

**THE ROLE OF ENVIRONMENTAL EDUCATION IN REDUCING WATER  
WASTAGE IN PRIMARY SCHOOLS IN EMPANGENI DISTRICT**

by

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## DECLARATION

I declare that

**“The role of Environmental education in reducing water wastage in primary schools in Empangeni District”** is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references.

Date: 01/ 11/ 2009

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## **SUMMARY**

South Africa is a water-scarce country and receives less rainfall than the average rainfall of the World. As population increases, and development calls for increased allocation of ground water and surface water for the domestic, agriculture and industrial sectors, the pressure on water resources intensifies.

This is exacerbated by the wastages that occur in schools and homes. Conservation of water by all consumers is essential.

The study attempts to identify practices that lead to wastage of water and indicate strategies for the reduction of water wastage and conservation strategy.

### **KEY TERMS:**

- environmental education,
- water wastage,
- water scarcity,
- water conservation,
- environmental policy,
- water policy,
- sustainable living,
- water demand
- water re-use and
- awareness programmes

# Chapter 1

## Orientation of the Study

### 1.1. Introduction

Water is essential for all economic development and for maintaining healthy ecosystems. As the world population increases and development calls for increased allocations of ground water and surface water for the domestic, agricultural and industrial sectors, the pressure on water resource intensifies. This may lead to tensions and conflicts amongst users, and excessive pressure on the environment. The increasing stress on fresh water resources brought about by ever-rising demands and wasteful use, as well as by growing populations worldwide is a serious concern.

It is envisaged that by 2020, 1800 million people will be living in countries or regions suffering from a water scarcity, and two thirds of the world's population could be under stress conditions. The situation will be exacerbated as rapidly growing urban areas place heavy pressure on neighbouring water resources (<http://www.dwaf.gov.za> [accessed on 09 July 2008]). South Africa is a water-scarce country and it is envisaged that by the year 2020 it will be facing water constraints, unless something is done to conserve water. Due to climate change and growing population, it is estimated that by the year 2020 South Africa will be getting 80 mm less rain than at present and our average rainfall will be about 380 mm, which is inadequate for our needs (DWAF, 1997:9). However, the constitution of the Republic of South Africa, 1996 (Act 108 of 1996:13), and the Bill of Rights enshrine basic human rights amongst others to have access to sufficient water and a safe and healthy environment. The two acts that enable government to fulfill these rights through the Department of Water Affairs and Forestry are:

- the Water Service Act, 1997 (Act 108 of 1997 and
- the National Water Act, 1998, which aims to ensure that water resources are protected, used, developed, conserved, managed and controlled in a sustainable manner, for the benefit of everyone in South Africa.

Addressing water scarcity requires actions at local, national and river basin level (<http://www.dwaf.gov.za> [accessed on 9 July 2008]). It also calls for action at global and international levels, leading to increased collaboration between nations on the shared management of water resources. It requires an intersectoral and multidisciplinary approach to managing water resources, in order to maximise economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems. Given the fact that water is essential to life, that it is a scarce resource and consequently that communities are obliged to manage and use the resource sustainably, the possibility of and need for changing community area members' attitudes toward the sustainable use of water becomes a priority.

Sustainable living must thus be a guiding principle for all individuals, communities, nations and the world (Le Roux, 2001:151).

To ensure the sustainability of the resources, communities must learn to adapt their present patterns of use, be conservative in actions that could affect the environment, study the effects of such actions carefully and learn from their mistakes.

People waste water in their homes, work places, and schools without even realising it. Humans have become so accustomed to have a 24 hour supply of water to all their needs from cooking to cleaning to drinking, that they sometimes forget that the country does not have an infinite supply of water.

According to Enviro Teach 1999 in Le Roux (2001:260), of all water that the municipality supplies, only 75% can be accounted for, the other 25% is a combination of un-metered supply and lost water due to leakages and wastage. In greater Soweto, for example, water that is wasted accounts for approximately 75 million litres of water a day. This huge amount of water lost in Soweto alone could be used to supply other communities that are without clean water.

In addressing the issue of water scarcity and water wastage by the communities and the learners at schools, Professor Kader Asmal, the former Minister of Water Affairs and Forestry, initiated the 2020 Vision for Water Project. The Department of Water Affairs and

Forestry (DWAF) in collaboration with the Department of Education (DoE) launched the 2020 Vision for Water project in 1996.

The purpose was to raise the levels of awareness of all South Africans especially young ones on the value of water and to conserve our water as a scarce natural resource.

Thirteen years after the project was launched it has not been fully implemented in some schools including those in Empangeni District.

Some schools are still involved in water-wasteful practices such as washing hands or drinking from the running taps and leaving taps open or dripping.

This study aims to establish and shape learners' attitude towards water and its sustainable utilisation. It will explore the role of environmental education in reducing water wastage in primary schools in the Empangeni District.

## **1.2 Motivation for the study**

South Africa is a water-scarce country and water is a vital natural resource that should be used wisely. All South African citizens should strive to conserve its water resources.

However, water wastage is a worsening problem in our homes and our schools.

In some schools in the Empangeni District water wastage is high and the authorities are doing very little or nothing at all to reduce or stop this wastage.

It is estimated that one leaking tap can waste up to two hundred litres of water each day and more than 2000 litres a month ([www.dwaf.gov.za](http://www.dwaf.gov.za)[accessed on 09 July 2008]).

Bernnan cited in Joubert (1993:12) states that whenever society faces large problems, there is a tendency to think that either their roots or their solutions lie at least partly in the education system.

From the above passage, it is clear that the solution to water wastage in our homes and schools lies in educating learners in schools who will be the best teachers of their parents and the best people to cascade information through their families and communities.

It is envisaged that the study would help learners identify water wastage practices and consequently identify ways of saving water in homes and schools. By saving water, they would help save schools' money and the environment as such.

It would also inform the municipalities how to save water, which could be used to supply communities without safe drinking water.

It is assumed that if the validity and reliability of this research is not compromised, the results could provide guidelines on how to solve water wastage practices in schools, homes as well as in communities where these learners come from.

### **1.3 The Research Problem**

Fox and Mohamed (2007:22) explain research problems as issues or difficulties that researchers experience within either practical or theoretical situations and to which they need to find solutions.

The decision to undertake this study was taken when the researcher observed that some schools in Empangeni District are still involved in water wastage practices. Children wash hands, drink from running taps and leave taps open or dripping. Children often play splash games with water. Pipes are sometimes leaking or taps are left dripping. Broken toilets also account for water wastage in schools and homes. The authorities are doing very little to save our precious water resource. This study attempts to answer the following question:

- what is the role of environmental education in contributing towards reducing water wastage in primary schools in Empangeni District?

The research study aims to provide answers to the following sub-questions inherent to the above mentioned problem statement:

- What water wastage practices were observed during the investigation at schools?
- How can environmental education change learners' views of the role of water in their lives?
- What are the effects of water wastage on the school and environment?
- What must be done to reduce water wastage in primary schools?
- How do educators, learners and school authorities react to leakages and breakages?

## **1.4. Aims and Objectives**

### **1.4.1 Aims**

The aim of this study is to explore the role of environmental education in reducing water wastage in primary schools in the Empangeni District.

### **1.4.2 Objectives**

The objectives of this research need to directly linked and related to the research questions as follows:

- To determine the water wastage practices that were observed at schools;
- To establish how environmental education (EE) can change learners' views of the role of water in their lives and their attitudes towards its use;
- To determine the effects of water wastages on the school and environment;
- To establish what could be done to reduce water wastages in primary schools and
- To investigate the reactions of educators, learners and school authorities to leakages and breakages.

## **1.5. Research Methods**

This research study follows the qualitative method. This method is chosen because the research is carried out in a real-life situation and not in an experimental situation (Maree, 2007:78). The advantages of qualitative research in this study is that it is possible to obtain information on how learners, educators and non-educator staff members thought and felt and what their perceptions were regarding the sustainable use of water.

### **1.5.1 Sampling**

Purposeful sampling was employed. Learners, educators and non-educator staff members from selected primary schools were interviewed on a one to one basis. Sampling continued until saturation was reached. The participants will comprise of five learners, two educators and one non-educator staff member in each of five selected primary schools in the Empangeni District, namely Bajabulile, Thambolini, Mzingwenya (Mthunzini Circuit); Maqhama and Sinaye (Lower-Umfolozi Circuit).

## **1.5.2 Data Gathering Techniques**

Taylor (2005:103), states that data gathering procedures should be reliable to the extent that the results obtained from the data, can be replicated by other researchers.

The use of the following reliable, unobtrusive data gathering techniques were implemented in the study.

### **1.5.2.1 Participant observation**

Observation provides a way of establishing what is happening in a situation (Fox & Mohamed, 2007:84) The researcher spent some time observing learners, educators and non-educator staff members' activities relating to water usage during break and lunch times.

### **1.5.2.2 Interviews**

An interview is a two way conversation in which the interviewer asks the participants questions to collect data and to learn about the ideas, beliefs, views, opinions and behaviours of the participants (Maree 2007:87).

Permission to conduct research from the schools was sought from the circuit managers and the principals. The researcher also sought permission from participants to interview and tape record the proceedings.

In combination with the individual interviews, focus group interviews were held towards the end of the data collection stage. The focus group interview comprised of educators only. Learners were excluded from focus group interviews because of their age and language barriers.

### **1.5.2.3 The Use of Literature**

Literature such as books, magazine articles, newspapers and media reports and available information on the internet were collected and integrated with the data which was obtained during the interviews and observations.

## **1.6 Demarcation of the Study**

To ensure that the study was completed within a reasonable period of time, but at the same time to ensure that the research topic was adequately addressed, the following demarcations of the study were applied in this study.

### **1.6.1 The Research Field**

The targeted group was purposefully selected for the study, where learners, educators and non-educator staff members from five selected primary schools in Empangeni District. The participants were selected because they had certain characteristics. For example, some educators who were selected had knowledge about environmental education. The schools selected were Bajabulile, Mzingwenya, Thambolini, Maqhama and Sinaye Primary school.

### **1.6.2 Duration of the Study**

The period of the investigation and finalisation of the results was between March 2008 and November 2009.

The research report involved the following:

- Planning the investigation and literature study.
- Data gathering techniques.
- Interviews including the transcriptions and preliminary analysis.
- Final analysis and interpretation of data.
- Summary of research findings, conclusions and recommendations.

## **1.7 Limitations of the study**

Empangeni District is a very big District. It consists of six hundred and eighty four schools. Therefore, it is difficult to cover all schools in the District. The language barrier may be a problem with primary school learners since they are second language speakers. The study was limited to black children in primary schools in two townships namely Esikhawini and Enseleni.

## **1.8 Definition of Terms**

For the purpose of this study, the following terms should be taken to mean the following:

### **“Role”**

The Collins Student’s Dictionary (2004:725) refers to the word “role” as task or function. For the purposes of this study, the word role refers to the particular task or function fulfilled by environmental education.

### **“Environment”**

Many authors perceive and analyse the concept ‘environment’ from a specific point of view (Lebeloane, 1998:32). For example, The Encyclopedia of Conservation and Environmentalism (1995:217) defines the word ‘environment’ as “the area that surrounds or circumscribes human or non-human beings”.

The Compact Oxford English Dictionary (2005:333) defines the concept ‘environment’ as the surroundings or conditions in which humans, animals or plants survive.

The Oxford Advanced Learners Dictionary (1995:387) defines the concept ‘environment’ as the natural conditions e.g. land, air and water in which people and animals live. The word ‘environment’ has been used to refer not only to natural conditions such as land, air and water but also to people (Cock in Cock, 1991:2) and the economic impacts on that environment (Pearce in Pearce, 1994:12). This means that the concept ‘environment’ has been broadened to include “social, political and biophysical realities” that act on the natural conditions (O’Donoghue, 1995:16).

In this study, the concept environment is used to refer to the total surroundings with the associated social, political economic and biophysical factors that act upon it.

### **“Education”**

The concept education has a variety of definitions.

Tselane and Mosidi (1998:11) refer to education as a lifelong process in which knowledge is imparted and correct skills, attitudes, and behaviour are developed. It is a gradual

process where its outcomes are not necessarily tangible or attainable overnight. However the term embraces both teaching and learning.

Fraser, Loubser and Van Rooy (1990:186) define education as the ‘activity engaged in when an adult who has superior knowledge and insight purposefully teaches a child, adolescent or adult in order to become intellectually independent and socially responsible. According to Devi (1996:31) in the Encyclopedia of Educational Development and Planning ‘the word ‘e-’ means ‘out of’ and ‘Duco’ means ‘I lead’’. “In other words, education is defined as a process of ‘leading out’ the inborn powers and potentialities and enabling the child to become what he or she is capable of becoming”.

In this study, the concept education refers not only to leading a child toward maturity but also leading adults. Education is then defined as a process in which an individual’s knowledge, understanding, skills and actions are enhanced to enable the individual to fully utilize such skills to the benefit of themselves and others in the social, economic and ecological surrounding.

### **“Environmental Education (EE)”**

Environmental education (EE) is the process of recognising values and clarifying concepts in order to develop skills and attitudes necessary to understand and appreciate the interrelatedness among people, their culture and their biological surroundings.

Environmental education also entails practice in decision-making and self-formulation of a code of behaviour about issues concerning environmental quality (Bornman 1997:56).

For the purpose of this study, the definition of ‘environmental education’ reflects the three essential dimensions of EE that refer to education as ‘ABOUT, FOR, IN/THROUGH environment’ (Fien, 1993:5; Neal & Palmer 1994:29).

Education ABOUT the environment refers to the knowledge dimension of EE in which teaching of concepts that generate knowledge and understanding of the environment is maintained. Dempsey, Gresele, Bogeholz & Martens (1997:260) maintain that education ‘ABOUT’ the environment “is concerned with providing cognitive understanding of the issues”.

Secondly, education FOR the environment has a tripartite ‘conceptualisation’ (Willer & van Staden, 1998:29) that calls for the teaching of the attitudes and values, skills and actions, as well as knowledge necessary for the maintenance and protection of the environment. Education FOR the environment is based on values, attitudes, and positive action. Education FOR the Environment is also concerned with finding ways of ensuring sustainable use of the environment now and in the future.

The third dimension is education IN/THROUGH the environment. This dimension focuses on the development of environmentally related actions and skills and uses the environment itself as a tool for learning about the environment. Neal and Palmer (1994:29) state that “education IN/THROUGH the environment uses the environment as a resource for learning. It is a resource which enables the development of a great deal of knowledge and understanding as well as skills in investigation and communication”. This study recognises education IN/THROUGH environment as the mode of EE that does not only generate the skills and actions but also knowledge, understanding and values for resolving the environmental problems issues and crises.

#### **“Reduce”**

The word “reduce” means to bring down or lower something. For this study ‘reduce’ refers to ways to lessen wastage of water.

#### **“Water wastage”**

The term water wastage refers to the act of wasting water, unsustainable use of water.

**“Sustainable Development”** is development that meets the needs of the present without compromising the ability to meet the needs of the future generation. Such development thus aims to improve the quality of human life while living within our ecological means and carrying capacity. It is development that is pro-poor, pro-nature and pro-job creation (Coetzer, 2005:13).

## **1.9 Chapter Division**

### **Chapter 1**

Chapter one provides an introduction to the study, the problem statement, the aims, relevance of the study and a brief description of the research methodology as well as an outline of the five chapters.

### **Chapter 2**

Chapter two provides a review of the literature and also provides the theoretical background for the study.

### **Chapter 3**

This chapter deals with the research methods that were employed in this study. It explains the research methodology and research instruments used in this study.

### **Chapter 4**

In this chapter a summary and discussion of the research findings are provided.

### **Chapter 5**

The final chapter focuses on issues such as summary of the research findings, challenges, conclusions and recommendations.

## **Chapter 2**

### **Literature Review**

#### **2.1 Introduction**

According to Mouton (2001:87), the literature review is a review of the existing scholarship or available body of knowledge. It helps the researcher to see how other scholars have investigated the research problem that he or she is investigating. The researcher wants to learn from other scholars, how they have theorised and conceptualised issues, what they have discovered empirically, what research instrumentation they have used and to what effect. De Vos, Strydom, Fouch and Delpont (2002:127) avert that a review of literature is aimed at contributing towards a clearer understanding of the nature and meaning of the research problem. The purpose of the literature review is to sharpen and deepen the theoretical framework of the research, familiarise the researcher with the latest developments in the area of the investigation and identify gaps in knowledge, as well as weaknesses in previous studies (Bless, Huggson-Smith & Kagee, 2006:24).

#### **2.2 The International Scope and Focus of Environmental Education (EE)**

A number of conferences had been held starting as early as the 1970's namely Stockholm (1972); Belgrade (1975); Tbilisi, Georgia (1977); the Brundtland Report (1987); the Moscow Conference (1988); the Earth Summit, Rio de Janeiro (Agenda 21, 1992) and afterwards the Johannesburg Summit in 2002. These conferences had made significant recommendations, also with regard to Environmental Education. The Stockholm Conference led to the establishment in 1975 of the United Nations Environment Programme (UNEP), which together with UNESCO founded the UNESCO/UNEP International Environmental Education Programme (IEEP). The IEEP listed the aims, objectives, key concepts and guiding principles of EE in a document prepared at the meeting known as "The Belgrade Charter."

Some of these objectives are listed below:

- to foster clear awareness of and concern about economic, social, political and ecological interdependence in urban and rural areas

- to provide every person with opportunities to acquire the knowledge, values, attitudes, commitment and skills needed to protect and improve the environment
- to create new patterns of behaviour of individuals, groups and society as a whole towards the environment (UNCED 1992:11).

The Tbilisi Conference prepared recommendations for the wider application of environmental education in formal and non-formal education. The following are some set statements based upon the Tbilisi Report Recommendations and are known as the Tbilisi Principles of Environmental Education. Environmental Education should:

- consider the environment in its totality-natural and built, technological and social (economic, political, cultural-historical, moral, aesthetic);
- examine major environmental issues from local, national, regional and international points of view;
- be a continuous lifelong process, beginning at an early stage through to the formal and non-formal stages;
- be interdisciplinary in its approach and emphasise links between curriculum areas and the environment;
- encourage problem-solving by searching for solutions to real environmental issues;
- focus on current and potential environmental situations while taking into account the historical perspective;
- promote the value and necessity of local, national and international cooperation in the prevention and solution of environmental problems;
- utilise diverse learning environments and a broad array of educational approaches to teaching/learning about and from the environment with due stress on practical activities;
- consider environmental aspects in plans for development and growth;
- enable learners to have a role in planning their learning experiences and provide opportunity for making decisions and accepting their consequences;
- relate environmental sensitivity, knowledge, problem-solving skills and values clarification to every age group and

- emphasise the complexity of environmental problems and the need to develop critical thinking and problem -solving skills (UNESCO-UNEP cited in Le Roux 2001:274).

In 1990, the World Conservation Strategy was published with the aid of IUCN/UNEP/WWF and was revised in 1991 and named as: Caring for the Earth, A Strategy for Sustainable Living. Debate arising from Our Common Future led to the second, and very much larger conference on environment and development, the so called Earth Summit staged in Rio de Janeiro, June 1992. The Earth Summit formulated the so-called Agenda 21. According to Agenda 21, 'education is crucial for promoting sustainable development and improving the capacity of people to address environment and development issues (Bornman. 1997:25). Agenda 21 also emphasised the obligation of governments to prepare strategies aimed at integrating environment and development as cross-cutting issues in education at all levels (The Earth Summit/UNCED, 1992:474-475).

A second crucial document produced at the summit is the Rio Declaration. It consists of 27 principles for sustainability, which provide the basis for programmes of international cooperation.

The principles relevant to this study will be described below:

**Principle 1-** Human beings are at the centre of concerns for sustainable development. They are entitled to a healthy productive life in harmony with nature.

**Principle 3-** The right to development must be fulfilled so as to equitably meet developmental needs of present and future generations

**Principle 4**

In order to achieve sustainable development, environmental protection shall constitute an integral part of the development process

**Principle 21-** The creativity, ideals, and courage of the youth of the World should be mobilized to forge a global partnership in order to achieve sustainable development and ensure a better future for all.

**Principle 27-** States have the sovereign right to exploit their own resources pursuant to their environmental and developmental policies and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other states (UNCED 1992: 70-72).

The proposal that governments should strive to update and prepare strategies aimed at integrating environment and development as a cross-cutting issue into education at all levels was welcomed by countries such as England, Scotland and United Kingdom.

According to World Commission on Environment and Development (WCED), ‘environmental education should be included in and should run throughout the other disciplines of the formal education curriculum at all levels – to foster a sense of responsibility for the state of the environment and to teach students how to monitor, protect and improve it’ (WCED 1987:11).

### **2.3 The Development of Environmental Education in South Africa**

Prior to 1972 the government was more concerned about the establishment of national parks, control soil erosion and reclaim land for agricultural purposes.

In 1972 a Cabinet Committee on Environmental Conservation recommended a National Policy on Environmental Conservation, which was later published in a White Paper in 1980. The Council for the Environment was established in 1984, which appointed a committee for Environmental Education. The committee for Environmental Education played a leading role in promoting environmental education in the formal, non-formal and informal education sectors (Council for the Environment 1986:1).

This Council aimed to develop an environmental awareness and to motivate people to accept responsibility for the environment and develop in them the expertise and values necessary to find solutions to environmental problems (Council for the Environment 1986:2). The Council also suggested that environmental issues be taught across the curriculum and not become a new independent subject.

The government sectors responded to the environmental crisis by developing a range of policies to protect the South African Environment, also the right and health of its citizens and economic development.

- **The Constitution of the Republic of South Africa, 1996 (Act 108 of 1996:11)** guarantees every citizen the right to:
  - (a) an environment that is not harmful to their health or well being and
  - (b) have the environment protected, for the benefit of the present and future generations, through reasonable legislative and other measures. These measures are to be taken in order to:
    - (i) prevent pollution and ecological degradation;
    - (ii) promote conservation and
    - (iii) secure ecologically sustainable development and the use of natural resources while promoting justifiable economic and social development.

The concern for environmental education issues in South Africa were also reflected in the **Reconstruction and Development Program (RDP)** document of 1994 which advocated programmes to:

Rekindle our people's love of the land, to increase environmental consciousness among our youth, to co-ordinate environmental education policy at all levels, and to empower communities to act on environmental issues and to promote an environmental ethic (RDP, 1994:2).

Other environmental measures include:

- The **White paper on Education and Training** of 1995 which advocated that Environmental Education, involving an interdisciplinary, integrated and active approach to learning, must be a vital element of all levels and programmes of the education and training system, in order to create environmental literate and active citizens and ensure that all South Africans, present and future, enjoy a decent quality of life through the sustainable use of resources (White Paper, 1995:18).

- The **National Environmental Management Act** (NEMA, 1998), which aims to improve environment management through sustainable development. It also promotes empowerment through environmental education, the raising of environmental awareness, the sharing of knowledge and other experiences (RNCS 2004:6).
- When **Outcome Based Education (OBE)** was introduced in South Africa, Environmental Education was to be incorporated into all learning areas but that did not happen. The Revised National Curriculum Statement (RNCS) has recognised the importance of Environmental Education by making the environment part of one of the underlying principles in the RNCS. Critical outcome (CO6) and critical outcome (CO7) support environmental learning (RNCS, 2004:7). Critical Outcome (CO6) requires that people use science and technology effectively and critically, showing responsibility towards the environment and health of others. Critical Outcome (CO7) links with the Tbilisi Principle for Environmental Education which state that EE should emphasise the complexity of environmental problems and thus the need to develop critical thinking and problem-solving skills (Le Roux 2001:374). These Critical Outcomes require all learners to be environmentally literate.

With the implementation of the National Environmental Education Programme for General Education and Training (NEEP-GET) in South Africa it was highlighted that to develop environmental literate learners who are able to address environmental problems require knowledge, values and skills best developed through active learning, critical thinking and active involvement in issues and encounters in the learners immediate environment (The long walk cited in Coetzer, 2005:309).

Being environmentally literate may include learner's ability to:

- interpret environments;
- recognise environmental issues;
- find relevant information about environmental issues;
- critically assess and evaluate such information;

- identify how environmental issues and risks impact on quality of life;
- justify a personal understanding and valuation of ‘a decent quality of life’ and
- analyse environmental issues, their causes, complexity and inter-relatedness, from a number of perspectives and in different contexts, with a depth and range appropriate to the grade (Le Roux. 2001:240).

Coetzer (2005:310) is of the opinion that current developments at national level regarding the provision and inclusion of Environmental Education in the Revised National Curriculum Statement (RNCS) is not sufficiently dealt with. The researcher agrees with Coetzer because the RNCS has given a broad idea of what content needs to be covered in each learning area. Coetzer further argues that in the adjusted Learning Area outcomes of National Sciences the competences that learners in South Africa should achieve is described only in general terms (Coetzer 2005:310).

Loubser (2005:27) is of the opinion that Environmental Education is one of the most effective ways to educate people, also the younger generation to have respect for nature. He also avers that Environmental Education which include environmental conservation issues be given equal importance as the other subjects in school curricula. Coetzer (2005:310) agrees that the provision of adequate Environmental Education is needed to address the most prevalent environmental problems and risks. One of the most serious current environmental problems is the water scarcity, which is exacerbated by the wastage of water in schools and homes.

#### **2.4 Water as a Scarce Resource**

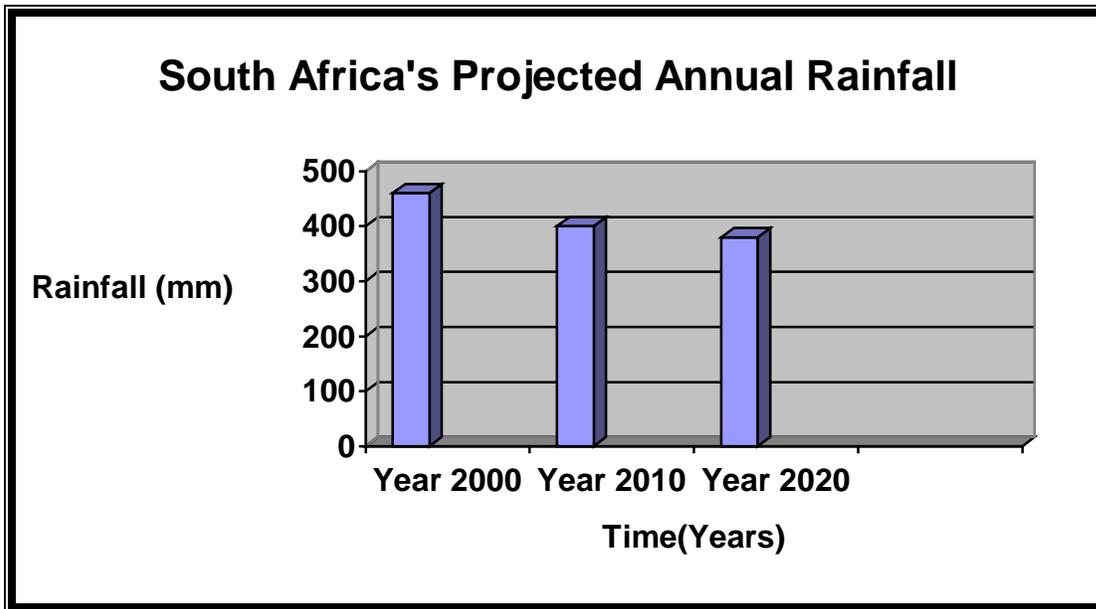
Access to safe drinking water is a fundamental need and a basic human right. The Constitution of the Republic of South Africa, 1996 (Act 108 of 1996:13), the Bill of Rights enshrine basic human rights amongst others to have access to sufficient water and a safe and healthy environment. However, globally 1.1 billion people are without access to a safe water supply and of this number 28 percent is found in the African continent (WHO 2000:7). During the period 1990-2000, the global human population expanded by 15 percent to reach an estimated 6.6 billion people. Africa’s population growth is almost

double the global average (WHO 2000:7). This rise in population escalates water demand and usage. It is estimated that in year 2000, 500 million people lived in countries that were chronically short of water. It is also projected that by 2050 more than 4 billion people, nearly half of the world population will live in countries that are chronically short of water (Clark & King 2004:19).

#### **2.4.1 South Africa – A water scarce country**

South Africa's average annual rainfall is almost half that of some other countries. South Africa receives about 500 mm of rain per annum. The other parts of the world such as Brazil, China, Congo and Rwanda receive on average about 1000 mm per annum. It is estimated that by the year 2020 South Africa will be getting 80 mm less rain than at present and our rainfall will be about 380 mm which is inadequate for our needs as illustrated in Figure 1 (DWAF, 1997:9). The lower rainfall estimate is mainly based on climate change and the escalating human impact on the environment.

Increased demand for water, and decreasing water quality, make careful water management a priority in our country. South Africa's population stands at 44.8 million at present. It is estimated that by 2025 South Africa's population will have doubled and that there will be insufficient water for domestic use, agriculture and industry (Enviro Facts, 1999: 16). Water is thus a very scarce resource in South Africa.

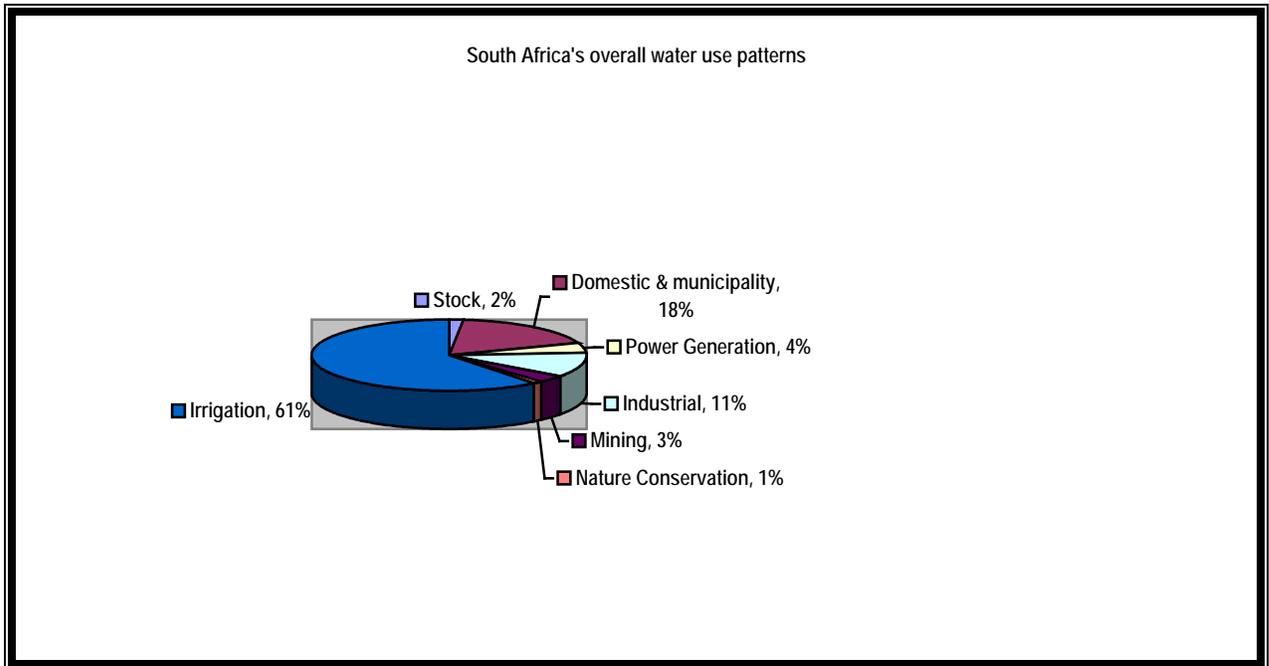


**Figure 1 South Africa's Projected Annual Rainfall**

(DWAf.1997:9).

#### **2.4.2 Water Usage in South Africa**

The rainfall we get is insufficient for our water needs in South Africa. We use water for the following activities: irrigation, stock watering, nature conservation, municipal and domestic use, industrial activities, mining and power generation. The pie graph overleaf (refer to Figure 2) indicates how much water we use for each activity in South Africa.



**Figure 2 : South Africa's overall water use pattern (DWA 1997:11).**

Water has been thought of as a commodity, something that is contained in rivers, lakes, transported in pipes and canals and purchased for various uses and services such as drinking, irrigation or industrial purposes. However, one needs to broaden this view and see that water itself is a part of a large complex ecosystem which provides us with many other services and benefits.

Some of the services provided by water resources are listed below:

- water for drinking and basic human needs;
- water for economic development (for example industry, agriculture, power generation);
- transport and /or purification of certain waste products;
- subsistence or commercial supplies of fish and plants;
- opportunities for recreation;
- maintenance of habitats for conservation of particular plants, animals, landscapes and environment for conservation of biodiversity, and for utilisation such as ecotourism;

- retention and storage of water
- transport of flood water (DWAF, 1999: 3).

#### **2.4.2.1 Domestic and municipal use**

Domestic and municipal use of water for drinking, cooking, washing, cleaning and gardening accounts for about seventeen percent of water consumption in South Africa. Most water wastage occurs during these domestic and municipal activities. Much of the water for domestic purposes never even reaches the consumer, but is lost through leaking pipes. In developing countries such as South Africa, cities lose about 40% of their water through leaking. Leaking taps in homes may waste more water than is actually used for cooking and drinking. As much as 30 percent of domestic water is simply flushed down the toilet (Clark & King, 2004: 30).

#### **2.4.2.2 Industrial use**

Industry accounts for 11% of water consumption in South Africa. Manufacturing industries such as food and beverages, pulp and paper and petrochemicals are particularly reliant on water (Hirji, Johnson, Maro & Matiza, 2002: 88).

#### **2.4.2.3 Irrigation**

Irrigation is by far the greatest user of water in South Africa. The pie graph in section 2.4.2, Figure 2 indicates that irrigation accounts for about 61 percent of all water consumption.

### **2.5 Water as a Finite Resource**

Water should be recognised as a finite and needed diminishing resource. It should be properly managed and sustainably used. Water demand management should be implemented to reduce wastage of water. If present trends in water usage and wastage continue, there will come a time when all the fresh water resources are fully utilised and other options, such as recycling and demand management, will have to be explored (Hirji et al, 2002: 132).

## **2.6 Water Demand (WD)**

The demand for water is growing each day and will continue to grow due to the need to boost our economic growth and development. However, planning this growth within the context of the scarcity of water resources in South Africa highlights the fact that we need to manage the growing demand for water in innovative ways (Fakir, Johnson & Stephens, 2002: 49).

The following factors influence the growth of water demand in South Africa and other countries:

- population growth
- the rate of urbanisation
- increase in standard of living
- increase in services and water provision
- economic and industrial growth and development (Fakir et al, 2004: 6).

The other factors which influence water use and consumption patterns in developed and developing urban and peri-urban communities are the following:

- the distance the consumer has to travel to the water source;
- income of the consumers;
- the level of education of consumers;
- the religion or culture of the consumers;
- the nature of housing and
- water using appliances e.g. washing machines (Fakir et al, 2004: 6).

## **2.7 Water Resource Management and Conservation (WRMC)**

WRMC in the context of this study is understood to mean a dynamic process of devising an alternative sequence of intentions, and selecting the activities that will optimise achievement of the objectives related to water resources. Water Conservation (WC) is defined as the efficient use and saving of water through measures such as water saving devices, water efficiency processes, water demand management and water rationing (Fakir et al, 2002: 7).

The South African Constitution (Act 108 of 1996:13) promotes sustainable and equitable access to sufficient water as well as appropriate and sustainable use of natural resources. It guarantees the right to access to sufficient and safe water for all citizens particularly for domestic, health and hygiene purposes. The National Water Act (NWA), Act 36 of 1998 and the Water Service Act, (Act 108 of 1997) introduced guiding principles to help us change the way we view and manage our water resources in line with the urgent need to meet basic water needs while reducing demand on water resources. The following are the principles of sustainability and equity, which guide the protection, use, development, conservation, management and control of water in ways which take into account:

- meeting the basic human needs of present and future generations;
- promote equitable access to water;
- promote the efficient, sustainable and beneficial use of water in the public interest and
- reducing and preventing pollution and degradation of water resources.

There are various other policies and laws regulating the use of water as our natural resource. These include Strategy for Water Services (2003), the Water Service Act (Act 108 of 1997), the National Environmental Management Act (Act 107 of 1998) and Environmental Conservation Act (Act 73 of 1989).

Water resource management is a very complex process that requires cooperation among various spheres of government and the active involvement of consumers and authorities. The involvement of all stakeholders such as the communities (consumers) who are either to be affected by or will be the beneficiaries of water resource management activities is of the utmost importance. The consumers are usually aware of the nature of water resource endowment in their areas. By being aware of the limited nature of available water resources and the competing demands for water in the region, communities have always appreciated the fact that choices have to be made in order to manage the limited water resources effectively, use them equitably and in a sustainable manner (Hirji et al, 2002:240).

According to the Environmental Management Framework, (DWAF, 2002:9) the historical focus of water resource management was the development of systems to store and transport water. This included the construction and operation of large dams, tunnels and pipelines and the local construction of systems of weirs, pump stations and irrigation canals. Water resource management as mandated by the National Water Act, (Act 36 of 1998) alluded to earlier, ensure that South Africa's water resources are protected, used, developed, conserved and controlled in an integrated, sustainable, equitable, efficient and optimal manner, to the benefit of all persons. The key principles underlying water management and conservation reflect the fundamental beliefs and attitudes to conserve and provide water efficiently to consumers. The National Water Resource Strategy states three fundamental principles, namely:

- water institutions should strive to supply water efficiently and effectively, minimize water losses and promote water conservation and water demand management among their consumers. Water institutions responsible for supplying water to users should take steps to reduce leakage in their systems and develop and implement measures to promote water demand management;
- users should not waste water and should strive to use it efficiently,
- Water Demand Management (WDM) should be an integral part of the planning processes for water resource management, water supply and the provision of water services (DWAF, 2004:79).

These guiding principles recognise the basic needs of present and future generations, the need to protect water resources and the need to promote social and economic development through the wise use of water (Enviro Teach, 2002(A): 23).

## **2.8 Sustainable use of water**

Our Living Earth cited in Coetzer (2005:313) defines sustainable development as the development that meets the needs of the present without compromising the ability to meet the needs of future generations. It postulates that sustainable development conserves land, water, plant and animal genetic resources, is environmentally non-degrading, economically viable and socially acceptable.

In order to achieve sustainable development all South African citizens must live sustainably. Sustainable living in the context of this study means to be conservative in actions that can affect the environment.

The strategy for sustainable living developed priority actions to be undertaken to achieve sustainable use of water.

Sustainable use of fresh water requires:

- better information;
- better awareness of how the water cycle works, the effect of land uses on the water cycle and better training in these matters;
- management of Water Demand (WD) to ensure efficient or equitable allocation of water among competing users and
- Strengthened management capacity of communities to use water resources in a sustainable manner (Caring for the Earth 1991:139).

Sustainable living implies that the users of water will take more responsibility for its conservation. For them to change their behaviour, attitudes and practices they will require information and advice. Awareness campaigns and education programmes are needed to persuade people to adapt their behaviour to the water cycle and to recognise that water is limited (Caring for the Earth 1991:140). The following points should be included in the awareness campaigns and education programmes designed for the learners:

- creation of basic understanding of the water cycle through teaching in school,
- promotion of awareness of the water cycle;
- explanation of the need of everybody to protect water against pollution,
- campaigns to improve hygiene and sanitation especially in lower income communities and
- steps to improve awareness of the values of wetlands, peatlands and other aquatic ecosystems (Caring for the Earth, 1991: 140).

## **2.9 Government and Non-Governmental Organizations (NGO's) initiatives**

### **2.9.1 The 2020 Vision for Water school project**

This is a project within the National Water Conservation Campaign (NWCC) and was initiated by the former minister of Water Affairs and Forestry, Professor Kader Asmal. The aim of this project is to educate the children of today about sustainable water use and water conservation. This project is a partnership between various national water education organisations and it focuses on the auditing of water quantity and quality within schools and their adjacent rivers.

The following are the goals of this project:

- to develop teaching aids on water and water conservation
- to facilitate water audits in schools and homes
- to train educators in environmental issues, also through water auditing
- to integrate water education into the formal school curriculum
- to establish an international collaborative network of resources, as well as audits in schools and homes. (2020 Vision for Water, 1997:1).

The project also envisages to raise the children's level of awareness to use water efficiently, conserve natural resources, participate in water resource management, make informed decisions and then transfer the knowledge to their parents at home.

### **2.9.2 The so-called Rand water, Umhlatuze water, Umgeni water, Mvula Trust and Delta environmental Centre**

These Non-Governmental Organisations' (NGOs') partnership has led to the formation of the 'Water Wise' Education Team (WWET). The partnership includes the national 'School's Water Action Project (SWAP) and the 2020 Vision for Water school project. These projects and resources empower learners to take responsibility for their lives and their environment and give them the life skills needed to solve environmental problems through action.

### **2.9.3 Enviro –Clubs/Eco –Clubs/ Eco-Schools**

All schools are encouraged to form enviro-clubs or eco-clubs. The clubs are instrumental in the implementation of environmental education programmes such as auditing, environmental policy and water policy formulation in schools. There are a number of clubs or programmes that can be joined for example Eco-link, “Landsdiens Klub”, Wildlife Environmental Society of South Africa (WESSA) and many more. Some schools in the Empangeni District are members of Eco- Schools, for example two participating schools i.e. Sinaye and Mzingwenya primary school. The Eco-School idea is about improving environmental management at the school, as well as environmental learning (<http://www.deltaenviro.org.za> [accessed on 3 November 2008]).

### **2.9.4 Environmental Days**

The Department of Water Affairs and Forestry annually celebrate environmental days such as Arbor Day, National Water Week, National Wetland Day and Marine Week. Schools are encouraged to take part in these activities which raise their awareness of the importance of natural resources for the country. Eco-Schools like Sinaye and Mzingwenya Primary schools in Empangeni District celebrate environmental days such as Arbor Day and Water Week. During Arbor Day celebrations, indigenous trees are planted and a guest speaker is invited to share his or her ideas with the school.

### **2.9.5 Rain Water Harvesting Programme**

The International Rainwater Harvesting Alliance was founded after the World Summit for Sustainable Development held in 2002 in Johannesburg (DWAF 2002) as a response to the ever-increasing water management crisis. Rain water is collected from the roofs of buildings via gutters and is stored in tanks for later use (DWAF, 2001:68,). Some schools in Empangeni District participating in this research have tanks to collect rain water which they use to water the garden and wash dishes.

### **2.9.6 Kids in Parks**

“Kids in parks” is an environmental education initiative that seeks to enhance access for learners and educators particularly those from previous disadvantaged backgrounds to South African National Parks (Environment Diary, 2006:16). The Kids in Parks programme was launched in October 2004 by the Department of Environmental Affairs and Tourism in partnership with the Department of Education, South African National Parks and Pick ‘n Pay ([www.sanparks.org.za](http://www.sanparks.org.za) [accessed 20 May 2009]).

Kids in Parks also aim to:

- provide meaningful environmental education in line with the framework of Outcomes Based Education (OBE) and curriculum 2005, which will equip future generations with knowledge and skills needed to manage the environment.
- enhance cultural resource management and indigenous knowledge
- strengthen Community relationships. Good park community relations are vital for generating community support for conservation
- contribute to local economic development through subcontracting, community driven enterprises, joint ventures, apprenticeship and employment (Environment Diary, 2006:16).

### **2.10 School Initiative**

#### **2.10.1 The need for an Environmental Audit**

An audit is a formal way of finding out, checking or assessing how things are, for example financial records in the management sphere (Le Roux, 200: 43). An environmental audit can be carried out on any scale inter alia to determine the condition of an environment in any area. Environmental audit is done in order to get a sense of what is happening environmentally at school and to identify environmental issues (Le Roux, 2001: 43). The school environment audit simply means an assessment of environmental performance at a school.

### **2.10.2 Water Audit**

Water audit in the context of this study simply means assessing the quality and the quantity of water used in order to avoid wastage of water especially in primary schools. Learners in primary schools waste too much water through funny water games. Water audit will create awareness of how much water is wasted at school each day. This will help the school develop strategies for water savings. There are two forms of water audit namely water quality audit and water quantity audit. Each one will be discussed briefly with more emphasis on water quantity audit since the study is concerned with quantity of water used and wasted in primary schools in Empangeni District.

#### **2.10.2.1 Water quality audit**

Water quality audit is a process of investigating, studying or checking a water source to determine how healthy the water is. Primary school learners can conduct water quality audits by removing dirt from the river or catchment area and testing for water contamination or examining water life in the river.

#### **2.10.2.2 Water quantity audit**

Water quantity audit is a process of determining the amount of water used and wasted. Learners can measure the amount of water used to avoid wasting it in schools and homes on a daily basis. Water quantity audit will help the school manage and improve its water resource.

The aim of conducting a water quantity audit is:

- to quantify how much water is used in different activities at school or at home;
- to identify where most water is used;
- to quantify the water savings;
- to identify where and how the savings can be effected and
- to implement measures that will start saving water in areas where too much is used ( DWAF, 1997:58).

### **2.10.2.3 How is water quantity auditing done?**

An enthusiastic and informed educator should be tasked with the policy development process and to facilitate environmental audits and water audits in the school. The coordinator should work closely with the School Management Team (SMT) and convene a water team to do the water audits.

The following steps are essential when conducting water audits:

- gather a group of enthusiastic learners into a water team to coordinate the audit at school;
- conduct an awareness campaign in order to raise awareness and gain participation from all water users at school;
- allow the water team to conduct an investigation to identify all activities that use water;
- the water team should then estimate how much water each activity uses;
- on the day of the audit, read the water meter early that morning e.g. 7 am to see how much water will be used over a 24 hour period;
- learners, educators, non- educator staff members count the number of times they use water in a day. This they multiply by the number of litres each activity uses;
- ascertain total consumption for each class. Add all class totals together with the total consumption of water used in flushing toilets and watering gardens to get a school total;
- on the following day, read the water meter again early that morning eg.7am, to see how much water will be needed over the period of 24 hours;
- compare the school total consumption with the metered consumption to see the effectiveness of the audit;
- add total water used in each activity to identify where savings can be made;
- read the water meter on a daily and weekly basis, to see whether the school or persons at home are using less water and
- calculate what the water savings would be and how much money would be saved for the next year if water is conserved (DWAF, 1997: 59).

After conducting an environmental audit or water audit the task team should draw up a school environmental policy and management plan.

### **2.10.3 School Environmental Policy**

A school environmental policy is a statement of intentions and principles for improving a school's educational and environmental performance. Developing school environmental education policies could contribute to an enriching, happy, healthy and more sustainable environment (School Resource Pack, 1999:1). Through the development of an environmental school policy the school can:

- integrate environmental issues into the school curriculum;
- manage school resources more wisely;
- provide a clear framework around which environmental education can be organised;
- provide a source of contextual/relevant teaching opportunities around the issues eventually identified;
- allow for forward planning and
- use each environmental day for a thorough investigation of the issues associated with it (School Resource Pack, 1999:1).

In order to successfully implement environmental education in school, the management team should consider the following steps:

- appoint an environmental education coordinator
- convene an environmental working group
- conduct a school audit
- draft a policy statement and action plans for schools' concerns
- evaluate and review policy and action plans and
- plan for implementation (Le Roux, 2001:105).

## **2.11 Conclusion**

The overview on what has been done nationally and internationally to implement Environmental Education and to conserve our natural resources has been highlighted. The policies and laws regulating the use of water as a scarce natural resource were elucidated. In the next chapter the research methodology matters, for example the participants, research design, sampling plan, and data collection procedures are described.

## **Chapter 3**

### **Research Methodology**

#### **3.1 Introduction**

In this chapter, the research methodology is described. The description of participants, the research design, the sampling plan and the data collection procedures are included. The steps according to which the data were gathered are also described here.

#### **3.2 Aims**

Appropriate data collection methods and instruments are necessary for the collection of data that can be analysed and generalised in other similar circumstances (Alasuutari 1998:49). In this regard the researcher is able to compare the results with other similar studies that were previously undertaken by other researchers.

The following are the aims of this chapter:

- (i) to identify and describe the research methods used for this study;
- (ii) to develop appropriate research instruments that will be used when conducting this research and
- (iii) to enable sampling of units to be studied from a given population.

#### **3.3 Research Design**

According to Mouton (2001:55), a research design is a plan or blue print of how the researcher intends conducting the research. Research design focuses on end products. Cresswell cited in DeVos et al (2006:268), define design in the qualitative context as the 'entire process of research from conceptualising a problem, to writing the narrative'. The researcher used qualitative research methods. According to Leady and Ormrod (2005:143), qualitative research is collecting, analysing and interpreting data by observing what people do and say.

The reason for the choice of qualitative research design is that it gives rich insight into situations and peoples' perception and experiences of these situations.

Qualitative research communicates on words and observations to express and attempts to describe people in their real situations. The advantage of qualitative research in this study is that, it is possible to obtain information on how learners, educators and non- educators thought and felt what their perceptions were regarding the sustainable use of water. Qualitative research enables direct observation of events. The researcher observed, listened to and recorded activities and events as they occur in their natural settings. It further enables the researcher to observe and compare different activities, events and behaviours of participants being researched.

The research design represents a combination of descriptive and exploratory strategies. Of primary importance is the description focus where an attempt is made to accurately portray sustainable use of water.

Descriptive research presents a picture of the specific details of a situation, social setting or relationship or focus on ‘how’ and ‘why’ questions (Neuman in De Vos, 2006:106).

In descriptive research, researchers usually go on to examine why the observed existing patterns occur and what these patterns imply.

In this study, descriptive research was utilised in the form of observations and interviews where participants described the situation as they perceived it. The study was also exploratory, as it attempted to gain insight into the role of environmental education in reducing water wastage in primary schools in Empangeni District.

The danger of using qualitative research is one of validity and reliability. According to McMillan and Schumacher (2001:407), validity refers to the degree to which the explanations of phenomena match the realities of the world. It addresses the question of whether the interpretations made by the researcher match the meaning the participants refer to when answering a question.

Reliability refers to the degree to which the findings are independent of accidental circumstances of research (Silverman, 1998:203). Since the researcher or the observer often works alone in varying circumstances, there is a danger of distorting information.

Bearing in mind these weaknesses, the qualitative research method is used with care and measures are taken to improve both validity and reliability. To improve validity and reliability the researcher used documented data and observations to validate information obtained through interviews. The interviews were tape recorded to ensure completeness of the verbal interaction and to provide material for reliability checks (McMillan & Schumacher, 2001:450).

Data gathering procedures should be reliable to the extent that the results obtained from the data can be replicated by other researchers (Taylor, 2005:102).

### **3.4 Research Instruments**

In qualitative research, the researcher attempts to gain a first hand, holistic understanding of phenomena of interest by means of a problem formulation and data collection. Methods such as participant observations and semi-structured interviews are used to acquire an in depth knowledge of the problem under investigation (De Vos, 2006:105).

In terms of collecting data, the following research instruments were used:

- (i) semi-structured interviews and focus group interviews
- (ii) participant observation and
- (iii) document study.

In the process of collecting data, it is important to select methods that are reliable, valid and suited to the purpose of the research.

### **3.4.1 Interviews**

Interviews involve personal interactions between the interviewer and the interviewee. Conducting an interview is a more natural form of interacting with people than making them fill in a questionnaire to do a test or perform some experimental task.

Kvale in Sewell (2001:1) defines qualitative interviews as “attempts to understand the world from the participant’s point of view, to unfold the meaning of peoples’ experiences and to uncover their lived world prior to scientific explanations.” Open-ended questions and probes yield in-depth responses about peoples’ experiences, perceptions, feelings and knowledge. Data consist of verbatim quotations with sufficient context to be interpreted (Taylor, 2005:103).

The researcher chose to use semi-structured, one on one interviews to gain a detailed picture of participant’s beliefs about, or attitudes towards the utilisation of water as natural resource. With semi-structured interviews the researcher had prepared a set of pre-determined questions as part of an interview schedule (De Vos 2006:302). The researcher then arranged questions from a simple to a complex nature and from broad to more specific ones, in order to allow for individuals’ preferences and differences.

Interviews were conducted with purposefully selected learners, educators and non-educators, during break and lunch times to avoid the disruption of teaching and learning times. Before the interviews were conducted the purpose of the interviews were explained to ease the tension of participants. The researcher asked permission to tape-record interviews to complement notes taken during interviews. The disadvantage of tape-recording, is that participants may not feel free and may withdraw from participating.

Conducting interviews is time consuming and the interviewer may influence the interviewees’ responses. The researcher also used focus group interviews. Focus group interviews are means of better understanding of how people feel or think about an issue, product or service (De Vos, 2006:305). Participants or interviewees are chosen because of their knowledge in a subject. Morgan cited in De Vos (2006:306) describes focus groups as

a research technique that collects data through group interaction on a topic determined by the researcher.

De Vos et al (2006:307) suggest the following advantages of using focus group interviews:

- (i) focus groups are a powerful means of exposing reality and of investigating complex behaviour and motivation;
- (ii) attempts to understand diversity and
- (iii) the method is friendly and a respectful one.

### **3.4.2 Participant Observation**

Participant observation is a typical qualitative approach to data which implies that data cannot really be reduced. The researcher observed activities, noted events and recorded them on an observation schedule (see appendix A). Because the interpretive approach emphasises studying phenomena in a naturalistic way, observation must often take the form of participant observation, where the researcher becomes fully involved in the setting being studied (Terre Blanche, Durrheim and Painter, 2006:308).

Kitchin and Tate (2000:221) posit that observation entails the systematic noting and recording of events, behaviours and artifacts in a social setting. The researcher became part of the situation. The presence of the researcher sometimes changes the behaviour of the participants because they are aware that their actions are being observed. It is for this reason that the researcher was introduced and his purpose explained to the participants. This was done to promote friendship and co-operation amongst the participants. Openness and mutual understanding was necessary between the observer and participants to avoid marginalisation of the observer.

De Vos (2006:281) posits that reliability and validity can become a serious threat for the researcher engaging in participant observation. It is impossible to arrange for exactly the

same situation in order to reach the same results as in the original study and, therefore, reliability is hard to achieve. Participant observation makes the observer less obtrusive and in doing so reduces the likelihood that the observer would influence the participants' behaviour. Kellerher cited in Babbie & Mouton (2007:295) explain the following advantages of observation.

- (i) it forces the observer to familiarize him or her with the subject;
- (ii) it allows previously unnoticed or ignored aspects to be seen;
- (iii) people's actions are probably more telling than their verbal accounts and observing these are valuable and
- (iv) it is unobtrusive and when obtrusive, the effects wear off in reasonable time.

### **3.4.3 Literature Study**

Document sources are classified into primary and secondary sources. Primary sources are the original written material of the authors own experiences and observations and secondary sources include material that is derived from someone else as the original source. The researcher used secondary sources such as official documents as well as mass media. Mass media include newspapers, magazines, journals, newsletters, television and radio reports, films and books of fiction and non fiction. Official documents include documents, minutes and agendas of meetings, financial records and annual reports. The researcher used government documents such as government gazette, policies, acts, the Constitution of South Africa and documents such as newspapers, articles from the internet and reports from Non-Governmental Organisations (NGO's).

When documents are studied it is of cardinal importance that the researcher evaluates the authenticity or validity and reliability of such documents (De Vos, 2006:317).

Babbie and Mouton (2001:285-286) recommended four different ways in which the validity and reliability of document study can be tested.

- (i) if the author is still living, he can be requested to read the whole product and present an autocritique.
- (ii) it is sometimes possible to compare the relevant document with other written documents.
- (iii) to verify data by interviewing other informants, persons in the same role or persons knowledgeable on the subject or who were personally involved in the event.
- (iv) the reliability may be checked either by similar documents at two or more points in time or by comparing the results of two or more researchers at the same point in time.

The advantages of document study include the following:

- (i) Document study is relatively cheaper than a comprehensive survey (Monette cited in De Vos et al, 2006:318).
- (ii) The researcher does not need to make personal contact with the respondents

Some disadvantages of document study are that:

- (i) not all documents were intended for research purposes and this can have influence on the objectivity of documents and that
- (ii) it is often impossible to ascertain critical factors such as the origin or the data of documents and
- (iii) the format of the document is not standardised.

### **3.5 Population**

According to Bless, Hugson-Smith and Kaggee (2006:98), population refers to the entire set of objects or people whom are the focus of the research and about which the research wants to determine some characteristics.

Kitchin and Tate (2000:53) pronounce the total of all possible people who display the characteristics the researcher is interested in, a population. Therefore a population can be defined as the total number of persons or units that an investigation is concerned with.

For the purpose of this research, population refers to the total number of educators, non-educators and learners of five selected primary schools in Empangeni District.

### **3.6 Sampling**

Sample is a subset of the whole population which is actually investigated by a researcher and whose characteristics will be generalised to the entire population (Bless et al, 2006:98).

The sample is studied in order to understand experiences and behaviours of the population from which it is drawn.

A sample of five primary schools on the role of environmental education in reducing water wastage can be generalized and applied to the primary schools in Empangeni District.

The sample comprised five primary schools selected through purposeful sampling.

This method was chosen because the population was large and it would have been complicated to use any random sampling method. Again the sample was chosen because the subjects being studied were likely to be knowledgeable and informed about the phenomena the researcher was investigating (McMillan & Schumacher, 1993:378).

**Table 3.1 Population Distribution**

Name of School	No. of Learners	No. of educators	No. of Non-educators	Total Population
1. Bajabulile	1200	38	2	<b>1240</b>
2. Mzingwenya	1999	54	3	<b>2056</b>
3. Thambolini	900	26	2	<b>928</b>
4. Sinaye	1447	38	3	<b>1488</b>
5. Maqhama	1200	33	3	<b>1236</b>
<b>Total</b>	<b>6746</b>	<b>189</b>	<b>13</b>	<b>6948</b>

Five learners, two educators and one non-educator staff member per school were sampled. This means that a total of twenty five (25) learners, ten (10) educators and five (5) non-educator staff members were purposefully sampled.

### **3.7 Data Collection Process**

The researcher requested permission from the principals of schools to conduct research in their schools. The purpose and nature of the study was explained. Interviews were conducted with interviewees over a period of five weeks. The researcher used questions on the interview schedule to reduce subjectivity. The interviews were done during break times to avoid disruption of the lessons. The observation schedule was also used to record observed events and behaviours of participants. Data collected through observation provided first hand information to the researcher.

Focus group interviews were also conducted with educators only. The researcher used focus group interviews because he was looking for a range of ideas or feelings that educators had about wastage and sustainable use of water.

The researcher also used literature study to collect data. The researcher studied books, journals and articles from the internet to collect data.

**Table 3.2 Interview and Observation Periods**

Primary School	Ward	Eco/Non-Eco School	Dates
1. Maqhama	Esikhaleni	Non-Eco School	04-06/03/2009
2. Bajabulile	Esikhaleni	Non-Eco School	09-11/03/2009
3. Sinaye	Enseleni	Eco School	16-18/03/2009
4. Thambolini	Ongoye	Non-Eco School	23-25/03/2009
5. Mzingwenya	Lindokuhle	Eco School	30/03-01/04/2009

### **3.7.1 Interviews with educators**

The following questions were asked during the interviews with educators:-

- (i) Do you celebrate environmental days such as National Water Week, World Wetland Day and Arbor Day? How?
- (ii) Are you teaching water concepts at school? Can you explain which concepts?
- (iii) Do you have a water policy at your school?
- (iv) What activities at your school could contribute to water loss?
- (v) What do you understand about water wastage?

- (vi) How does water wastage affect the school, the community and the municipality?
- (vii) How can the school reduce wastage of water?
- (viii) What do you understand about water conservation (WC)?

### **3.7.2 Interviews with non-educator staff members**

The following questions guided the interviews with the non-educator staff members:-

- (i) What activities do you think waste water at this school? How?
- (ii) Do you use a watering can or hose pipe to water the garden? Why?
- (iii) At what time of the day do you water the garden? Can you tell me the reason for your choice?
- (iv) How do you reduce water loss through the soil?
- (v) How promptly does the school respond to broken and leaking pipes?

### **3.7.3 Interviews with learners**

The following questions guided the interviews with learners:-

- (i) What activities do you think use a lot of water at school?
- (ii) Why is water so important to our lives?
- (iii) Can you tell me how children waste water at school/home?
- (iv) What can be done to save water at school/home?

(v) Can you estimate how much water you use per day at your school and home?

(vi) Do you know where the water from your school comes from?

### **3.8 Data Recording Strategies**

Two methods were used to record data during interviews and observations. The researcher tape-recorded the interviews and wrote notes during interviews and observations.

Permission to tape-record the interviewees was obtained before recording was done.

### **3.9 Conclusion**

Appropriate data collection methods and instruments, their advantages and disadvantages were discussed. A qualitative approach was followed and research instruments included interviews, observations and document study.

In the next chapter the synthesis and interpretations of the research findings will be discussed.

## **Chapter 4**

### **A Presentation and Analysis of the Results**

#### **4.1 Introduction**

The purpose of this chapter is to present, analyse and interpret data that was collected through interviews, observations and document study. The research findings are structured according to the questions asked during interviews and observations made at five selected primary schools in Empangeni District. Interviews were conducted with educators, non-educators and learners.

The research study aimed to provide answers to interview questions which are directly linked to the research aims and objectives as stated in chapter one (1.4).

#### **4.2 Presentation of Findings**

Data pertaining to the research topic were collected from a variety of available sources and the interpretation and analyses of such data are implemented in the discussion.

A total of forty (40) participants were interviewed in five selected primary schools. The distribution of participants were as follows:

- five (5) learners,
- one (1) non-educator and
- two (2) educators in each school.

This means that a total of twenty five (25) learners, ten (10) educators and five (5) non-educators were interviewed.

Table 4.1 Number of people interviewed

Name of school	Eco-School/ Non-Eco-School	No. of Educators	No. of Non- Educators	No. of Learners	Total
Maqhama	Non-Eco	2	1	5	<b>8</b>
Bajabulile	Non-Eco	2	1	5	<b>8</b>
Thambolini	Non-Eco	2	1	5	<b>8</b>
Sinaye	Eco-School	2	1	5	<b>8</b>
Mzingwenya	Eco-school	2	1	5	<b>8</b>
<b>Total</b>		<b>10</b>	<b>5</b>	<b>25</b>	<b>40</b>

Apart from interviews, the researcher also visited selected schools to observe events, activities and behaviour patterns of educators, learners and non-educators at five selected schools concerning wastage of water.

A variety of research instruments namely interviews, documents study and observations were used in this study to improve the validity and reliability of data collected. The interviews were tape-recorded to ensure completeness of the verbal interaction and to provide material for reliability checks.

#### **4.2.1 Interviews with Educators**

During the interviews with educators the following responses were given by the interviewees. The responses were recorded on an interview schedule and tape-recorded.

4.2.1.1 Do you celebrate environmental days such as National Water Week, World Wetland Day and Arbor Day?

- Three schools do not celebrate environmental days.
- Two schools celebrate both Arbor Day and Water Week. During these days schools organise different activities such as story telling, poems, planting trees, ‘indlamu’ (Zulu dance) and have a guest speaker to address the school (see chapter 2, 2.11.4).

#### 4.2.1.2 Does the school have an Environmental Policy or a Water Policy?

- Two schools have an Environmental Policy but some educators are unaware of its existence in their schools.

The other three schools have neither an environmental policy nor a water policy. They have no knowledge of how to formulate and compile these policies.

#### 4.2.1.3 Are you teaching water concepts? If so what concepts?

- Few educators are teaching water concepts such as water pollution, importance of water, water audit, water conservation and water purification.
- Other educators are not teaching water concepts. The reason for not teaching water concepts was that they are not Natural Sciences’ educators, they teach Economics and Management Sciences, English, Technology and Mathematics. They don’t know how to integrate water concepts into their learning areas/subjects.

#### 4.2.1.4 What do you understand about water wastage?

All educators were able to answer this question. The following responses were obtained:

- water wastage means excessive use of water, for example, using a lot of water to wash a few dishes, rinsing glasses and cutlery under running water and brushing teeth using a running tap.

#### 4.2.1.5 What do you think contribute to water wastage in your school?

- All educators mentioned the flushing of toilets and urinals as the biggest waster of water at school. Flushing the toilets take about 12 litres. Leaking toilets were also mentioned as one of the biggest sources of water waste.
- They also mentioned leakages and dripping of taps. Learners sometimes leave taps open or dripping. Dripping taps can also waste considerable water.
- Using running water to wash dishes.
- Learners also play splash games with water and drink from the running taps with their hands.
- Illegal connections done by the people in the informal settlement waste a lot of water. The quantity of water loss through illegal connections is not accounted for and cannot be measured.

#### 4.2.1.6 How does water wastage affect the school, community and municipality?

All educators were able to respond about the school; very few could respond about the community and the municipality.

The following responses were obtained.

- (i) About the **School**- they said water wastage increases the water bill of the school. Money that could be used to buy learner and teacher support materials (LTSM) is used to pay for the increased water bill. The school may not afford to pay high water bills and the municipality may be forced to cut the water supply to the school
- (ii) About the **Community**- as already mentioned above, water wastage has a negative impact on the water bill. The water that is wasted could be used to

supply other communities with safe potable water. Illegal connections and other wastages decrease the volume of water supply. Shortages of water supply result in health problems which may lead to the transmission of diseases such as cholera, diarrhea, tuberculosis and other diseases.

(iii) About the **Municipality**-the costs of purifying and supplying water are very high. Due to the water loss through leakages, wastage and illegal connections the municipality is forced to increase the water tariffs. Water purification and water supply from the reservoirs to the communities require energy or electric power. Therefore the wastage of water also causes the wastage of electricity (also see chapter 4, 4.2.4.4).

#### 4.2.1.7 What do you understand about water conservation?

All educators responded to this question very well. The following responses were received:

- (i) water conservation means the efficient use and saving of water for present and future generations (see chapter 2, 2.9).
- (ii) it also refers to reducing the usage of water and recycling of waste water for different purposes like cleaning and watering the plants.

#### 4.2.1.8 How can the school reduce water wastage?

This question was well answered. All educators knew how to reduce wastage of water.

The following responses were obtained:

- (i) the school must draw up a school environmental policy and a water policy (see chapter 2, 2.5).
- (ii) each school must have an environmental team or a water team which would conduct an environmental audit or a water audit in a school (see chapter 2, 2.4)

- (iii) the school must also set up water awareness programmes.
- (iv) each class should keep a tapped bucket of water for learners to drink.  
Learners must use disposable cups to drink water from a tapped bucket.
- (v) the school management must repair all leaking pipes, toilets and dripping taps with immediate effect to reduce wastage.

4.2.1.9 Have you attended workshop(s) on water conservation/wastage?

- Only educators from Eco-Schools confessed to have attended workshops on water conservation and water wastage.

#### **4.2.2 Interviews with Non-Educators**

The interviews were also conducted with non-educator staff members. One non-educator staff member per school was interviewed.

4.2.2.1 What activities do you think waste water at your school?

- Flushing toilets wastes considerable water especially with leaking toilets (see chapter 2, 2.4.2).
- Watering the garden using a hose pipe.
- When washing hands, learners sometimes leave the taps open or dripping.

4.2.2.2 What time of the day do you water the garden? Can you tell me why?

- The garden is watered in the morning and afternoon. One reason given was that the evaporation rate is less in the morning and afternoon. Others could not give reasons for their choice.

4.2.2.3 How do you water the garden? Do you use a watering can or a hose pipe? Can you give reasons for your choice?

- Most participants preferred to use a watering can because they claim a watering can use less water and the hose pipe wastes water and washes seedlings away.
- Others preferred to use a hose pipe because it saves time and energy.

4.2.2.4 How do you reduce water loss through the soil?

Two participants were able to answer the question and gave the following responses:

- Water loss through evaporation can be reduced by covering the soil with dry grass or leaves.
- It can also be reduced by the application of kraal manure or organic matter into the soil.
- Weeds compete with crops for space, air, nutrients and water and therefore should be eradicated.

Three participants were unaware of the methods to reduce water loss through the soil.

4.2.2.5 When washing cars do you use a hosepipe or a bucket? Can you tell me why?

- In some schools washing cars is prohibited.
- Those who wash cars preferred to use a hose pipe because they claim it saves their time and energy.

4.2.2.6 How promptly does the school respond to broken and leaking pipes?

- The schools respond promptly to broken or leaking pipes. The broken item is replaced with the new one immediately.

- In some schools no breakages or leakages has been reported.

### **4.2.3 Interviews with Learners**

The following questions were asked and the responses were as follows:

4.2.3.1 Do you know where the water from your school taps comes from?

- Different responses were obtained. Some thought it comes from the government or municipality who purify and supply it.
- Others thought it comes from the Umhlathuze River and Mzingazi River.

4.2.3.2 Why is water so important to us?

All participants acknowledged the fact that life on earth is dependent on water.

Some of the responses given by the learners were that:

- people cannot live without water; plants and animals also depend on water for growth and survival;
- water plays a very important role in the plants during the process of photosynthesis;
- it is essential for digestion;
- it is the medium that carries most of the materials needed for life;
- water cools the body and that
- water is a universal solvent.

#### 4.2.3.3 What activities use a lot of water in your school?

Learners were able to mention several practices that result in water wastage.

- Most learners agreed that a lot water is used for flushing the toilets, cleaning dishes and watering the gardens.
- Washing hands also uses too considerable water because learners sometimes forget to close the taps.
- Leakages that are not reported to the school management were identified as the main cause of water wastage.

#### 4.2.3.4 Can you tell me how children waste water at school?

All learners were able to narrate how they waste water at home and at school. The following responses were given during the interviews:

- People waste water when they wash hands under running taps. Learners drink with their hands from the running taps. Some leave taps open or dripping after drinking or washing hands (see chapter 2, 2.2.4).
- Learners sometimes play splash games with water.

#### 4.2.3.5 What can be done to save water at school?

Participants were knowledgeable about water saving practices and mentioned a variety of ways in which to stop water wastage in homes and at school. The challenge is that they know all the strategies to save water but mainly lack practice.

The following responses were obtained:

- all taps should be locked and only opened by the educator or prefect for learners to fetch water for their classrooms
- educators and prefects should supervise learners during break time. This would stop learners from leaving taps open and dripping.
- each class should keep a tapped bucket of water so that learners drink from the bucket using cups.
- one must turn off the tap while brushing his or her teeth to save water.
- one must also keep a container of water in the fridge not in the freezer, in order to avoid having to run the water down the sink to defrost it.

4.2.3.6 Can you estimate how much water you use per day at school and home?

- all learners failed to estimate the amount of water they used per day.

#### **4.2.4 Focus Group Interview- Discussion**

A focus group interview was conducted with educators only. Learners and non-educators were excluded because of their age and language barriers.

The following topics also emerged to be of significance in the responses of all participants. The researcher felt it necessary to discuss these topics with the group of educators.

#### **4.2.4.1 Environmental Policy and Water Policy**

Only two schools (Sinaye and Mzingwenya) had an environmental policy and none had a water policy. The two schools having an environmental policy are eco schools. They are affiliated to Eco schools, a programme of the Department of Environmental Affairs. According to the directive from the Department of Education, each school has to draw an environmental policy, which will direct and guide the school community towards a sustainable way of living.

It will assist the school to produce environmental literate learners and educators.

#### **4.2.4.2 Nature of Water Wastage**

All respondents acknowledged that water wastage was a worsening problem in schools and homes. The wastage that was observed and recorded can be prevented. Most educators were able to identify the nature of wastage and measures, which can be taken to prevent or reduce water wastage. For example two schools bought buckets with taps and cups for each class. Learners drink their water from the class and the taps around the school are kept locked and opened under the supervision of the educator. The form of wastage the learners seemed to enjoy much was when they watered each other using a hose pipe. What was surprising was that they were all aware that they are wasting water. It was clear that they had never been taught conservation methods and water wise activities. Therefore, they have no sense of responsibility for conserving water.

#### **4.2.4.3 Awareness Programme**

Very few schools celebrate environmental days; only eco- schools celebrate Arbor Day and Water Week. The Department of Environment Affairs and Tourism (DEAT) does not support schools that are not affiliates of eco schools. The municipality and Umhlathuze

Water Board have not visited all schools to do a water-wise campaign. Educators themselves seem to lack environmental knowledge. Some are unaware of environmental days. Therefore they do not commemorate these days. Only eco school educators had an understanding of environmental days and taught water concepts. When they were asked if they teach water concepts, some educators said that they do not teach water concepts because they teach Human and Social Sciences, Economic and Management Sciences and Languages. None of the educators mentioned water auditing or environmental auditing and water conservation or water wise activities (see chapter 2, 2.11.4).

#### **4.2.4.4 Implications of Water Wastage**

Most participants acknowledged that water wastage can have a negative impact on their lives. Some did not know that South Africa is a water-scarce country. They thought that water is an abundant natural resource, which could be used as one pleases.

Educators were able to relate how water-wastage would affect the school, community and the municipality. They were able to tell that by saving water one would be saving school money which could be used to buy Learning and Teaching Support Material (LTSM). It was interesting to hear that by saving water the municipality would be saving electricity which they use to pump water to our homes and that they will be able to supply needy communities with safe water.

The researcher also noted that water wastage could force the municipality to raise the rates of water. This could also have a negative impact on the lives of poor communities as they cannot afford to pay their water bills. The municipality may be forced to stop the water supply to such communities.

#### **4.2.4.5 Training**

All educators interviewed had no formal training on water concepts such as water conservation, water auditing and water wastage. There are no programmes designed for them. All what they knew, they obtained the information from textbooks or from media.

#### **4.2.4.6 Water Wastage Reduction**

The research indicates that knowledge of the importance of water and of acceptable strategies for using the resources sustainably are not necessarily lacking but the problem lies with the practice of sustainable strategies.

Educators have a clear understanding of how schools can save water or reduce the wastage of water. It was very easy for them to narrate ways of reducing the wastage of water. The major obstacle is taking action to solve the problem. They do not live by the principles of sustainability.

#### **4.2.4.7 The Attitude of Participants**

All the participants were aware of water-saving techniques but very few practise these techniques and their attitudes and actions contribute towards the problem. All participants perceived water as an unlimited, abundant natural resource. When asked to estimate the amount of water each participant use each day, they could not estimate. This is an indication of insensitive behaviour towards water usage.

#### **4.2.4.8 Recycling, Re-use and Repair**

Very few participants mentioned water recycling or re-use practices. They knew that water used for washing dishes and hands if stockpiled could be used to water the garden. Some had tanks to collect rain water which is then used to water the garden or wash dishes. They knew little about recycling and re-use and are not practicing these strategies at home or at school.

Leaking pipes, taps and toilet cisterns are repaired immediately by the maintenance staff.

#### **4.2.5 Participant Observation**

Apart from the interviews conducted, the researcher also visited selected primary schools to observe events, activities and behaviour patterns of learners, educators and non-educators concerning the wastage of water. The researcher preferred to use an observation schedule to guide him in his observations.

In all schools the source of water is tap water. Rain water is also stockpiled by a few schools. The harvested water is used for cleaning, cooking and watering the garden. In very few schools learners used tapped buckets and cups to fetch and drink water. In other schools learners drink with their hands or with their mouths direct from the taps and large quantities of water run down the drain.

In three schools learners were observed playing splash games with water.

In non-eco schools observed, the floors were wet after break times because the water basins were overflowing or the taps were left open. Almost all taps were dripping because young children are unable to close them tightly.

### **4.3 Conclusion**

The findings have been presented, analysed and discussed in detail. Chapter five (5) will present an overview of the study, challenges, conclusions and recommendations of the study.

## **CHAPTER 5**

### **Summary of the Research Findings, Conclusions and Recommendations**

#### **5.1 Introduction**

The previous chapter presented and interpreted the data collected through document study and interviews complemented by observations made at each school.

This chapter presents an overview of the study, challenges, conclusions and recommendations regarding the role of environmental education in reducing water wastage in primary schools in Empangeni District.

#### **5.2 Restatement of Objectives.**

The researcher felt it necessary to restate the objectives of the study mentioned earlier on, in 1.4.2, so as to link them with conclusions and recommendations of the study.

These objectives are as follows:

- (i) to determine the water wastage practices at school and home.
- (ii) to establish how environmental education can change learners' views about the role of water in their lives and their attitudes towards its use.
- (iii) to develop environmental and water policies in schools in an effort to save water.

The research study also aims to provide answers to the following sub-questions inherent to the problem statement mentioned in 1.3.

- (i) What water wastage practices were observed during the investigations at schools?
- (ii) How can environmental education change learners' views about the role of water in their lives?

- (iii) What are the effects of water wastage on the school, community and municipality?
- (iv) What must be done to reduce water wastage in primary schools?
- (v) How do educators, school authorities and learners react to water wastage practices?

### **5.3 Overview of the study**

#### **5.3.1 Water wastage practices**

The participants were required to identify water wastage practices taking place at their schools or homes. Some of the practices were identified by the researcher during observations made at these schools.

- Irrigation at inappropriate times, that is during the day when the sun is hot and over-irrigation of the land waste a lot of water.
- People washing cars and irrigating using hosepipes.
- Leaking and dripping of taps and taps left open or not tightly closed.
- Illegal water connections done by the people living in the informal settlements.
- Learners using water irresponsibly for example by opening taps widely and allowing water to overflow in sinks,
- Unnecessary flushing of toilets. A leaking toilet is one of the biggest sources of water waste.
- Alien plants use much more water than indigenous plants.
- Using running water to wash dishes, hands and rinse clothes.
- Taking a shower wastes more water than a bath.

### **5.3.2 Reduction of water wastage in schools and homes**

Some of the factors influencing the water use and consumption in urban and peri-urban communities as mentioned in 2.7 include:

- the rate of urbanisation,
- increase in standard of living,
- income of the consumers,
- the level of education of consumers and
- the nature of housing.

The participants seemed to know much about the strategies to be used to reduce the wastage of water in schools and homes however they are not practicing these strategies.

The following points were identified during the interviews with the participants:

- educating learners about the importance, scarcity and conservation of water. Most participants know conservation methods but they don't know the reasons for conserving water.
- each class should keep a tapped bucket of water for learners to drink.
- they also mentioned repairing leaking taps/pipes and blockages immediately.
- using water tanks to collect rain water to be used to irrigate gardens and wash dishes.
- water users should not waste water and should strive to use it efficiently.
- development of awareness programmes at schools and communities.
- schools must take part in celebrating environmental days.

- conducting water audits to determine the water quality and water quantity.
- supervision of learners during break times is essential to ensure that they don't leave taps open.
- avoid washing cars with hosepipes and consider using two buckets of water to wash a car.

#### **5.4 Research findings and conclusions**

The research findings and conclusions indicate that people take water for granted as it seems so plentiful in Empangeni District. Most of them are unaware that South Africa is a water-scarce country and a semi-arid region.

It has been noted that schools which participate in Eco-Schools show a sense of responsibility towards the use of water. This was evident when they harvest rain water, use tapped buckets to collect water for each class and use cups to drink water.

Environmental education should help to change the mindset of learners, educators and non-educators to live sustainably. Sustainable living implies that the users of water would take more responsibility for its conservation. For them to change their behaviour and attitudes towards water and wastage practices, would require information and advice. Environmental education must play an important role in changing learners' attitude towards water.

#### **5.5 Challenges of the study**

The researcher was unable to conduct the study in schools far from his home and place of work due to time and financial constraints. Another challenge was the language barrier concerning learners and non-educators. The learners are second language speakers and the

non-educators are illiterate and cannot communicate in English. The researcher had to explain the questions in their mother tongue which is isiZulu and record in English. This could have influenced the validity and reliability of the study.

## **5.6 Recommendations**

After having presented the overview, challenges and conclusions of the study, the researcher deemed it necessary to suggest the following recommendations.

### **5.6.1 Environmental policy and water policy**

The Department of Environmental Affairs and Tourism (DEAT) and the Department of Water and Forest (DWAF) should assist schools to develop their environmental school policy and water policy. This would help schools manage their resources and produce citizens who are environmental literate.

### **5.6.2 Education and Training**

Educators need training in environmental education in all school levels. This would equip them with skills and knowledge about water and other natural resources. This would also equip them with skills for an environmental audit, water audit, water purification and knowledge and appreciation of our natural resources (see 4.2.1.9).

All sectors of consumers need to be educated about the conservation and management of water in order to:

- Understand the importance of the resources and be knowledgeable about its conservation and management.

- Be aware of the scarcity of water as a natural resource and value, appreciate and protect it.

### **5.6.3 Awareness Programmes**

The Department of Water and Forestry (DWAF) in consultation with other departments such as the Department of Education (DoE) and Department of Environmental Affairs and Tourism (DEAT) must assist schools in developing awareness programmes concerning water conservation and water wastage practices. This would help learners acquire a basic understanding of how the natural environment functions, how its functioning is affected by human activity and how harmony between human activity and the natural environment may be achieved.

These programmes would also help educators, non-educators and learners acquire a set of values and feelings of concern for water and the motivation for actively participating in water conservation and water-wise activities.

### **5.6.4 Participation in Environmental Clubs/Eco-schools**

All schools should join environmental clubs or eco-schools. The participants who are members of eco-schools showed great understanding of water conservation and the sustainable use of water.

## **5.7 Other recommendations**

Other recommendations include the following:

- water the garden less frequently, but deeply and thoroughly. Avoid watering in the heat of the day when much water is lost through evaporation.
- eradicate all weeds and alien plants; more water is utilized by this vegetation.
- re-use bath and sink water to water the garden. Sink water is rich in nutrients.
- turn off any running taps and report leaks and drips to the school management team immediately.
- reduce the amount of water used to flush the toilet by placing a two-litre plastic bottle filled with water at the bottom of the cistern.
- each class should keep a tapped bucket of water for drinking and must avoid drinking from the running taps.
- each school must have a water team which will conduct water audits at school.
- learners at schools should be made aware of the environment through the availability of journals and magazines like Water Wheel, Enviroteach, Envirokids and Environmental Management.

## **5.8 Conclusion**

The study was an investigation of the role of environmental education in reducing water wastage in primary schools in Empangeni District. The findings indicated that schools affiliated to eco-schools are more water-wise than non-affiliate schools. At all school levels, the introduction of an environmental club, school environmental policy and water

policy is essential to address the issue of sustainable use of water. Most of the participants were aware of how water is wasted but could not take the responsibility towards saving it.

Water conservation is a collaborative effort and must include all spheres of government and consumers.

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**APPENDIX 1**

ENQUIRIES: MS Mbokazi  
STUDENT NO: 30108802  
CELL: 076 9333 271  
TEL : 035 7964 796  
FAX NO: 035 7965 252

PO Box1198  
ESIKHAWINI  
3887  
  
09 February 2009

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Dear Sir/ Madam

I humbly request permission to conduct research in your school from the \_\_\_\_ to \_\_\_\_ 2009.

I am a postgraduate student registered for Master Degree with specialisation in Environmental Education with the University of South Africa. I am conducting a research on the role of environmental education in reducing water wastage.

The purpose of the research is to develop and design environmental educational programmes for water conservation at the schools around Empangeni.

I hope my request shall meet your favourable consideration.

Yours faithfully

---

MS Mbokazi (Mr.)

**APPENDIX 2**

ENQUIRIES: MS Mbokazi

PO Box1198

STUDENT NO: 30108802

ESIKHAWINI

CELL: 076 9333 271

3887

TEL : 035 7964 796

FAX NO: 035 7965 252

09 February 2009

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The District Manager

Empangeni District

P/Bag 8520

Empangeni

Dear Sir/ Madam

I humbly request permission to conduct research in some schools in your District (Circuit) on the 2<sup>nd</sup> March 2009 to the 2<sup>nd</sup> of April 2009. The selected schools in your District (Circuit) are **Bajabulile, Thambolini, UMzingwenya, Maqhama and Sinaye Primary School.**

I am a postgraduate student registered for Master Degree with specialisation in Environmental Education with the University of South Africa. I am conducting a research on the role of environmental education in reducing water wastage.

The purpose of the research is to develop and design environmental educational programmes for water conservation at the schools around Empangeni.

I hope my request shall meet your favourable consideration.

Yours faithfully

MS Mbokazi (Mr.)

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**APPENDIX 3**

**INTERVIEW SCHEDULE**  
**INTERVIEWS WITH EDUCATORS**

1. Do you celebrate Environmental Days such as National Water week, World Wetland Day, Arbor Day? How?

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2. Does the school have environmental policy /water policy?

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3. Are you teaching water concepts at school?

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4. What do you understand about water wastage?

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5. What activities do you think contribute to water wastage in your school?

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6. How does water wastage affect the school, the community and the municipality?

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7. What do you understand about water conservation?

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8. Have you attended any workshop on water conservation/ wastage?

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9. How can the school reduce wastage of water?

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**APPENDIX 4**

**INTERVIEWS WITH NON-EDUCATORS**

1. What activities do you think waste water at this school?

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2. How do you water the garden? Do you use watering can or hose pipe? Can you give reason for your choice?

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3. At what time of the day do you water the garden? Can you tell me the reason why?

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4. How do you reduce water loss through evaporation and weeds?

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5. When washing cars do you use hosepipe or bucket? Can you tell me why?

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6. When does the school respond to broken and leaking pipes?

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**APPENDIX 5**

**INTERVIEWS WITH LEARNERS**

1. Do you know where the water from your school taps come from?

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2. Why is water so important to our lives?

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3. What do you think could be the effects of water shortages/scarcities in your school/home/community?

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4. What activities use water at school?

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5. Can you tell me how people waste water at school/home?

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6. What can be done to save water?

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7. Can you estimate how much water you use per day at your school/home?

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**APPENDIX 6**

**OBSERVATION SCHEDULE**

1. What is the source of water in this school?

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2. Do learners use cups to drink water?

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3. Is there any water on the floor in toilets?

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4. Are there any leakages observed?

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5. Are there any dripping taps?

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6. How do they wash their cars?

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7. When and how do they water the garden?

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8. Does the school have water tanks to collect rain water? If collected, what is it used for?

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