically significant relationship between “students’ performance in school” and “practice at home of knowledge and skills learned in school”: students with average and above average performance in school are more likely to practice knowledge and skills learned in school at home than students with poor performance in school.

We also found a statistically significant relationship between “membership of a co-curricular club with activities related to food security and natural resource management” and “practice at home of knowledge and skills learned in school”: members of these co-curricular clubs are more likely to practice knowledge and skills learned in school at home than non-members.

Students said they would like to learn more about the following natural resource management practices: tree growing and tree uses (32%), grafting and growing of fruit trees (18%), crop management (14%) and maize production (11%).

62% of the students interviewed and 82% of the parents mentioned that students are sometimes given **homework** related to agriculture or the environment by their teachers. 58% of the students and 100% of the parents said students revise their

homework with members of their families. 82% of the parents interviewed indicated that they learnt something from their children's homework. Most of the parents agreed with the statements that the education their children get is relevant to the local situation (90%) and relevant to their future (94%).

Many parents are illiterate and are therefore unable to help their children with revision of homework. The headmaster said 65 pupils (out of a total of 752) are orphans. He further said that parents only help with homework when homework is in the form of a survey (e.g. on the types and names of trees) and that teachers should encourage pupils to consult with their parents. The pupils gave some examples of homework related to natural resource management, e.g. they were asked to find out what causes soil erosion and the signs of soil erosion.

90% of the parents of students we interviewed at Nyandoro Primary School have farming as their main occupation. The rest of the parents are traders. Most of the farmers also supplement their farm income by trading, mining, or working as labourers on large scale farms. Parents have an average of about 7 years of education and an average farm size of about 7 acres.

Natural resource management practices in the community include tree growing, soil and water conservation, cultivation of sunflower, cotton, maize, beans, vegetable and bananas, beekeeping, fish ponds, fruit orchards and woodlots. There are only a few woodlots in the community while there is high demand for poles and firewood, so many members of the community buy this from the school. The school is the only visible green space in the surrounding environment when viewed from a distance.

The **parents** promote natural resource management in the school by donating seedlings of banana and baobab, seeds, polythene bags for the tree nursery, and a plough. Most of the seedlings (especially banana (*Musa* sp.) and mango (*Mangifera indica*) seedlings) were donated by parents who farm in the surrounding community (e.g. see Box 13), and some seedlings have been purchased. One farmer taught the school about cultivation of apricots and paprika. Some parents have promoted an improved mango variety in school. A teacher learnt from a student about a mango variety which has big fruits. The headmaster also gave an example of "*a pupil who is teaching others about different mango varieties; he can identify a mango variety by the smell of the leaves*". One parent (Mr. Kabvunye, see Box 13) showed the school how to plant bananas and how to prune orange trees. He has also given seedlings of mango (*Mangifera indica*) and baubinia (*Bauhinia* sp.).

### Box 13: Mr Kabvunye (65) interacts with Nyandoro Primary School

Mr Kabvunye is a 65 year old farmer living in Chikwe village, about 8 km from Nyandoro Primary School. Mr Kabvunye has 2 wives and 18 children, of whom 6 are studying at Nyandoro Primary School. Mr Kabvunye was inspired by a workshop that was organized by the Schools and Colleges Permaculture (SCOPE) Programme in 1992 at Nyandoro Primary School.

Mr Kabvunye said: *"I do not expect my family to go hungry, I can produce more than enough food for my family, and I am able to send my children to school."* This was also evidenced by the number of crops which remained in the fields without being harvested and by the fact that Mr Kabvunye indicated that he would need another wife to bear more children so that more of the agricultural produce from his fields could be consumed.

The farm of Mr Kabvunye is about 25 ha. One part of the farm is divided into blocks. In each block, Mr Kabvunye and his family cultivate different crops and at the border of each block they have planted trees to prevent soil erosion and to mark the boundaries of each plot. This segmentation of the farm also allows better work management and better monitoring of the harvest of each section. Water harvesting techniques are also used on the farm to trap and conserve water.

On another part of the farm, which Mr Kabvunye calls his "project", the following crops are grown: maize (for family consumption and for sale), finger millet, cassava, round beans, butterbeans, cotton, vegetables (e.g. tomatoes, onions, and cabbages) and fruits (e.g. oranges, papaya (*Carica papaya*), banana (*Musa* sp.), avocado (*Persea Americana*), snot apple (*Azanza garckeana*), baobab (*Adansonia digitata*) and Indian plum (*Ziziphus mauritania*)).

Mr Kabvunye has benefited a lot from Nyandoro Primary School and the school has in turn profited from him through exchange of tree seeds and seedlings. His children come home with knowledge and skills from school, which they practice at home, and he in turn is a resource person to the school.

**Socio-economic aspects** which affect natural resource management practices at Nyandoro Primary School and the surrounding community include (non-exhaustive list based on interviews with key informants, teachers, parents and students):

- Lack of knowledge: e.g. on good land management practices
- Resource constraints: e.g.
  - For fencing
  - For buying agricultural inputs
- HIV/AIDS prevalence:
  - Money and time used for caring for the sick and orphans
  - Labour shortages
- Cultural beliefs:
  - Villagers are not supposed to go to the fields on Friday
  - Taboos on cultivation of certain trees: e.g.
    - If you plant a mango tree (*Mangifera indica*), you won't stay for a long time in that homestead.
    - A certain tree which grows in the school compound can cause a lot of quarrels, conflicts in a homestead.

### **6.2.2.3 MAHUWE PRIMARY SCHOOL**

#### ***INTRODUCTION***

Mahuwe Primary School (see Picture 18) is located in Guruve District (Lower Guruve) in Mashonaland Central Province in Zimbabwe about 200 km from Harare. The school was established in 1990.



**Picture 18: Entrance to Mahuwe Primary School in Zimbabwe**

There was an enrolment of 1,103 pupils (562 girls and 541 boys) in June 2004. There are 28 teachers (12 female and 16 male). All teachers are trained and qualified, 16 of them are trained up to diploma level and 2 of them have degrees in education. The longest serving teacher joined the school in 1996 and the most recent joined in 2004. All the teachers are housed within the school compound and in neighbouring government houses, apart from the headmaster who is staying on his farm at about 3 km from the school.

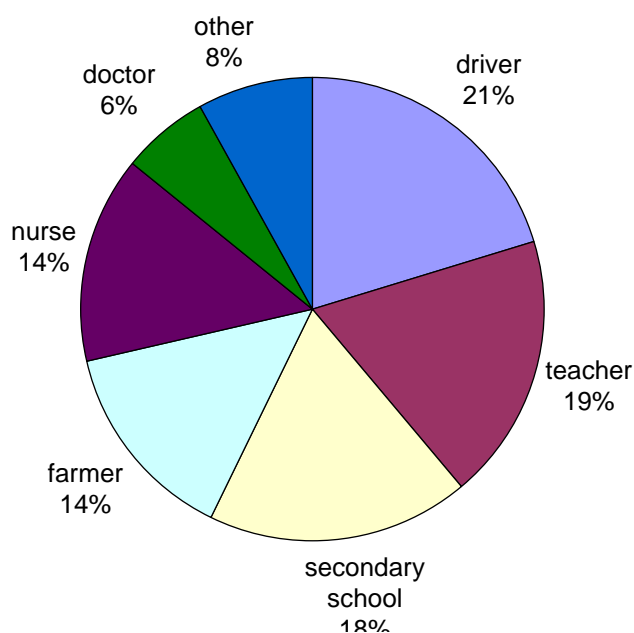


**Table 19: Distribution of students per class at Mahuwe Primary School (Zimbabwe) in June 2004**

Grade	1	2	3	4	5	6	7	Total
Number of classes/streams	4	4	5	4	3	3	4	27
Number of students	186	181	196	156	144	112	124	1103
Average number of students per class	47	45	39	39	48	37	31	41

Children at Mahuwe Primary School come from as far as 9 to 10 km, but the average distance from home to school is about 3.5 km.

50 students (25 boys and 25 girls) randomly selected in Grades 5, 6 and 7 were asked what they would like to do after they have finished school. Their aspirations are summarized in Figure 14.



**Figure 14: Future aspirations of students in Grades 5, 6 and 7 at Mahuwe Primary School in Zimbabwe (% of responses)**

### ***THE SCHOOL ENVIRONMENT AND NATURAL RESOURCE MANAGEMENT PRACTICES AND HOW THEY ARE USED AS TEACHING AND LEARNING RESOURCES***

The area around the school is generally dry and hot with only one rainy season (between October and March). The water in the area is salty.

Environmental action at Mahuwe Primary School started in 1992 through the efforts of the Forestry Commission and the Department of Natural Resources, which hosted workshops on the Tree Growing and Tree Care (TGTC) Programme.

A tree nursery was established in 1993. The purpose of the tree nursery is to research the germination of indigenous tree seedlings and to encourage the local community to plant trees since it is a source of seedlings to the community. The school also generates some income by selling some of the tree seedlings. This income is used to buy textbooks and exercise books. The tree nursery has helped the school to win prizes in school competitions.

Woodlots with indigenous and exotic trees were established in 1996 with the help of the Forestry Commission. The woodlot with indigenous trees has about 300 trees and the woodlot with exotic trees has about 4000 trees (mainly jacaranda (*Jacaranda mimosifolia*) and gum tree or eucalyptus (*Eucalyptus* sp.)). The woodlots are used for income generation, making of poles, windbreak, aesthetics, erosion control, shade and outside classrooms. The school sells poles to the surrounding communities.

A vegetable garden was started in the school compound in 1997. The Lower Gurube Development Association donated a fence, a borehole and a water tank. The school started vegetable gardening because of perennial droughts and subsequent unavailability of vegetables and fruits. The vegetable garden is used for income generation by selling vegetables, for food, as a source of seedlings for planting out in the community, and as a demonstration resource to educate pupils and other community members.

Planting of fruit trees in the school started in 1997, following some advice of Ministry of Health and Forestry Commission officials who identified health problems with the schoolchildren. The school has two fruit orchards: one with 3 species of indigenous fruit trees (*Cordyla africana*, *Ziziphus mauritiana* and *Azanza garkeana*) and another one with 9 species of exotic fruit trees (mulberry, mango, guava, lemon, grapefruit, Mexican apple, peach, pawpaw and orange trees). The fruits are used for consumption by teachers and pupils and for income generation.

A school farm was established in 2000. The main crops grown are maize and beans. These are used as food for teachers and as a source of income.

All children from grade 4 to 7 are allocated to the various natural resource management projects in school. The **co-curricular clubs** that deal with natural resource management practices in the school are the following:

- Nursery: This club deals with the tree nursery in the school.
- Tree plantations: This club deals with the woodlots in the school.
- Orchard: This club deals with the fruit orchards in the school.
- Vegetable garden: This club deals with the vegetable garden in the school.
- Science and research: This club started in 1996. It is focusing on problem solving, using things from the environment, investigation, and production of materials. While we were doing our research, we witnessed members of this club making soap from roots of trees. They have also been making mosquito repellents. They also make butter and drink using indigenous fruits (e.g. marula - *Sclerocarya birrea* ssp. *caffra*). They also use baobab fruits.

- Resource management: This club looks at conservation of natural resources like water and management.
- Biodiversity: This club started in 2004, mainly for awareness creation and environmental protection.
- Health and sanitation: This club deals with awareness on diseases and prevention, personal hygiene and sanitation.
- Pollution control: This club started in January 2004 and deals with sensitization of children on pollution causes and control.
- HIV/AIDS awareness: This club mainly deals with awareness and impact on the community.

A random sample of 50 students in Grades 5, 6 and 7 showed that 86% of the students are a member of a co-curricular club and 82% of the children are a member of a co-curricular club with activities related to food security and natural resource management.

In summary, the school environment and natural resource management practices are used for the following reasons:

- Income generation
- Food and nutrition
- Teaching and learning
- Environmental conservation
- Community awareness

In terms of teaching and learning, **natural resource management practices are used in all subjects**: mostly in Environmental Science (e.g. soil erosion; reclamation of gullies; bushfires, see Box 14, Picture 19, and Picture 20; health, see Box 15; materials and technology, see Box 16) and Social Studies, but also in Mathematics (e.g. using sticks or stones from the local environment for counting; measurement (e.g. measuring perimeters of natural resources like trees, see Box 17 and Picture 21); shapes (e.g. of a tree trunk)), Languages (e.g. writing essays about natural resources; explaining the meaning of words, see Box 18 and Picture 22) and Religious and Moral Education (e.g. in the topic “me and my community”). The deputy headteacher gave the example of the topic “crops, trees and animals” in Science: “*Teachers take the children to the tree nursery and show them tree seedlings and parts of trees*”. Teachers also indicated that they use tree leaves for making paints for Art and Craft. Teachers also said: “*Children understand more of Environmental Science when we use the local environment and natural resource management practices*” and “*The environment is our laboratory, e.g. when doing an experiment on evapotranspiration of plants*”.

#### **Box 14: Practical demonstration of bush fires in Environmental Science**

A lesson on “Bush Fires” in “Environmental Science” showed some of the advantages of practical demonstration as a teaching method. The teacher also used a variety of other teaching methods, including lecturing, group discussion and oral questioning.

The teacher used different visual materials to illustrate the topic: the blackboard, real materials (land, grass, water, matches), and drawings

During the practical demonstration, the teacher showed how a fire spreads (see Picture 19) and how spreading of the fire can be prevented by use of water (see Picture 20) or use of a fireguard. The children actually constructed a fireguard to prevent fire spreading in the school compound. This practical demonstration appeared to be very important in terms of achieving the expected learning outcomes of the lesson. The teacher also explained what bush fires can destroy.

Students indicated that they learned something useful which they can also tell their parents.



**Picture 19: Demonstration of bush fires in Environmental Science**



**Picture 20: Prevention of fire spreading by use of water**

#### **Box 15: Teaching about bilharzia using natural resources**

We observed a double lesson in “Environmental Science” on “Health: Bilharzia”. This lesson took place partly inside the classroom and partly outside the classroom.

The teacher used a variety of teaching methods, including lecturing, practical demonstration, oral questioning, group discussion and songs. Visual materials used by the teacher included the blackboard, real materials, posters and charts.

The children were taken outside to see areas of stagnant water, which can harbour bilharzia-transmitting snails. Children learned that water should be boiled before using it to prevent bilharzia.

Children were given homework assignments on identification of areas with stagnant water at home and on consultation with their parents on herbs which are used to treat bilharzia.

**Box 16: Explaining the difference between natural and man-made materials**

We observed a lesson in “Environmental Science” on the topic of materials and technology (Grade 7). Natural resources were used in the lesson which took place partly inside the classroom and partly outside the classroom.

The teacher used a variety of teaching methods, including lecturing, practical demonstration, oral questioning and group discussion. Visual materials used by the teacher included the blackboard, real materials (cotton balls, maize seeds, charcoal), writing cards and charts.

Students had been asked to collect different materials at home and bring them to the classroom. The brought things like pieces of wire, paper, charcoal, grass, leaves and soil. These materials were used to make something useful in groups.

Students went outside the classroom to identify natural (e.g. trees, soil, cotton) and man-made materials. Maize seeds and burning of cotton were used to illustrate how materials can change into other materials.

**Box 17: Teaching about perimeters using locally available resources**

We observed a lesson in “Mathematics” on “perimeter” (Grade 6) where natural resources were used as teaching and learning aids. The lesson took place partly inside the classroom and partly outside the classroom.

The teacher used a variety of teaching methods, including lecturing, practical demonstration, oral questioning and group discussion. Visual materials used by the teacher included the blackboard, real materials (trees, stones, click wheel), models and cards.

Practical activities during the lesson included measurement of the perimeter of the school orchard and the perimeter of the baobab (*Adansonia digitata*) tree trunk. The materials used were appropriate for the lesson. The use of materials which children were familiar with also seemed to make the children understand the topic better. The teacher also linked to topic to uses at home: measurement of the perimeter of a farm to find out how long a fence would need to be.



**Picture 21: Pupils measuring the perimeter of a baobab (*Adansonia digitata*) at Mahuwe Primary School in Zimbabwe**

**Box 18: Explaining the difference between the words 'much' and 'many' in English using tree seedlings and soil**

We observed a lesson in "English" explaining the difference between the words 'much' and 'many' (Grade 6).

The teacher used a variety of teaching methods, including lecturing, practical demonstration, oral questioning, and group discussion.

Teaching aids used included the blackboard, tree seedlings in plastic containers with soil, exercise books for counting and illustrating the word 'many', cards with questions, and crossword search puzzles. The teacher used a lot of practical demonstration, using the tree seedlings and the soil to illustrate the words 'much' (for things that cannot be counted, e.g. soil) and 'many' (for things that can be counted, e.g. tree seedlings).

The children seemed to be very enthusiastic about what they were learning and enjoyed themselves. They indicated at the end of the lesson that they learnt to understand the difference between 'much' and 'many'.



**Picture 22: Using trees and soil to explain the difference between the words 'much' and 'many' in English at Mahuwe Primary School in Zimbabwe**



Factors hindering natural resource management in the school include the following:

- Lack of water, erratic rainfall
- Lack of a fence: this results in thefts and damage by animals
- Lack of time
- Lack of knowledge
- Pests and diseases in the garden
- Theft
- Lack of money to buy inputs
- Lack of community support.

Lack of water and lack of fencing were identified as the main problems by the teachers. A water shortage once caused about 100 tree seedlings to die.

### ***TEACHERS' CAPACITY TO USE NATURAL RESOURCES IN MAKING EDUCATION MORE RELEVANT TO THE LOCAL SITUATION***

In 1992, workshops were hosted on the Tree Growing and Tree Care (TGTC) Programme. In 1997, five teachers were empowered through CAMPFIRE to start research projects within the school. The school started a research project on germination of seeds of indigenous trees. The headteacher and some teachers were trained in Better Environmental Science Teaching (BEST). The headteacher then trained all the teachers in the school. Action, the Department of Agricultural Research and Extension (AREX), and the Forestry Commission organized training courses in environmental management in 1993, 1997 and 2000. About 7 teachers attended these trainings. The school has organized several staff development workshops for all teachers: one to identify environment-friendly school projects, and another one for the project leaders to narrow down the aims and objectives of the different projects.

Teachers at Mahuwe Primary School found these trainings useful in terms of their skills development. Teachers and headteachers at Mahuwe Primary School feel there is need for improvement in teacher training colleges in terms of teaching natural resource management. Natural resource management should be a subject in teacher training colleges. Some teachers should be able to specialize in natural resource management. There is also need for more in-service teacher training which would allow for continuous staff development in teaching and learning practices that could affect food security and sustainable rural development.

Teachers also indicated that they have **inadequate teaching and learning materials** related to natural resource management. They said they need more books, science kits (e.g. magnifying glass) and other teaching and learning resources. Teachers should be well equipped to be able to teach effectively.

The inadequacy of teaching and learning materials is partly substituted by the use of locally available materials: e.g. use of charcoal to substitute chalk, making paint using parts of trees, use of tree branches and feathers as paint brushes, substitute charts by improvising boxes for drawing, use of empty bags from the cotton company, and use of plastic papers for covering books.

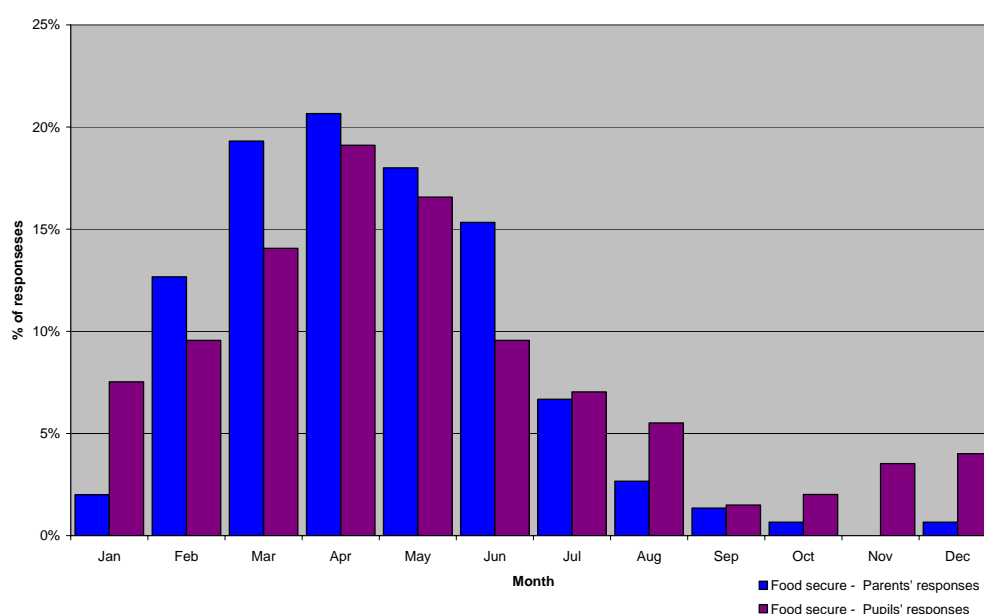
Teachers said that they are not aware of any specific national policy on the use of natural resources in teaching and learning in schools and the deputy headteacher said *"that is why some schools don't have natural resource management projects"*. In



2002, the Ministry of Education started putting some emphasis the use of natural resources in teaching and learning through the introduction of the BEST (Better Environmental Science Teaching) Programme. The motto for the province is that every school should be green: “*Green schools, green homes and green fields*”. one suggestion given by the teachers to strengthen teaching and learning making use of natural resources is a comprehensive policy from the Ministry of Education stipulating that each school should have natural resource management projects which help in making teaching and learning less theoretical and more practical.

### **PERCEPTIONS ON HOW RELEVANT EDUCATION USING NATURAL RESOURCE MANAGEMENT CAN HELP ADDRESS FOOD SECURITY AND SUSTAINABLE RURAL DEVELOPMENT**

The months from August to January are experienced as the most food insecure around Nyandoro Primary School, while the months from February to June appear to be the months which are most food secure (see Figure 15, based on individual responses of parents and students and verified during group interviews with teachers, parents and students).



**Figure 15: Parents' and students' perceptions on food security throughout the year (Nyandoro Primary School, Zimbabwe)**

All the students we interviewed mentioned that they take breakfast and dinner every day. 60% of the students we interviewed said they also take lunch. Most parents said there is often not enough food or sometimes not enough food to eat in their household (see Table 20).

**Table 20: Parents' perceptions on the type of food consumed by their households in the past 12 months (Mahuwe Primary School, Zimbabwe)**

Type of food	% of responses (n = 44)
Always enough of the kind of food we want to eat	2%
Always enough food, but not always the kind of food we would like to eat	5%
Sometimes not enough food	43%
Often not enough food	50%

**Reasons given for food insecurity** include the following:

- Inadequate rainfall, drought, and hence little food crop harvest
- Lack of farming equipment and lack of funds to buy farm inputs (e.g. seeds)
- Damage to crops by animals like elephants, wild pigs, baboons, cattle
- Only one cash crop grown (cotton)
- High temperatures, too much sun
- Poor soils
- No funds for buying food
- Lack of financial management skills
- No animals for draught power
- Small fields, small farms
- Lack of knowledge.

The **effects of hunger on children's learning in school** as given by different respondents included the following:

- Falling asleep in class, lack of concentration
- Pupils become weak, lose their strength and weight, poor health
- High absenteeism
- Dropping out of school
- Low participation in class
- Deviant and delinquent behaviour
- Poor performance in examinations
- Stealing of food
- Lowers teacher morale, transfer of teachers
- High degree of indiscipline
- Child labour increases during hunger periods
- Teenage marriages increase during hunger periods
- Students spent a lot of time searching for wild fruits (e.g. ber or *Ziziphus mauritania*, baobab or *Adansonia digitata*)

The natural resource management innovations practiced in the school compound perceived to be the **most valuable** in terms of food security and sustainable rural development include the following:

- Tree nursery
- School farm (maize fields)
- Vegetable gardens
- Fruit orchard
- Woodlots (tree plantations)

During a ranking exercise, the headmaster, teachers and one group of students ranked the tree nursery as the best because they sell tree seedlings to big companies and “*It is the mother of all projects - it supplies all seedlings to the tree plantations and fruit orchard*”. The school farm with the maize fields was ranked as the best by the parents and a second group of students.

Pupils indicated that they practice at home some of these natural resource management innovations which are demonstrated in the school: they have tree nurseries and plant trees (e.g. fruit trees like mango (*Mangifera indica*) and ber (*Ziziphus mauritania*)) at home, they have vegetable gardens, and they cultivate maize, beans, cotton, peas and groundnuts. The headmaster said that a former student of the school has started a tree nursery and is selling tree seedlings to the community. Teachers said that children take tree seedlings from the school to plant at home.

The teachers, the deputy headteacher and the headteacher mentioned some of the **skills** needed for food security and sustainable rural development which children are learning from school:

- Record keeping skills
- Research and investigation skills
- Marketing, pricing, advertising and selling skills (e.g. butter from marula or *Sclerocarya birrea ssp. caffra*)
- Fund management skills
- Planning skills, project management skills
- Seed collection skills
- Crop cultivation skills, garden management skills, tree cultivation skills (raising of tree seedlings, tree seed pre-treatment, grafting, pruning), natural resource management skills
- Self-reliance skills, survival skills

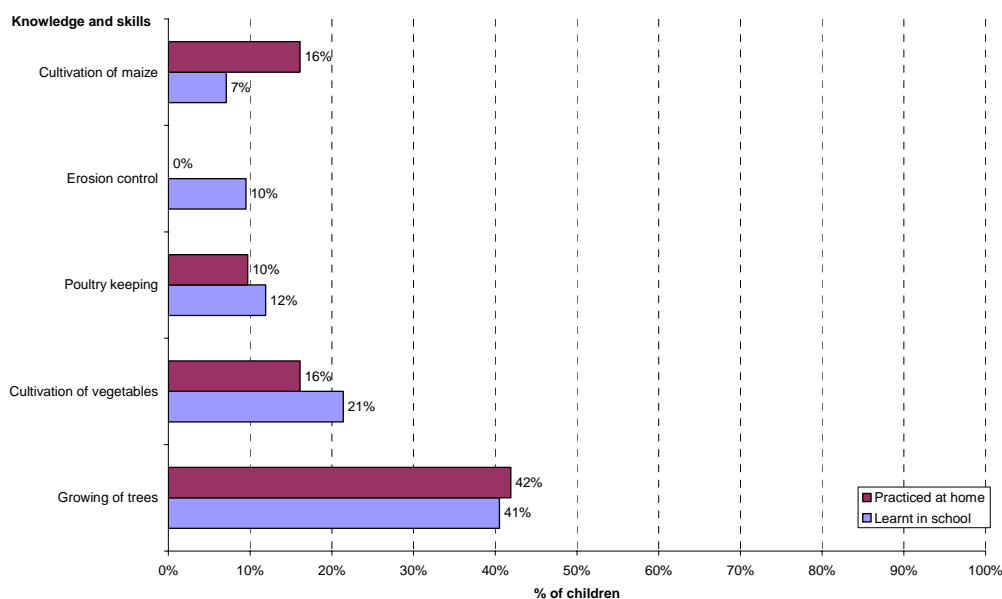
The pupils said that they got the following skills and techniques as a result of the natural resource management practices in the school:

- Cultivation and management of trees, tree nursery management, using cuttings to raise seedlings
- Fencing skills
- Prevention of soil erosion (e.g. not cultivating river banks, planting of trees), soil improvement
- Land preparation
- Composting
- Watering plants
- Water harvesting by making ridges

- Weeding
- Vegetable gardening and management skills
- Use of manure/fertilizer and other agricultural inputs
- Harvesting skills
- Marketing skills (e.g. selling of fruits and vegetables)
- Leadership skills.

### ***INTERACTIONS OF TEACHING AND LEARNING IN THE SCHOOL WITH NATURAL RESOURCE MANAGEMENT PRACTICES IN THE COMMUNITY***

Students said they have learnt different kinds of knowledge and skills related to natural resource management in school. During group interviews, children mentioned skills such as land preparation, tree cultivation, watering, fencing, vegetable gardening, soil fertility management, harvesting and marketing skills. During individual interviews, children and parents also indicated that they are practicing at home some of the knowledge and skills they learnt in school at home (see Figure 16). 62% of the students interviewed and 86% of the parents interviewed said children practice at home some of the knowledge and skills they learn in school. 59% of the parents said they have learned something from the knowledge and skills practiced by their children at home. Most of the parents agreed with the statements that the education their children get is relevant to the local situation (89%) and relevant to their future (91%).



**Figure 16: Most important knowledge and skills related to natural resource management learnt in school and practiced at home (based on 50 individual pupils' responses, Mahuwe Primary School, Zimbabwe)**

Students said they would like to learn more about the following natural resource management practices: tree growing (24%), crop production (20%), cultivation of cotton (13%) and erosion control (11%).

Children sometimes revise **homework** related to natural resource management with their parents, brothers and sisters. Teachers however indicated that some parents don't know what to advice their children. In some cases, parents have to sign children's homework. 56% of the students interviewed and 68% of the parents mentioned that students are sometimes given homework related to agriculture or the environment by their teachers. 46% of the students said students revise their homework with members of their families. 59% of the parents interviewed indicated that they learnt something from their children's homework.

The school has assisted in the identification of a problem in a community about 10 km from the school. There was a gully that was threatening to destroy a borehole supplying water to more than 70 households in the Gurupira communal lands. The school engaged the community in discussions to develop solutions for the problem.

The school drama club performs with songs, dances and drama during field days in the surrounding communities to raise awareness on natural resource management issues. Farmers buy and children get tree seedlings from the school nursery (e.g. for national tree planting days). Mahuwe Primary School sometimes donates vegetables to Chitsungu mission hospital in the area. The school also sells poles to surrounding communities. The school has also influenced the establishment of an agroforestry garden project in the community (see Box 19).

**Box 19: Mahuwe Primary School influences the establishment of an agroforestry garden project**

In 1997, Mahuwe Primary School started a community outreach programme. As a result the *Dyarai miti* (plant trees) project was established, supported by the Lower Gurube Development Association, a community-based institution, and Environment Africa.

The agroforestry garden project is managed by a group of female farmers. The main objective of the garden is to raise enough vegetables and fruits for the members to feed their families as well as to generate income by selling these products to the surrounding community.

The tree seedlings, which were planted when the garden project started, came from Mahuwe Primary School, and all the group members have children or relatives at the school.

Most of the group members are generating enough food to feed their families and some cash to assist in their children's education. Some of the challenges they face include pests and diseases, water shortages and market access.

89% of the parents of students we interviewed at Mahuwe Primary School have farming as their main occupation. The rest of the interviewed parents are traders. Most of the farmers also supplement their farm income by trading, mining, or working as labourers on large scale farms. The 50 parents who were interviewed had an average of 6.5 years of education and an average farm size of about 8 acres.

Natural resource management innovations which are being practiced in the community include: tree cultivation, tree nurseries, fruit trees, vegetable gardening

(for home consumption and for sale, mostly done in groups), cultivation of cotton, keeping of livestock, cultivation of field crops (maize, bananas, groundnuts, sorghum, guar beans), beekeeping, fishponds, cultivation of sunflower, and reclamation of gulleys. The headmaster noted however that the community would need more sensitization on some natural resource management innovations.

Parents sometimes provide materials and food to the school, especially during school functions. Parents sell vegetables to the school at a low price. Parents also provide the school with materials like pockets for raising tree seedlings and watering cans for free. Some farmers bring tree seeds to the school for the tree nursery (e.g. seeds of ber or *Ziziphus mauritiana*, mango or *Mangifera indica*, yellow tree bauhinia or *Bauhinia tomentosa*, snot apple or *Azanza garckeana*). Parents have also provided knowledge on improving soil fertility. One of the teachers “*learned the name of an indigenous tree from a farmer and got advice*”. One of the parents (Mr. Kabvunye) showed the school how to plant bananas and how to prune orange trees.

**Socio-economic aspects** which affect natural resource management practices at Mahuwe Primary School and the surrounding community include (non-exhaustive list based on interviews with key informants, teachers, parents and students):

- Lack of financial resources to buy inputs, poverty
- Lack of knowledge, illiteracy
- Lack of community support
- Water shortages: there are too few boreholes
- Gold panning: makes people not practice or neglect natural resource management
- Damage to crops and trees by cows and elephants
- Pests, e.g. termites
- Shortage of land for farming
- Clearing of forests and trees for conversion to agriculture
- Use of trees for firewood due to lack of alternative energy sources

Several discussions and interviews revealed that parents and community members can help enhancing natural resource management practices in the school by controlling the movement of animals to school to avoid trees and crops being destroyed, by providing financial support to school projects, by lending tools to school and by assisting in tilling the school land. Parents should also work together with teachers to come up with project ideas. Meetings involving the school and community could be organized. The school could in turn enhance natural resource management in the community by sensitizing the parents on natural resource management practices. The school should be a model for farmers to learn from. This could be achieved by knowledge development, education and awareness campaigns in the community through poems, posters, and drama, by participating in community programmes and by demonstrations on natural resource management practices like tree planting and establishment of tree orchards. Parents suggested that the school should show them skills of how to manage natural resource management projects, and schoolchildren are supposed to continue helping them in actual farming. A limitation mentioned by the headmaster was that there is not always enough time for involving community members and children in the natural resource management projects.

### **6.2.3 DISCUSSION**

Food insecurity and rural poverty in Zimbabwe is closely associated with lack of access to land in rural areas, and with low levels of education.

Some efforts have been made to improve the quality and relevance of basic education, including increasing teaching and learning resources, ensuring the supply of qualified teachers, improving qualifications of teachers already in service, and ensuring that the curriculum addresses the needs of the learners as well as the challenges of the contemporary world.

Several primary schools in Zimbabwe have initiated projects related to natural resource management. The purposes of these projects vary, but include income generation, nutrition, teaching and learning, environmental conservation, community awareness and outreach and life skill development of students. Teachers use locally available natural resources as a teaching aid in various subjects as this provides real examples of things in the local environment and gives a practical touch to theory.

Some primary schools in Zimbabwe now serve as a resource centre where parents, farmers and other community members can learn from. Schools work jointly with groups in the community to implement projects in school and in the community to enhance sound agricultural and environmental practices.

Government agencies and NGOs could use schools more frequently as training grounds. Continued sensitisation of parents and communities is crucial. Parents should be further encouraged to work together with teachers and develop interesting projects which have the potential to impact on food security and sustainable rural development.

There is also need for further staff development for teachers, headteachers and education officials through trainings, workshops and seminars, since most of the teachers still only have limited knowledge on natural resource management. Stronger linkages to organizations that can provide useful information on natural resource management practices are also required.

Zimbabwe lacks a clear policy framework to promote the use of natural resource management and sustainable development issues in schools. Some organisations in Zimbabwe are currently pushing and lobbying for the inclusion of education for sustainable development in the school curricula. Education policies need stronger reorientation towards issues in food security and sustainable rural development. Ways of making basic education relevant to rural people should be incorporated in the teacher training curriculum. There should be clear policy guideline on agriculture, land use and natural resource management in schools and this should be made part of learning in schools. The education policies could also spell out good practices for schools and each school should be encouraged to be actively involved in agriculture and environmental conservation. Teachers and students should be allocated time and incentives to incorporate this.

## 6.3 MALI

### 6.3.1 INTRODUCTION TO MALI

#### 6.3.1.1 MALI: BASIS FACTS AND INDICATORS

Despite higher economic growth since 1994, Mali remains **one of the world's poorest countries** - rated 174/177 in 2004 using the UNDP Human Development Index and a per capita income of US\$300 in 2004. While Mali may rank among the poorest, there are no reliable ways to measure its remarkably vigorous informal sector. In addition, farmers hoard a large share of their income.

Social indicators are very low: in 2003, 64 percent of the population was estimated to be living below the poverty line, life expectancy at birth was 52 years, infant mortality was 113 per 1,000 live births, and the adult illiteracy rate was 55 percent.

The country – which is landlocked – is one of the largest in Africa with a surface of 1,204,000 km<sup>2</sup> (of which about 60% is desert). Mali has a population of 11.6 million in 2004, which is predominantly rural and growing at an annual rate of 2.4 percent.

Poverty in Mali is essentially a rural phenomenon with the **rural poverty** incidence three times higher in rural areas than in urban centres. The poorest of the population are rural households engaged in subsistence agriculture. Poverty in Mali is characterized by illiteracy, malnutrition, reduced life expectancy, poor health, unhealthy environment, and reduced participation in economic and social life. The most vulnerable parts of the population are women, children suffering from malnutrition, young people with no access to employment and the elderly.

Economic infrastructure, particularly transport and communications, is weak and human capital is underdeveloped as shown by indicators on health and education levels.

Mali's **climate** can be severe. There are three main seasons: the very hot months from March to June; the hot, rainy period from June to October; and a pleasant, cooler, dry period between November and March. Mali is vulnerable to drought, and risks further desertification.

**Agro-climatic zones** range from Saharan (less than 150 mm of rainfall) in the north to Guinean or sub-tropical (1,200 mm of rainfall) in the south. Growth in the agricultural sector is constrained by low and irregular rainfall, poor and fragile soils, as well as generally low productivity because of the widespread use of traditional technologies.



### **MALI'S POVERTY REDUCTION STRATEGY PAPER (PRSP)**

The policy direction and quantitative objectives of Mali's Poverty Reduction Strategy Paper (PRSP), completed in May 2002, are based on a vision of sustained and poverty-reducing growth. The strategy lays out three priority areas (Government of Mali, 2002):

1. Institutional development, governance and participation.
2. Human development and access to quality basic services: This strategic pillar includes education and literacy initiatives aimed at fostering a better linkage between education/training programs and labour market needs. One of the components in this is improving education quality through the development of a curriculum and teaching methods adapted to local circumstances.
3. Development of infrastructure and support for key productive sectors: This strategic pillar includes a new vision for rural development and a multidimensional approach to food and nutrition security. The new vision for rural development is built around a master plan that incorporates, among other things, an approach by product sector, a shift in responsibilities towards key stakeholders (private sector entities, producer organizations), and a desire for sustainable management of natural resources and the environment. The policy for rural development and food security involves actions on a number of fronts: inputs, agricultural equipment, land security, non-farm revenue-generating processes, crisis-prevention measures, programs for emergency actions, and education, health and environmental measures.

Donors are supporting the implementation of the PRSP, whose goals are aligned with the Millennium Development Goals (MDGs), as well as to goals under the New Partnership for Africa's Development (NEPAD). The March 2004 roundtable meeting confirmed donors' commitment to Mali's PRSP, with \$2.4 billion in aid pledged by Mali's development partners over the coming three years.

### **6.3.1.2 BASIC EDUCATION IN MALI**

#### **STRUCTURE OF MALI'S EDUCATION SYSTEM**

In Mali, basic education lasts for nine years, which are divided into two cycles: the first is six years and the second is three years. Secondary education lasts for two to four years and is divided into different streams: one general leading to the *Baccalaureat* in 3 years, one vocational (two years) leading to *Certificate of Professional Capacity* and another vocational (four years) leading to the *Brevet of Technician*. Since the 1999 education law, Mali's education system has been structured as follows:

- Nursery education
- Basic education (nine years of schooling), including:
  - Basic First Stage (six years of primary education ending with the *Certificate of Completed Studies in the First Cycle of Fundamental Instruction*)
  - Basic Second Stage (junior secondary education of three years, ending with the *Diploma of Fundamental Studies*)

- Secondary education (two to four years):
  - General Secondary (three years in High School leading to a *Baccalaureat General*)
  - Technical Secondary (three years in Technical High School leading to a *Baccalaureat Technique*)
  - Vocational 1 Secondary (two years programme leading to a *Certificate of Professional Capacity*)
  - Vocational 2 Secondary (four years programme leading to a *Brevet of Technician*)
- Higher education

Teacher training for the first cycles in fundamental instruction is held at the regional *Institutes Pedagogiques d'Enseignement General* (IPEG). Education lasts four years after completion of the *Diploma of Fundamental Studies* and includes courses in General Education, Pedagogy, Child Psychology, and Teaching Practice.

Teachers of the second cycle of Fundamental Instruction are trained in *Ecoles Normales Secondaires*, which also offer four-year courses for those with *Diplomas of Fundamental Studies* or two-year courses for those with *Baccalaureat*.

Higher secondary school teachers are trained for four years after the *Baccalaureat* and an entrance examination in the *Ecole Normale Supérieure*.

### **ACCESS TO EDUCATION IN MALI**

Access to primary education in Mali did progress from a gross enrolment rate in primary education of 61% in 2001 and 53% for girls to 70.5% and 60% respectively in 2003-04. Progress in access comes not only from public sector investment, but also from a dynamic community-based investment. Community schools enrolment did progress at an average annual rate of 12 % during the four last years when enrolment in public schools increased at a rate of 8%. Community schools represent 18% of total enrolment in basic education and are mostly financed by the poorest segment of the population (World Bank, 2005b).

The Malian government lacks the necessary resources to provide Education for All. Mali has dealt with this difficulty in part by making it easier for NGOs to participate effectively in the education process. The registration process for NGOs is streamlined (the government must complete the registration within three months or an NGO is automatically registered) and has had relatively good success. For example, Save the Children began a program in Mali that used private funds to create schools in communities that hired local people as teachers, developed curricula to focus on a few key areas of learning, and offered instruction in local languages. The program was set up to provide access to education in remote areas where no schools existed. Government standards for community schools were established as a result of the Save the Children experience and community schools obtained official legal status. The sheer force and number of community schools has changed community expectations and turned even rural community members into powerful advocates for demanding educational services from the government.

### **QUALITY OF EDUCATION IN MALI**

While access to education remains a problem, another major impediment to achieving universal primary enrolment is the poor quality of education—including an inadequate infrastructure, poor pedagogic materials, lack of trained teachers, and formal education's irrelevancy to the lives of boys and girls and their different learning needs.

Completion rate in primary education remains very low at 40%, which is a major constraint for Mali durable development, and repetition rate is not improving, remaining at a high 19.4% in the first cycle and at 28.3% in the second cycle of primary education. Major causes are (World Bank, 2005b):

1. Lack of qualified teachers
2. Inefficient provision of textbooks
3. The high number of students per teacher
4. The new curriculum for primary education is not yet in place
5. Ineffective quality/performance monitoring.

### **THE LINK BETWEEN POVERTY AND EDUCATION**

Within the framework of the PRSP, the Education Department has done an analysis of the current education situation in Mali and the links between education and poverty. The findings are as follows (Government of Mali, 2002):

1. The indicators for the Malian education system are among the least impressive in the world. Enrolment rates are lower in rural areas than in urban areas, differences between regions are considerable, and the rates are particularly low for girls. In terms of basic education, the attendance rate is between 3 and 4 times higher in urban areas than in rural areas.
2. Dropout and repetition rates are very high. Inequalities between girls and boys increase as they progress toward the higher grades. Major variations exist between the poor and the non-poor in terms of expenditures on education and attendance at school. A child from a non-poor household has between two to three times the chance of attending elementary school than a child from a poor household.
3. The quality of education is very low. Because of the scarcity of human resources, the staff recruited is not well qualified. The number of hours of teaching time is very low and classes are overcrowded. The factors underlying the low education indicators include:
  - The living conditions at home
  - The high cost of schooling
  - The distance from schools
  - The need for manpower at key times in the agricultural season
  - The negative perception of the usefulness of school
  - Public expenditure trends

### **EDUCATION FOR SUSTAINABLE DEVELOPMENT IN MALI**

In the case of Mali, education for sustainable development in the formal education sector mainly occurred as a result of the implementation of the Training and

Information Programme on the Environment (TIPE) (*Programme de Formation et d'Information pour l'Environnement – PFIE*) funded by the European Union. This programme is implemented by the Inter-State Committee for the Fight Against Drought in the Sahel (CILSS) and was initiated in the sub-region in the early 90's. Educational activities are carried out in seven countries, including Mali (Box 20).

Due to the limitations faced by the Ministry of Basic Education to cover the school age population of the country, Mali has seen an effort on the part of the NGO community to fill the gap. As a result, education for sustainable development in Mali may be also taking place in schools that are managed and funded by local communities and receiving technical support from NGOs. The curriculum being implemented in some of these schools is not the official curriculum implemented in classical public-sector elementary schools. Its content may be richer in environmental issues than would be the case in the public sector. Community schools are trying to be more responsive to the needs of communities that often built them and pay partially or in full for teachers' salaries. In so doing, they are not only addressing more environmental questions than classical public schools do, but they may be addressing them in ways which have more practical implications for both students and their parents (GreenCOM, 1999).

#### **Box 20: Training and Information Programme on the Environment (TIPE) in Mali**

Mali is one of nine countries involved in the Training and Information Programme on the Environment (TIPE) (*Programme de Formation et d'Information pour l'Environnement – PFIE*) through membership in the Inter-State Committee for the Fight Against Drought in the Sahel. TIPE is a good example of multi-stakeholder collaboration and participation at all levels, from international to local.

TIPE is a 10-year effort that began in the early 1990s and is funded by the European Union. In Mali, 320 public schools have adopted TIPE to date. This formal environmental education programme is introduced in all elementary grades. Curriculum and training materials are produced by a regional pedagogical committee. A national pedagogical committee in each country makes appropriate adaptations.

The TIPE strategy in Mali takes advantage of a site or piece of land adjoining the school, which is shared in some fashion with the community. Each school is required to set up a joint project with the local community and establish school-community liaison through a village follow-up committee, so local delegates can participate in decisions and monitor site use. Mutual benefit is the key to this **school-community linkage**. Some schools ask families to donate sheep and cow manure to fertilize school gardens; other schools lay out nurseries for vegetables and seedlings and get the village to establish a neighbourhood follow-up committee to help transplant them in public spaces. The headmaster at one school contacted government water and forest officers to organize a course for villagers on the proper care and pruning of trees. Another school requested outreach help from its association of women alumni. Yet another school worked with a Catholic youth group and the agricultural services agent to replant trees at two village sites. The school also found a partner to install a solar pump, giving the community access to drinking water (GreenCOM, 2000).

### **6.3.1.3 FOOD SECURITY AND RURAL DEVELOPMENT IN MALI**

#### ***AGRO-CLIMATIC CONDITIONS***

Agro-climatic zones in Mali range from Saharan (less than 150 mm of rainfall) in the north to Guinean or sub-tropical (1,200 mm of rainfall) in the south. The most binding constraint to agricultural production is the limited amount and unreliability of rainfall.

Just 28% of Mali's land is arable, and only about 30% of that is under cultivation. Moreover, this resource remains unstable and under threat of desertification. Most of Mali gets less than 600 millimetres of rain annually: as a result, soil loss due to wind and water erosion remains significant. The country thus faces a growing environmental degradation problem while challenged by its population's increasing need for food.

#### ***AGRICULTURAL PRODUCTION***

The poorest of the population are rural households engaged in subsistence agriculture. Growth in the agricultural sector is constrained by low rainfall, poor and fragile soils, loss of biodiversity, low productivity because of the widespread use of traditional technologies, lack of socio-economic infrastructure and services, and credit and financial services (World Bank, 2004).

Agricultural production is higher in the south, where rainfall is relatively higher. Here, cotton production represents 45% of foreign exchange earnings which are, however, highly vulnerable to the world price for cotton. Despite poor conditions for agricultural productivity, including infertile soils and inadequate rainfall, the Malian rural household economy remains extremely dependent on agriculture. The most vulnerable parts of the population are women; children suffering from malnutrition; young people with no access to employment; and the elderly (World Bank, 2003b).

#### ***FOOD SECURITY***

Thanks to the fertile banks of the Niger River Mali as a country is food sufficient. However, cultivating this food supply requires hard work. Mali has the second highest rate of child labour in the world in part because children are needed to help in agricultural production. According to the International Labour Organization, most children in Mali do not think of this work as oppressive or abusive, although many are anxious for greater education.

#### ***CONSTRAINTS AND ISSUES FOR RURAL DEVELOPMENT***

Growth in the rural sector is severely constrained by a number of factors such as geographic, climatic, human, poor state of basic infrastructure and weak connection to markets (World Bank, 2004):

- **Declining and erratic rainfall.** Over the past 30 years, the country has faced declining and erratic rainfall and a southward movement of desertification. Severe droughts in the 1980s (particularly 1983-84 and 1987-88) have left an estimated 4 million rural residents highly vulnerable to food shortages. The climatic risk is a critical factor in sustained production and productivity

increase. Recent droughts had negative impact on productive assets and on the behaviour of producers who select low risk/low productivity production systems.

- **Low productivity of agriculture.** With some noticeable exceptions like rice production on the irrigated perimeters of the *Office du Niger*, productivity of Malian agriculture and agro-food system remains generally very low and stagnant, even compared to that of other developing countries. This is due to a number of factors, among which the widespread use of traditional low-input/low-output cultivation techniques, insufficient access to water resources for irrigation, as well as losses and inefficiencies in the downstream stages of the supply chain due to high transportation costs, lack of storage infrastructure, limited development of post-harvest processing, and weak connection to markets.
- **Limited access to markets because of poor basic rural infrastructure.** Rural infrastructure is poor and unevenly distributed, contributing to slow growth in many regions. Due to the poor network of rural/feeder roads, large parts of rural areas are not adequately linked to markets, which hinders producers from fully exploiting the new opportunities offered by increased urban demand and export possibilities. In addition, limited access to input distribution and credit, as well as other agricultural services (extension, technical advice), has resulted in low yields and poor revenues. Rural water supply also raises a serious challenge to both people and livestock.
- **Insufficiently diversified rural economy and weak private sector in rural areas.** Mali's predominantly rural economy is heavily concentrated on a limited number of traditional productions and exports (cotton, rice and livestock). This imposes limits to the revenues and economic opportunities in rural areas and creates a high level of vulnerability to shocks, both at macro and micro (farm) level. Private sector activities in rural areas are essentially limited to trading, mostly in the informal sector. As a result, private sector involvement for the creation of new opportunities, technology transfer, investment and generation of income and employment remains extremely low.

### ***RURAL DEVELOPMENT STRATEGY***

The Ministry of Rural Development prepared a long-term Master Plan for Rural Development (*Schéma Directeur du Développement Rural*) in 1992 and an update in 2001. It includes nine priority action programs that have been integrated into the Poverty Reduction Strategy (*Cadre Stratégique de Lutte contre la Pauvreté – CSLP*):

1. Support to agricultural services and producer organizations
2. Development of rural infrastructure and farming equipment
3. Promotion and improvement of the competitiveness of agricultural supply chains
4. Stimulation of exports of agricultural, forestry, livestock and fishery products
5. Intensification and diversification of agricultural production
6. Reinforcement of food security
7. Promotion of financing of the rural sector and rural credit
8. Management of natural resources to sustain rural development
9. Contribution to the finalization and execution of local development plans.

## **6.3.2 STUDY SCHOOLS IN MALI**

### **6.3.2.1 LOCATION OF THE SCHOOLS**

Both schools are located in Ségou Region. The capital of this administrative region is the city of Ségou, Mali's second-largest city. Situated at the centre of Mali, Ségou Region covers 64.947 km<sup>2</sup> (around 5% of Mali). The region is bordered by Sikasso Region to the south, Tombouctou and Mopti to the east, Burkina Faso to the southeast and Koulikoro to the west.

Much of the economy of the Ségou Region is supported by agriculture, which is based on irrigated agriculture, dryland farming and pastoralism. Dryland farmers in the central region of Ségou cultivate millet and legumes, while those in the south grow cotton in rotation with cereals. Ségou Region has a semi-arid climate with an average annual rainfall ranging from 150 mm in the north of Ségou Region to 750 mm in the south, although levels vary considerably from year to year. The rainy season lasts for three to five months, and the dry season is divided into a cool and a hot period. The two growing seasons overlap, with the main rice season falling between May and December, and dry season production of vegetables or rice between November and June. Several waterways, particularly the Niger River, allow irrigation for agriculture.

In 2004, the region was inhabited by 1,887,100 people, of which nearly half are younger than 15 years old. The population growth was estimated in 1998 as 2.1% per year. 79% of the population is rural.

The region is divided into 7 Cercles<sup>12</sup> (Baroueli, Bla, Macina, Niono, San, Ségou and Tominian) encompassing 118 communes and 2.166 villages. The major urban centres are Ségou, San, Niono, Dioro, and Markala, the latter of which has Mali's principal hydroelectric dam.

### **6.3.2.2 SE DEMBELE 2<sup>ND</sup> CYCLE SCHOOL**

#### ***INTRODUCTION***

Sé Dembelé 2<sup>nd</sup> Cycle School (Picture 23) is located in Kirango Village in the Cercle of Markala in the Region of Ségou in Mali, about 35 km from the town of Ségou. Majority of the population are from the Ethnic community Bambara. The school was established in 2001. Students come from Markala and Thio. Markala is an urban centre (Markala is a town on the Niger River, 35 km downriver from the city of Ségou; Markala is the site of Mali's primary hydroelectric dam), while Thio is a rural community

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<sup>12</sup> A Cercle is an administrative unit in Mali. Mali is divided into eight regions and a district. These subdivisions bear the name of their principal city. The regions are divided into 49 Cercles. The Cercles and the district are divided into 703 communes, 19 urban communes and 684 rural communes.



**Picture 23: Sé Dembelé 2nd Cycle School (Mali)**

The total number of students in October 2004 was 509 (236 girls and 273 boys). There were 9 male and 2 female teachers. The teachers are all qualified and they have been teaching in the school for between 1 to 4 years and about 5 of the teachers were newly posted. There is an average of 85 students per class (Table 21).

**Table 21: Distribution of students per class at Sé Dembelé 2<sup>nd</sup> Cycle School (Mali) in October 2004**

Grade	7	8	9	Total
Number of classes	3	2	1	6
Number of students	267	141	101	509
Average number of students per class	89	71	101	85

### ***THE SCHOOL ENVIRONMENT AND NATURAL RESOURCE MANAGEMENT PRACTICES AND HOW THEY ARE USED AS TEACHING AND LEARNING RESOURCES***

The school has a small forest of eucalyptus (*Eucalyptus* sp.) and neem (*Azadirachta indica*) trees. The school also has a fruit garden with citrus, mango (*Mangifera indica*) and guava (*Psidium guajava*) trees and bananas (*Musa* sp.), and a live fence around the school, supported by the World Agroforestry Centre (ICRAF). In the school garden they also plant sweet potatoes. The teachers were not fully knowledgeable about the different tree species in the school compound and they had to refer to the headteacher. The eucalyptus (*Eucalyptus* sp.) woodlot was started in 1998 (before the establishment of the school), live fences and neem (*Azadirachta indica*) trees in 2002, and citrus, mangoes (*Mangifera indica*) and guavas (*Psidium guajava*) in 2003.

Since the school is a second cycle school, it is not covered by the Training and Information Programme on the Environment (TIPE). The neighbouring first cycle



school however is a member of TIPE. The natural resource management activities at Sé Dembelé are jointly managed by the first and second cycle schools.

The headteacher said the natural resource management innovations serve the purposes of reforestation and occupation of idle land.

Students participate in irrigation of the school garden. According to the students, natural resource management in the school is used for beautification, food (students eat the fruits), shade and income.

According to the parents, natural resource management practices in the school are used for prosperity, food and income (e.g. when students drop out of school, they have knowledge of different crops and they will be able to practice some of the things learnt and earn a living).

The natural resource management practices in school are used for teaching and learning in natural sciences. Teachers use them for reference in Biology (e.g. a hippopotamus which was killed near the school was used to explain the importance of conservation).

The headteacher indicated that most lessons focus on what is outside the school and not what is in the school environment (e.g. in Grade 7 they don't teach about local plants).

The students indicated they learn about tree planting, how to manage fields, watering techniques and the benefits of trees (e.g. shade, fruits).

The headteacher and parents said children learn about environmental conservation (e.g. preventing extinction of plants and animals, techniques of planting guavas and vegetables). The teachers said children appreciate the benefits of trees.

Teachers said that there used to be a school policy (up to 2002) stating that every student had to take care of a tree and students got marks on this activity. Many of the trees planted at that time have grown big, but they are not taken care of now. Teachers suggested that a policy on afforestation for soil cover should be introduced.

A dictation in French in Grade 8 deals with the cultivation of rice (Picture 24), which is a major staple crop in the area. This is an example of making a language lesson locally relevant.

At Sé Dembelé 2<sup>nd</sup> Cycle School, there are no co-curricular clubs that deal with agriculture, natural resource management or the environment. During holidays however, students have formed groups to plant trees in school and town hall.



**Picture 24: Dictation in French about the cultivation of rice  
(Sé Dembelé 2<sup>nd</sup> Cycle School, Grade 8, Mali)**

### ***TEACHERS' CAPACITY TO USE NATURAL RESOURCES IN MAKING EDUCATION MORE RELEVANT TO THE LOCAL SITUATION***

The headteacher said that natural resource management is not adequately taught in teacher training. Their training is academic only, not practical. Teachers have not received any teacher development support or in-service trainings on natural resource management. Teachers said teacher training should focus more on environmental studies. One of the teachers said: *"If you want train somebody, you should be trained first"*. Teachers also complained about the frequent transfer of teachers.

The headteacher indicated that he doesn't understand the curriculum very well. He said training of trainers should be introduced in relation to natural resource management and teaching and learning support materials should be made available.

Teaching and learning materials related to natural resource management are lacking. The teachers partly substitute the inadequacies in teaching and learning materials by using local materials (e.g. rocks) and by borrowing materials.

The inadequacy in teachers' capacity to use locally available natural resources in making education more relevant was illustrated during a Biology lesson on locusts in Grade 8. The lesson was taught mainly from the blackboard and a drawing in a textbook (Picture 25) – while there were many living locusts available in the school compound. Making use of these living locusts could help in making this lesson less theoretical and more practical.



**Picture 25: Teaching about locusts from a Biology textbook  
(Sé Dembelé 2<sup>nd</sup> Cycle School, Grade 8, Mali)**

***PERCEPTIONS ON HOW RELEVANT EDUCATION USING NATURAL RESOURCE  
MANAGEMENT CAN HELP ADDRESS FOOD SECURITY AND SUSTAINABLE  
RURAL DEVELOPMENT***

Most food insecurity is experienced in the months from June-July to October. The reasons given for food insecurity by different respondents include: scarcity of rainfall, finished food stocks due to poor production and food crops not yet ready for new harvest, lack of diversification of the diet, poverty, lack of land and unproductiveness of the soils.

**Table 22: Parents' perceptions on the type of food consumed by their households in the past 12 months (Sé Dembele Second Cycle School, Mali)**

Type of food	% of responses
Always enough of the kind of food we want to eat	17%
Always enough food, but not always the kind of food we would like to eat	77%
Sometimes not enough food	4%
Often not enough food	2%

The effects of hunger on children's learning in school were identified by the headteacher as affecting both mental and physical development and failure in school. The students said they lack concentration in class, become inactive, feel weak, have

stomach complaints, don't come to school, have to repeat classes or fail in school. The parents said children have difficulties in understanding of lessons and don't like going to school as a result of hunger. Teachers added that as a result of hunger students don't communicate properly, drop out of school and students quickly feel tired. Teachers themselves also become tired of teaching because they don't get good collaboration from the students.

In terms of natural resource management practices used in schools, the students and parents said that the vegetable garden would be the most important in terms of contributing to food security and income generation while according to the headteacher this would be the fruit trees.

Students practice at home some of the natural resource management practices taught and demonstrated in school, e.g. ploughing and sowing, irrigation of vegetable gardens and tree planting. Students were able to describe the different steps in the gardening process and they also sell some of the produce in the market. Parents mentioned the following activities practiced at home by their children and learnt in school: crop production (77%), environmental management (15%), bush fire fighting (13%), tree planting and management (5%) and making of improved stoves (2%). 94% of the parents said that they have learnt something from the practices of their children at home.

#### ***INTERACTIONS OF TEACHING AND LEARNING IN THE SCHOOL WITH NATURAL RESOURCE MANAGEMENT PRACTICES IN THE COMMUNITY***

Students mentioned that they have learnt in school different types of knowledge and skills related to natural resource management, e.g. application of fertilizers, irrigation, protection of plants, and optimal height of trees. 75% of the parents interviewed agreed with the statement that the education their children get is relevant to their future.

Most parents are illiterate and are therefore unable to help children in revising their **homework**. 80% of the parents mentioned that students are sometimes given homework related to agriculture and the environment. 36% of the parents mentioned that they help their children with revision of homework. 90% of the students said that they revise their homework with a family member. 68% of the parents mentioned that they have learnt something from their children's homework. The headteacher pointed out that it often depends on the students' background and their home environment. In rural areas, they have many other activities to do (e.g. going to the river). But nevertheless, parents seem to have learnt something from the natural resource management practices which their children have learnt in school and are applying at home, e.g. about tree planting, vegetable gardening, and cultivation of sweet potatoes. A parent gave the example of his son who came home with knowledge and skills of cultivating sweet potatoes and he then planted sweet potatoes on the whole piece of land.

87% of the parents of students we interviewed at Mahuwe Primary School have farming as their main occupation. The parents who were interviewed had an average of 4.6 years of education and an average farm size of 5.4 acres.

Natural resource management practices in the community include tree planting for controlling desertification (e.g. neem (*Azadirachta indica*), eucalyptus (*Eucalyptus* sp.), and fruit trees), vegetable gardening and cultivation of sorghum and millet.

Parents said their children sell fruits for them and give them the money. Parents are paying for cereals, school materials and clothes.

The parents do not promote natural resource management in school because they think it is already done in school anyway (because they see trees have been planted in the school compound). Students reported that parents don't promote natural resource management practices in the school because of their illiteracy.

**Socio-economic aspects** which affect natural resource management practices in the school and the community identified by different respondents included (in order of importance):

- Lack of information on natural resource management practices, lack of sensitization and communication, lack of training
- Lack of finance to buy planting materials, seedlings and fertilizers
- Lack of enough water and land (in the school)
- Lack of labour
- Unproductive soils
- Destruction of trees by animals.

Some suggestions were given on how school-community links could be improved in relation to natural resource management practices:

- Parents (and the community) can supply organic manure and seeds to the school
- Students' own initiatives need to be encouraged by their parents and teachers and students should help their parents with skills learnt in school
- Parents should be better sensitized because now they are not informed, they don't have any specific duty and their priority is the provision of daily meals to their families (according to the headteacher).
- School members (teachers and students) have to be role models in the community in sustainable agricultural and natural resource management practices. The school has to become a driving force for improved natural resource management in the community and be dedicated to the cause and service to communities.

### **6.3.2.3 BANANKORONI 2<sup>ND</sup> CYCLE SCHOOL**

#### ***INTRODUCTION***

Banankoroni 2nd Cycle School is located in Banankoroni Village in Ségou Region in Mali, 15 km from the town of Ségou. The school was established in 1978. Total enrolment at Banankoroni 2nd Cycle School was 215 students (66 girls and 149 boys) in October 2004. There were eight teachers (five female teachers and three male teachers). Six of the teachers are government officials trained at the national teacher training colleges and two teachers are under a short contract and have a

vocational training certificate. The headteacher has been in the school since 1990 and has been headteacher since 1999. The average length of service of teachers in this school is two years.

There are three classes with an average of 72 children per class (Table 23).

**Table 23: Distribution of students per class at Banankoroni 2<sup>nd</sup> Cycle School (Mali) in October 2004**

Grade	7	8	9	Total
Number of classes	1	1	1	3
Number of students	71	95	49	215
Average number of students per class	71	95	49	72

***THE SCHOOL ENVIRONMENT AND NATURAL RESOURCE MANAGEMENT PRACTICES AND HOW THEY ARE USED AS TEACHING AND LEARNING RESOURCES***

A natural resource management practice at Banankoroni 2<sup>nd</sup> Cycle School which helps in creating wealth is the cultivation of neem trees (*Azadirachta indica*). There are trees in the whole schoolyard. The trees were planted before the school was built and the headteacher doesn't know the history of the trees. The trees are used for shade (e.g. the headteacher uses the shade as his office and teachers rest under the trees between lessons). The neighbouring 1<sup>st</sup> Cycle School has planted improved Indian jujube (*Ziziphus mauritiana*) trees.

Banankoroni 2<sup>nd</sup> Cycle School has a school garden, but it is not being utilised. The school has got some fields which are being utilised by villagers. The rent of this land provides some income for the school. The headteacher said the funds generated are used for training. Before the school acquired a water pump, pupils used to go to the river to fetch water.

The headteacher said students have learned practices of water filtering, decanting and sanitation. The parents said *"We cannot tell what our children have learnt. We saw pupils working in the school garden, but we wouldn't know what they have learnt"*.

There are no co-curricular clubs dealing with agriculture, natural resource management or the environment at the school. People are hostile and parents always need their children. According to the headteacher, only punished pupils work overtime (after the classes).

***TEACHERS' CAPACITY TO USE NATURAL RESOURCES IN MAKING EDUCATION MORE RELEVANT TO THE LOCAL SITUATION***

Although teachers seem to consciously link theory in class to students' own experience by referring to pupil's previous knowledge acquired in the first cycle and knowledge gained from their parents (e.g. about agriculture, planting of mango trees),

teachers indicated that they are not properly trained in using natural resources to make education more relevant to the local situation. “*Our education (training) is insufficient for teaching about and with natural resources*”. Teachers suggested that teacher trainings should be organized for teachers of the second cycle to learn agricultural techniques and how to incorporate natural resource management into the official programme.

Teachers also have inadequate teaching and learning support materials related to natural resource management. They said they would need more books and teaching material. They are partly substituting the inadequacy in teaching materials by using local materials (e.g. when teaching about parts of a cricket, they make some drawings (sketches) and if possible they ask pupils to bring crickets to the classroom) or borrowing materials (e.g. for explaining the rotation of the globe, they borrow a globe or they make a sketch of the globe on the blackboard).

***PERCEPTIONS ON HOW RELEVANT EDUCATION USING NATURAL RESOURCE MANAGEMENT CAN HELP ADDRESS FOOD SECURITY AND SUSTAINABLE RURAL DEVELOPMENT***

Most food insecurity is experienced in the months from June-July to September-October. The reasons given for food insecurity by different respondents include: insufficient food production, exhausted or sold stocks and new harvest not yet ready, poor crop harvest management, insufficient rains, lack of fertilizers, lack of land, high population density and poverty.

**Table 24: Parents’ perceptions on the type of food consumed by their households in the past 12 months (Banankoroni Second Cycle School, Mali)**

Type of food	% of responses
Always enough of the kind of food we want to eat	28%
Always enough food, but not always the kind of food we would like to eat	59%
Sometimes not enough food	4%
Often not enough food	7%

Effects of hunger on students’ learning in school identified by different respondents included the following:

- Students don’t listen to the teacher:
- Lack of understanding and concentration, students forget what they have learnt, students fall asleep in class
- Sickness in class, stomach pains
- Students arrive late in school, leave school early or don’t come to school at all
- Negative impact on the teachers: teachers are less motivated and work less intensively

Students are applying some natural resource management practices at home which could help them in addressing food security and sustainable rural development: water

decanting and filtering, ploughing, cultivation of cassava, rice and sorghum, planting of trees and vegetable gardening.

### ***INTERACTIONS OF TEACHING AND LEARNING IN THE SCHOOL WITH NATURAL RESOURCE MANAGEMENT PRACTICES IN THE COMMUNITY***

Teachers said parents come to school during school open days and they occasionally come to see teachers in order to know more about their children's education. Parents said they encourage children to study and also the elder students urge younger ones to study. The children said parents urge them to study, but some parents don't do it because they are illiterate. The headteacher added that parents extol children to learn their lessons.

Students said that their parents have learnt something from their children's natural resource management practices and homework. An example given was the method of crop field ridging (plowing perpendicularly to the direction of the slope). The parents however said they have not learnt anything from children, as children do not learn anything about agriculture in school: *"Children do not even learn how to cultivate millet or cassava in school"*.

Natural resource management practices in the community include: tree cultivation, (mango (*Mangifera indica*), neem (*Azadirachta indica*), African mahogany (*Khaya senegalensis*)), live fences (*Lawsonia inermis*, *Ziziphus mauritiana* and *Acacia senegal*), cultivation of millet, cassava and rice, truck farming<sup>13</sup> along the river.

The headteacher said that parents do not promote natural resource management in school perhaps because the school did not call them and because of lack of natural resource management practices in school currently. The teachers said that because a long time ago there was a vegetable garden, but now the school does not have its own school garden and parents know that there is not much going on (they know that the school does not practice this kind of work). The parents also explained why they don't promote natural resource management in school *"We think teachers already know these techniques, we think they are already well educated"*. Students said that their parents don't understand natural resource management practices very well.

The **socio-economic aspects** of the community that affect natural resource management practices in the school and the community include:

- Poverty
- Lack of land
- Cassava fields are protected with dead fences - branches come from cutting of trees
- Cultural or traditional beliefs: e.g. onions are associated with the devil
- Water problems.

Some suggestions were given on how school-community interactions related to natural resource management could be improved:

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<sup>13</sup> Truck farming: horticultural practice of growing one or more vegetable crops on a large scale for shipment to distant markets.



- The parents or community can enhance NRM practices in the school by making people should be made aware that the school can't know everything and a framework of consultation should be established where school (teachers) and parents can come together in issues of natural resource management.
- The school can enhance natural resource management in the community by introducing natural resource management in the school garden and the school's programmes. Pupils can help changing their parent's behavior when pupils put their knowledge into practice.
- The school can invite experienced farmers for training.

### **6.3.3 DISCUSSION**

In general, there is a lack of adequate teaching and learning support materials in Mali. Many classes are overcrowded. The use of locally available natural resources as a way of making education more relevant is very limited in second cycle schools, but appears to be more widely used in first cycle schools, partly thanks to the Training and Information Programme on the Environment (TIPE) (*Programme de Formation et d'Information pour l'Environnement – PFIE*). Most lessons are taking place inside the classroom with lecturing and oral questioning being the most commonly used teaching methods. Student-teacher interactions are generally good and students are enthusiastic in answering questions.

For education to have a more direct impact on food security and sustainable rural development, education should include more practicals and activities directly related to the daily lives of children and young people in rural areas - such as agriculture and livestock production - should be more intensively integrated in the teaching and learning process. The competence of the teachers to do this would need to be improved by adequate training and the supply of adequate teaching and learning support materials.

There is need for a stronger exchange of ideas between students, teachers and parents in order to establish better school-community linkages. There have already been some successes in terms of developing relationships between the school and the community in Mali that could be replicated elsewhere.

The following elements would be essential in making basic education relevant to rural people in Mali:

- The existence of a supporting curriculum in the school.
- Training programs in using the local environment as a way of making education relevant for teachers, principals and education officials.
- Learners and their needs have to be at the centre of basic education.
- Schools need to be equipped with supporting educational and technical materials.
- School projects must be sufficiently long in time in order to progressively overcome any resistance there may be. A project that ends after three or four years has little chance of garnering the support of the community.

## **7 MAIN FINDINGS**

### **7.1 RELEVANT BASIC EDUCATION CONTRIBUTES TO RURAL DEVELOPMENT**

The centrality of basic education for rural development and for the general improvement of rural life is now widely accepted. The quality and relevance of schooling can positively influence productivity, both in agriculture and in off-farm employment.

The relevance of basic education is a major concern in rural areas of the developing world. Raising the quality and relevance of basic education seems to pay off in terms of food security and sustainable rural development. Relevant basic education in rural areas enables people to live more productive lives. When schools are relevant and educate many children well, the process of rural development can occur relatively quickly; when schools and teachers are poorly equipped and educate few children well, education's impact on development is relatively slow.

The lack of basic learning opportunities which are of good quality and relevant to the local situation is both a contributing cause and an effect of rural poverty in many developing countries. Opportunities for relevant basic learning are generally inadequate to help rural people to break out of the vicious poverty cycle. Relevant basic education of good quality is unlikely to break this cycle by itself, but it should be a key part of rural poverty reduction strategies and approaches.

### **7.2 RELEVANT BASIC EDUCATION CAN HELP IMPARTING LIFE SKILLS WHICH ARE USEFUL IN ALLEVIATING POVERTY IN RURAL AREAS**

The importance of basic skills – notably numeracy and literacy – is recognized in most countries as a foundation for further development. These skills are given a high priority in primary education.

Not all of the additional skills needed for agricultural production, food security and sustainable rural development will be addressed directly through primary education. The role of primary education is to lay a foundation which will allow for these skills to be developed through non-formal, informal and further education. Most of the skills are interlinked and are used simultaneously in practice. Relevant basic education can contribute to this skills development and help imparting life skills which are useful in alleviating poverty in rural areas. These skills include decision making and problem-solving skills, technical skills, planning skills, management skills, social, interpersonal and communication skills, negotiation skills, facilitation skills, critical thinking (necessary for fostering innovation and change), food preservation and processing skills, marketing skills, leadership skills, business skills, income-generating skills, entrepreneurial skills, and awareness about social, political and legal institutions (necessary for the development of skills for effective participation in civil society).

### **7.3 SCHOOL CURRICULA ARE OFTEN OVERLOADED AND LEAVE LITTLE ROOM FOR LOCAL INTERPRETATION**

The curriculum, teaching approaches, teaching and learning support materials and sometimes the language of instruction are not always suited to the local context, customs, livelihoods and rural development activities. Therefore, learning in school may appear quite irrelevant to poor rural children in comparison with their more immediate survival needs.

To attract and retain learners and to meet their requirements effectively, there must be a commitment to improve the quality and relevance of basic education – especially in rural areas. In several cases, this will involve designing and implementing basic education programmes in close harmony with other development efforts in rural areas (food security, agricultural production, health, environmental protection, access to credit, etc.) to ensure that learners can put their knowledge and skills to good use.

The education system in developing countries is often centralised and very demanding and leaves little time or opportunities for localised interpretation of the content.

### **7.4 RURAL TEACHERS ARE OFTEN POORLY EQUIPPED**

Teachers are the key to effective learning and relevant basic education of good quality. Successful educational innovation lies largely with the teacher, as the interpreter and deliverer of the curriculum. Unfortunately, teachers are often inadequately prepared, trained, supervised and supported in their work, especially in rural areas. Teaching is often far removed from the students experience at home and in the community.

The capacity of the teacher to interpret the curriculum and relate it to the local rural context will depend on a number of factors, including personal motivation, competence in a range of teaching and learning strategies and professional attitude, especially towards learners. Increased efforts to reorient teacher education courses and programmes towards relevant teaching and learning can empower teachers to play an important role in making basic education relevant.

Support from the headteacher, the school administration and the education system is important for teachers. Teachers who are allowed and encouraged to participate in decision-making and to treat the curriculum with some flexibility and room for contextualisation are usually better motivated.

### **7.5 TEACHING AND LEARNING SUPPORT MATERIALS ARE IN MANY CASES INADEQUATE**

Even if teachers are competent and well trained, they often find it difficult to teach effectively because of the lack of adequate teaching and learning support materials that are relevant to the local situation.

## **7.6 AGRICULTURAL AND ENVIRONMENTAL EXPERIENCES CAN BE USED AS A WAY OF MAKING BASIC EDUCATION IN RURAL AREAS MORE RELEVANT TO THE LOCAL SITUATION**

New approaches to contextualisation of content and pedagogy using agricultural and environmental experiences offer encouraging options to improve the relevance of basic education.

School gardens and agricultural practices such as agroforestry can be used as media for contextualising teaching and learning in rural areas and have potential to enable children to cope more effectively with general subject matter in school. At the same time, contextualised teaching and learning can contribute to the skills formation process.

## **7.7 COMMUNITY OWNERSHIP IS CRUCIAL FOR RELEVANT AND EFFECTIVE BASIC EDUCATION**

A major challenge is to promote community ownership of basic education programmes, which helps to ensure their relevance, sustainability and effectiveness both in terms of learning achievement and of contributing to other rural development activities.

School-community links exist in every school, but they come in different forms and are not always very strong. Successful interventions to make basic education more relevant empower local communities and use their expertise.

## **8 IMPLICATIONS FOR POLICY AND DONOR SUPPORT**

### **8.1 POLICY IMPLICATIONS**

Orienting policies – including EC external assistance policy – towards poverty reduction is a complex issue, which requires an integrated and multi-sectoral approach which is based on research findings. Addressing such complexity requires a flexible, but determined effort by governments and their partners.

Within this complex poverty reduction framework, our study focused on two areas, namely food security and sustainable rural development, and the role of relevant basic education. Suggested policy and donor support implications are therefore mainly targeting these two areas.

Human capital can be built up by providing more schooling, but policies that fail to consider the quality and relevance of education risk expanding quantity without truly expanding human capital.

Policy thrust and political will is an important variable for accelerating educational progress in rural areas. The problems of education quality and relevance in rural areas need to be recognized and addressed through coherent, explicit policies and strategies.

Policymakers and others – including schools and communities – have to seek ways to make the content and approaches of primary education more meaningful and effective within the context of food security and sustainable rural development.

A policy framework should place learners at the centre of the teaching and learning process, emphasizing that, from the outset, policy must acknowledge their diverse characteristics, circumstances and learning needs. Strategies to improve educational quality and relevance should draw on the strengths of learners and on their knowledge, interests and capacities.

Although poor-quality and irrelevant education exist at all levels, improvement must begin at the primary school level, where children develop their basic attitudes and approaches to learning. Improving the quality and relevance of education for learners in primary schools is a prerequisite for developing the human resource base required to meet the changing demands of rural labour markets. To initiate a deeply rooted and sustainable process of rural development, human capital strengthening must be broadly based and allow a progressively larger share of the general population to participate in the process of economic transformation.

Education for All (EFA) action plans need to progressively address issues such as relevant education, food security and sustainable development in rural areas. Rural-sensitive approaches which are context specific are required.

## **8.2 IMPLICATIONS FOR DONOR SUPPORT**

Despite the shortcomings in the provision of quality basic education in rural areas today and despite the shortfall in resources allocated for it, progress is being made as many countries continue their efforts to expand its coverage and improve its quality and relevance.

Relevant basic education in rural areas could be funded as a component of food security and sustainable rural development strategies or as part of the education sector. Unfortunately, it has received inadequate donor attention either way.

### **8.2.1 A CONCERTED MULTI-SECTORAL EFFORT IN RURAL AREAS OF THE DEVELOPING WORLD TO DEVELOP BASIC EDUCATION GEARED TOWARDS RURAL DEVELOPMENT IS NEEDED**

Donors must offer more concerted and effective assistance to develop basic education geared to agriculture, rural development and food security, especially in the poorest countries.

The need for more coordinated approaches has been recognised, but has only recently begun to be addressed. The World Bank and other inter-governmental institutions, such as FAO and UNESCO, are now seeking to revive interest among donors in basic education in rural areas. The FAO/UNESCO flagship programme on 'Education for rural people' provides an illustration of this movement. This also fits in the global vision of the UN Decade of Education for Sustainable Development (2005-2014) of "a world where everyone has the opportunity to benefit from quality education and learn the values, behaviour and lifestyles required for a sustainable future and for positive societal transformation".

It is necessary to locate support to education in poverty-stricken rural areas within the wider context of rural development and to promote multi-sectoral approaches designed and implemented with a high level of community involvement.

### **8.2.2 BASIC EDUCATION IN RURAL AREAS SHOULD FOCUS ON LEARNERS' NEEDS**

Efforts to expand basic education programmes to reach more learners need to be accompanied by measures to ensure that the content, quality and delivery of those programmes effectively meet learners' needs.

This also means that learning needs to be child-centred, holistic, experiential, active and practical.

### **8.2.3 SCHOOL CURRICULA SHOULD BE MEANINGFUL REGARDING THE LIFE SITUATIONS OF RURAL CHILDREN AND RELEVANT TO LOCAL NEEDS AND CONDITIONS**

The relevance of the curriculum to the learner's needs and interests is essential. School curriculum should be meaningful regarding the life situations of rural children and relevant to local needs and conditions. Most developing countries have a centrally determined curriculum which is generally designed for pupils familiar with an urban environment and may contain elements that conflict with local practices. Decentralized curricular interpretation and adaptation needs to be possible within prescribed national curricula. Initiatives which combine the national common core content and supplementary content based on the local culture and economy need more support.

Participatory curriculum development where relevant stakeholders and experts are involved can contribute to creating a more relevant curriculum.

While rural schools should not look like urban schools, they must offer the same opportunities as urban schools for children to advance through the school system to higher levels. Though the national curriculum is often poorly suited to rural schools, modifications must be acceptable to all stakeholders, including ministry officials and parents.

### **8.2.4 IMPROVED PRE-SERVICE AND IN-SERVICE TEACHER TRAINING SHOULD BE SUPPORTED**

The teacher is a key actor in the provision of basic education. Teachers must strive to make education interesting and relevant for the rural poor through the use of appropriate teaching and learning methods and through interpretation of the prescribed curriculum in relation to the local context. In order to make basic education more relevant in rural areas, teachers need knowledge of substantive areas and content related to agriculture and the environment, as well as pedagogical skills to use a repertoire of appropriate teaching strategies.

Teachers therefore need adequate teacher-training and support, especially in innovative teaching and learning approaches including participatory techniques, both pre-service and in-service. Continuous improvement in the quality and relevance of basic education should entail continuous competence and skills upgrading for teachers.

Awareness raising and training for educational administrators and school inspectors in leadership, managerial, motivation and supervisory skills are equally important.

Professional development sessions should be arranged in such a way that teachers and educators come away with something that, if they implement it, will save them time and effort and not involve them in additional effort.

Recruitment and training of teaching staff in rural areas should be encouraged as this will allow relying more on available local skills and talent. Sound investment in human

(and social) capital in rural areas is an essential part of any good economic strategy for broad-based and equitable rural development.

### **8.2.5 ADEQUATE TEACHING AND LEARNING MATERIALS SHOULD BE PROVIDED**

Teachers need adequate teaching equipment and support such as reference materials and textbooks. Learning materials should be linked to the local environment and learners' experience. The school environment can be used as a learning resource and teaching and learning support materials can draw on agriculture and natural resource management as the local context for learning.

Teachers (as well as other stakeholders and experts) need to be involved in materials development from the very start, to build on existing good practices.

People and learning resources for teaching children about their rural environment, agricultural skills, and other practical skills and knowledge that complement the academic curriculum should be made available to schools.

More investment in providing relevant and adequate teaching aids and learning materials to rural schools would produce good returns in learning achievement.

### **8.2.6 IMPROVED SCHOOL-COMMUNITY LINKAGES SHOULD BE ENCOURAGED**

Good practices in sustainable agriculture and rural development can be shared between the school and the community. Schools and school gardens can function as experimental grounds and agricultural development centres where both modern and local knowledge is exchanged through interaction and involvement of different actors.

Farmers and other local experts have a vast wealth of relevant knowledge and skills, can be invited as resource persons to schools and can help teachers and students learn about agriculture and the local environment.

Parents and community members can learn new ideas, methods and techniques from their children and teachers and from school demonstration plots.

Agricultural extension officers can assist teachers with technical knowledge, help with the establishment of demonstrations in the school garden and link the school to agricultural and rural development institutions.

Communities should be encouraged to use schools as centres for education and social activities beyond primary school. Schools should be hospitable for adult literacy classes, extension activities, women's groups, community functions, and other activities and events. This not only brings parents into the school, it also helps transform the school into a multi-function learning and meeting centre and puts it at the centre of the community.



### **8.2.7 MORE EFFECTIVE MONITORING AND SOUND SCIENTIFIC RESEARCH AND ANALYSIS OF BASIC EDUCATION IN RURAL AREAS SHOULD BE SUPPORTED**

Despite the growing consensus that poverty is multi-dimensional and complex, a lot of poverty research has been based on using approaches and methods that cannot capture a full picture. External funding can usefully help underwrite certain research and development costs relating to the improved provision of basic education in rural areas.

More effective monitoring of basic education activities in rural areas is needed. Too little is currently known about what education is needed, what is being offered and how knowledge and skills are being taught.

The many kinds of expertise and technical skills needed to analyse the provision and quality of education in rural areas may not be readily available in all countries. International partners can help by organizing in-country training workshop, study visits to countries with similar conditions and problems and other experience-sharing activities to enable national officials and specialist to acquire useful information and gain broader perspectives to deal with relevant basic education and rural development issues. Further support can be provided through technical documents, publications and Internet websites. Lessons learned and experiences need to be shared with donors, educators, policy makers and the wider community.

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