CHAPTER 1

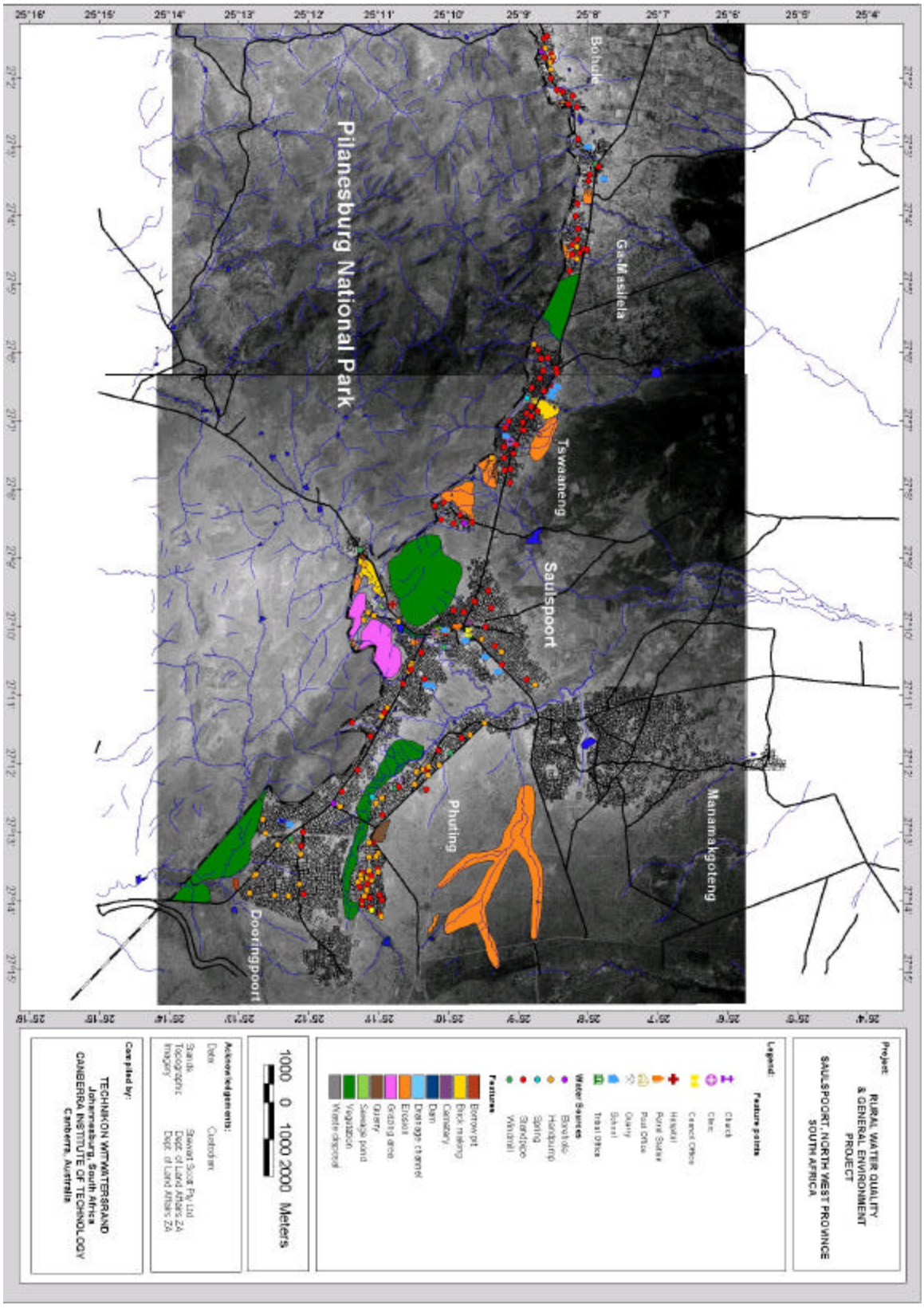
CONTEXTUALISATION OF THE STUDY

1.1 ORIENTATION TO THE STUDY

Saulspoort region is in the North West Province in the vicinity of the Pilanesberg. (See the map of Saulspoort provided on page 2). The Bakgatla tribes all of whom are under the leadership of Chief Nyalala Pilane populate the region. There are twenty-eight villages with a total population of 9999 according to 1996 statistics: 4681 males and 5318 females. Each village has a headman who, together with the chief, advises the communities on several community issues, including those related to the use of water.

Prior to 1994, people in the Bophuthatswana homeland were mainly dependent on nearby rivers and dams for their water. Shortly before the incorporation of Bophuthatswana into the new South Africa democracy in 1994, the Tosy project that aimed to provide villages with piped water, was initiated. This project was a joint venture between the Magalies Water Board and the Saulspoort Water Forum.

When the African National Congress (ANC) government came to power in 1994, one of its priorities was to redress past inequalities and discriminatory practices. The guidelines for achieving this goal were embodied in the policy document of the Reconstruction and Development Programme (RDP). One of the identified aims of this programme was to provide all households in South Africa with legally connected water (RDP 1994:21). At this time, the Tosy project that was already achieving success, was further extended. By 1999 it had accomplished its goal and all 28 villages of Saulspoort region was serviced with piped water.



SAULSPOORT, NORTH WEST PROVINCE OF SOUTH AFRICA

Although some view water as a God-given resource which should be available free of charge to all who need it, considerable costs are involved in the process of providing communities with this resource, especially when it is purified and piped to the community. In South Africa, water is a scarce resource and it is necessary to plan for the sustainable utilisation and management of the resource. 'Management' includes not only planning how the resource should be shared and distributed among those who need it, but also takes into consideration the financial aspects related to procuring and distributing the resource. Principles that guide the management of resources include the community and the priorities determined within the framework of the national economic development policy (Breen 1998:36). In the light of these principles, it is easy to see why, when villages in the Saulspoort region were provided with piped water, meters were installed to monitor the consumption of water as a means of reclaiming costs in a fair and equitable manner.

However, Breen (1998:36) found that the negative attitude of the people in rural areas towards water utilisation tends to be an issue of concern. Water wastage in such communities is considerable and is a serious environmental problem that needs to be addressed. Given the fact that water is essential to life, that it is a scarce resource and that the communities are obliged to manage and use the resource sustainably, the possibility of and need for trying to positively influence community members' attitudes towards the sustainable use of water through education, became prominent. Put differently, Kerr (1998:109) posits that the way in which environmental resources are used is largely determined by one's knowledge of and attitude towards those resources.

1.1.1 Motivation for the study

The demand for water is increasing exponentially and it is estimated that South Africa will experience the equivalent of permanent drought somewhere between 2020 and 2040. Water rationing is likely to become a fact of life, and even now, water conservation measures must be implemented in all spheres as a matter of urgency (Le Roux 2000:223). Because water is indispensable, it is a resource which must be used in a sustainable way taking into account the accessibility and availability of the resource. The needs for water in human activities have to be satisfied, but should be reconciled in line with the availability of the resource. Priority has to be given to the sustainable use of the resources, which can be achieved through a variety of means. The role of education in achieving this objective should not be negated or underestimated.

Although it could be said that rural villagers should aim to share fairly the benefits and costs of the water used, it is necessary to take into account that communities differ in their needs and their ability to contribute towards recovering the costs related to making the resource available. Nevertheless, regardless of the individual's needs and economic status, all should take responsibility for their impact on and utilisation of natural resources (Bandhu 1994:30). These issues are determined by the attitudes of individuals towards viewing and using these resources. According to Bandhu (ibid), natural resources such as water are basic to life and the generation of a livelihood. For this reason, resources should be used judiciously and carefully to ensure their sustainability.

An ecological view of sustainable living sees this as a process that requires that the use of environmental resources by one group of people in the present should not jeopardize the perpetuation of the environmental resources and the well-being of people in other parts of the world or destroy the capacities of future generations to satisfy their reasonable need and wants (Le Roux 2000:194).

Similarly, it has been said that the well-being of future generations depends on the skill and effectiveness with which present communities' knowledge base and values are informed and inspired (Porrit 1990:1). In terms of the communities under review, this means that they must take no more from nature than what nature can replenish. This in turn means adopting lifestyles and development paths that respect and work within nature's limits.

According to Fien (1993:8), education for sustainable living develops human capacity and creativity to participate in determining the future, encourages technical progress as well as fostering the cultural conditions favouring social and economic change to improve the quality of life, and more equitable economic growth while living within the carrying capacity of supporting ecosystems to maintain life indefinitely. This suggests that it is necessary to design, implement and evaluate environmentally focussed education projects and programmes that will assist communities in using resources, (in this case, water) in a more sustainable and equitable way. Projects and programmes aimed at the management of the resource, should be economically efficient, socially appropriate and presented within clearly defined parameters based on an approach of full community participation in the management of that resource. Based on the foregoing observations, the researcher felt moved to determine Saulspoort region communities' attitudes regarding the use of a scarce resource such as water and whether education programmes that focused on heightening awareness regarding water as a scarce resource could be instrumental in shaping the attitudes of communities towards the sustainable use of an all-important resource in their environment. The motivation for investigating this issue could said to be two-fold: firstly in the interest of the community who would benefit financially should the wastage of water be curbed, and secondly in the interest of the environment since water is a scarce resource which needs to be protected from misuse.

1.1.2 Contribution of the study

According to the spokesperson of the Magalies Water Board, Mr Montwedi (2002: pers. Comm.), water is being wasted unnecessarily and despite the efforts of the Saulspoort water Forum who work with the Magalies Water Board to inform and train communities on the proper use of water, the problem of water wastage persists. The contribution to the study lies in the purpose of the research, which is to investigate water wastage in Saulspoort and to seek ways of finding solutions to the problem. Finding out what the attitudes of the villagers towards water utilisation are and how to encourage sustainable use of water through appropriate education, forms the main contribution of this study.

1.2 STATEMENT OF THE PROBLEM

Measured in global terms, water is especially scarce in South Africa, and consequently it is imperative that all water sources be treated with consideration and be used sparingly. According to Chief Nyalala Pilane (2000), water wastage in the Saulspoort villages has been an incessant problem over the years. It needs to be established what the underlying cause of this apparent indifference towards water as a scarce resource is and whether for example, ignorance or careless habits regarding the use of water, contribute towards this problem. The research problem identified encompasses determining the prevailing attitudes of Saulspoort region communities regarding the use of water as an environmental resource and the potential role of education in shaping these attitudes positively.

In order for the stated problem to be adequately investigated, the following aims and objectives of the study need to be pursued.

1.2.1 Aims of the investigation

The researcher sees the study as gaining an in-depth understanding of the community members' perspective of water as a resource and their views on the way in which this resource should be used. The study further aims to identify principles regarding the nature of education that could be used to equip communities with short and long term incentives and strategies to use water sustainably.

1.2.2. Objectives of the study

To achieve the aims of the investigation, the following objectives need to be reached:

- To establish how water is supplied to the community
- To determine the purpose for which villagers use water
- To observe how water is used
- To find out what villagers' attitudes towards water and its utilisation are
- To establish how and why villagers waste water
- To establish the nature and scope of the environmental education programmes provided by the local water forums
- To determine the effect of these environmental education programmes
- To suggest, based on the outcomes of the preceding objectives, ways to positively influence community attitudes towards the sustainable use of water as a scarce resource

It is therefore imperative to investigate further the nature of environmental education research to reach the set objectives.

1.3. NATURE OF ENVIRONMENTAL EDUCATION RESEARCH

Research provides new perspectives regarding the phenomenon being studied and it is a systematic process of collecting and logically analysing information. Environmental education research which is typically consistent with the ecophilosophical view encourages individuals to be autonomous, independent, critical and creative thinkers, taking responsibility for their own actions and participating in the social and political reconstruction, required to deal intelligently with environmental issues within mutually interdependent and evolving social situations (Fien 1993:19). Fien (ibid), further states environmental education research typically researches the environmental issues within the political, social and economic structures of the society whereby there is a need to actively challenge the accepted, taken-for-granted environmental values and assumptions of the analytic and empiricist conception of the world. An ecophilosophical view of the environment, as embodied in the preceding discussion, ensures that the environment and its issues and risks is given foremost importance. According to this view, the environment has equal status and is not subservient to mankind.

Thus environmental education research in this context deals with a rethinking of the problems of humans and the world which cannot be accomplished without effort.

1.3.1 The research process

According to Le Roux (2003), the underlying epistomological and methodological assumptions orientate the way research is conducted. Nevertheless, how the research process proceeds, depends on various variables such as the academic discipline, theoretical framework, the researcher's role and personal attributes like skills, experiences, values and beliefs.

Wiersma (1991:206) proposed interrelated and over-arching steps identified as constituting research, which are also applicable to the environmental education research process. These steps are:

- Choosing or identifying a research topic or a problem
- Investigating the problem or theme by collecting and critically evaluating relevance of the data
- Interpreting the data and drawing conclusions
- Making recommendations based on the findings and conclusions of the research
- Presenting the research through a written report

These are the steps that will guide the research process of this study.

1.3.2. The research approach

The research required to provide answers to the study posed above will entail inquiry into and the observation of the practices and dynamics of an aspect of community life. A qualitative research approach would be best suited to provide data of this nature since qualitative research is concerned with understanding social phenomena from the participants' perspectives (Macmillan & Schumacher 1993:14).

Qualitative research presents facts in narrative form. There is great flexibility in both the methods and the research process. A qualitative research uses an emergent design and makes decisions about the data collection strategies during the study (Macmillan & Schumacher 1993:15). The following is typical of qualitative research:

- The researcher finds meaning as she comes into contact with the data
- The data are analysed by identifying and extracting themes

- The unit of analyses is holistic and concentrates on the relationship between concepts and contexts
- Qualitative research sees reality as subjective (Macmillan & Schumacher 1993:95).

It is said that in a qualitative research paradigm, data collection, interpretation and analysis extends beyond the concrete to the conceptual or intangible and necessitates an interactive and reflective process utilising multiple levels of analysis (Prosser 1998:98). Prosser (ibid), further believes that the processes are demanding and labour intensive and it could be argued that the use of visual imagery including photographic images could do much to enhance presentation, identify interrelationships or instances of cause and effect and other conceptual issues which are difficult to articulate in words. In short, visual images could be used to overcome language shortcomings or barriers and are important sources of insight, rich in informational content and show critical points or events. This will be further discussed under photographs as the tool to collect and enhance data in this study.

Because the study will be carried out in a particular community and the views of community members will be studied and their behaviour observed, the researcher will need to pay particular attention to conducting the research in such a way that no offence is given and that the privacy of the individual is respected. Where it is considered to be in the interest of the credibility of the study, names and contact details of participants in the study will be provided with the participants' permission. This also applies to publishing photographs of villagers at work in the community. The local authorities will need to be approached for permission to conduct the research in the area and the support and cooperation of the tribal authority (the chief and his headmen) will be sought to gain access to the communities and to conduct interviews with the villagers and to photograph aspects of community life.

1.3.3 The research population

There is a need to specify the population to which the research addresses (Cohen & Manion 1986:97). The population under survey in this study is comprised of community members of all ages in the villages. It will be the researcher's task to collect information from a smaller group of the population in such a way that the knowledge gained is representative of the total population under study. This study will employ purposive sampling where the researcher will use her discretion to handpick the cases to be included in her sample on the bases of her judgement of their typicality (Cohen & Manion 1986:100).

1.3.4 Collection of data

A variety of data collection tools will be used in the research process.

1.3.4.1 Literature review

Literature review is a systematic and critical analysis and summary of the existing literature relevant to the current research topic. It involves reading an appropriate proportion of the voluminous literature that is available (Cohen & Manion 1994:175). A literature review enables one to gain further insights into the topic. The reader is orientated towards identifying a broad topic, which needs to be refined and demarcated. Another significant purpose of literature review is to develop a clear research design. This is done by consulting a range of sources on research methodology to enable one to select appropriate research methods and related research tools (Anderson & Arsenault 1999:21). It is also useful to study the advantages and disadvantages of the research methods used by others in order to adopt or improve them in one's own research.

Le Roux (ibid), deduces that a literature review places the study in historical spatial perspective and enables the researcher to contemplate and contextualise the topic and assign to it its position in relation to the world at large. She further

states that the relationship between the proposed study and previous work on the topic is clarified, gaps in knowledge and weaknesses in previous studies are identified and unnecessary replication is circumvented. However, Le Roux (ibid), believes that the point above does not exclude the possibility that a research project may deliberately replicate a study for the purposes of verification or repudiation.

It is apparent, according to Le Roux (2000b:8), that a proper literature review ensures credibility since it gives the researcher the opportunity to indicate to peers and fellow researchers that he is familiar with the latest developments surrounding the topic or issue being researched.

1.3.4.2 Focus group interviews

Focus group interviews will be used to collect significant data related to the study (Ferreira & Puth 1988:167). Using focus group interviews as a data collection tool has advantages that include the following, (Ferreira & Puth 1988:167) :

- To assist the researcher to obtain valuable and meaningful data because they provide a natural, relaxed and secure setting
- To help the researcher to reach consensus, however, the interview need not be devoted to discovering the objective nature of the situation
- The group setting in focus groups allows questions to be clarified and modified, enhancing the group discussion and assisting in the chain reaction of participant dialogue
- The group is equipped in advance with a content analysis which therefore assists the researcher to distinguish the objective facts of the discussion from the subjective definitions of the situation
- The researcher, through her familiarity with the objective situation, is able to recognise symbolic or functional silences, distortions, avoidance or blocking, thus being more prepared to explore their implications

- It makes it easy for the researcher to evaluate continuously the interview while it is in progress

The researcher will use different interview guides for different categories of respondents selected for interviewing (see appendices 1,2 and3).

1.3.4.3 Photographs

In environmental education research, the collection, interpretation and analysis of qualitative data are generally recognised as being significant since this data is said to provide, in its richness, meaningful insight into and extended understanding of contexts and issues being investigated. The paper presented at the Environmental Education Association of Southern Africa, Le Roux (2003), discusses the methodology and analysis of qualitative data in the form of visual representations, in particular, photographic imagery. Visual representations provide an overview of the extent and context of the issue and serve to facilitate the identification of central points or events. Secondly, representation of data using the visual medium supports verbal reasoning which is distinct from the sequential reasoning arising from other qualitative data interpretation strategies.

Visual representations whether they be photographs, drawings, diagrams, tables, histograms or graphs are generally used as illustrative, representational or supportive evidence or as stimulus for further exploration in research or learning experiences (Ball & Smith 1992:5-11). They further state that visual representation in the form of photographs are not commonly used as primary sources of information to be interpreted or analysed in their own capacity, as a visual topic of inquiry. Photographs however, have particular inherent qualities that make them suitable sources of qualitative data. These characteristics can be summarised as follows:

- Photographs are resources for the examination of visual phenomena

- Camera records are the least abstract of all recorded information and are a close replica of reality
- Photographs best capture context; both the intended and that which the image-maker did not intend
- Photographs record activities or phenomena within naturalistic settings
- Photographs capture the relationship between visual language and social reality
- Photography explicitly fuses descriptive and persuasive concerns
- Observations are made both about and with photographs
- While modern education uses literacy as a distinguishing characteristic of modern and intellectual society, reality shows many remain illiterate and continue to rely on visual expression

In the light of the preceding, it could be argued that although it is acknowledged that visual data does have certain limitations, photographs remain an unexplored and underutilised source of data in research and learning contexts (Ball & Smith 1992:18). Ball and Smith (ibid) pose that the sense and fuller understanding of the image that viewers make from photographs depends on cultural assumptions, personal knowledge and the physical and social context within which the picture is presented. It also needs to be recognised that a skilled viewer will be able to make both subjective and objective value judgements regarding the image. In light of the fact that photographs are viewed rather dubiously as being authentic sources of research data and to avoid inaccuracies when analysing photographs for academic purposes, certain error-reducing techniques should be considered:

- Conduct photo interviews by asking those individuals who are portrayed in the photographs to discuss with you or the researcher the photographs and the events they depict
- Examine the exhibits in an analytical fashion

Despite certain limitations posed by visual data, it is useful to use photography techniques to collect data related to the study (Huysamen 1994:85). Photographs help the researcher to:

- Enhance observation
- Creatively contribute towards data collection
- Provide useful data for the historical background, by capturing the past in a special way, thus serving as the basis for interviewing.

The researcher will record the names and contact details of persons in the photographs for follow-up to ensure the validity of the research.

1.4. EXPLANATION OF CONCEPTS

The following concepts are central to the study and require further clarification.

1.4.1. Education

Van Rensburg, Landman and Bodenstein (1994:366), define *education* as 'the purposive and deliberate intervention of the adult in the lives of children to bring to independence'. The Longman Dictionary of Contemporary English (1991 s.v. 'education'), defines *education* as 'the process by which a person's mind and character are developed through teaching, especially through formal instruction at school or college. However, the purpose of *education* in terms of post 1994 education and training policies should also be mentioned. Education in this context and also in the context of this study applies to community education which encompasses the education of both children and adults. This view of education is in keeping with the purpose of post-1994 education and training policies (South Africa 1995:23).

The new approach to the provision of education in South Africa has to fulfil the objectives of the RDP by redressing the imbalances of the past and ensuring an equitable and democratic society. Furthermore, the ANC, in policy guidelines for a democratic South Africa entitled 'Ready to Govern' (ANC 1992:29-30), emphasised its stance and aims regarding the provision of education and providing a core curriculum that would lead to the satisfaction of the needs of the individual as well as the socio-economic needs of society. The White Paper on Education and Training (South Africa 1995:21), emphasises the purpose of education beyond 1994 by maintaining that values and principles of education and training include among others, a call for a system that ensures open access to education and training opportunity of good quality, so that opportunities for lifelong learning are enhanced.

Nonetheless, this study views *education* as a human phenomenon whereby the abilities, skills, attitudes and knowledge of individuals, regardless of age, are developed.

1.4.2. Attitudes

The New Encyclopaedia Britannica (1990 s.v. 'attitudes'), defines *attitudes* as 'predisposition to classify objects and events, and to react to them with some degree of evaluative consistency'. The World Book Dictionary (1989 s.v. attitudes), defines *attitudes* as 'the way of thinking, acting, or feeling, or behaviour of a person towards a situation or cause'.

In this study, *attitudes* will be regarded as the behaviour of a person towards a situation.

1.4.3. Natural resources

The concept *natural resources* is defined by the World Book Encyclopaedia (1998 s.v. 'natural resources'), as 'those products and features of the earth that permits it to support life and satisfy people's needs'. The Universal Dictionary (1989 s.v. 'natural resources'), defines *natural resources* as 'the total means available to a country for her economic development, including such elements as plants, raw materials, soil and water'.

In the study *natural resources* will be referred to as finite commodities available in the environment that need to be used sparingly as they are the supporters of life. According to Cunningham (1994:226), water is an infinitely available, renewable resource because it is constantly purified and redistributed by the action of the sun, wind and gravity. However, in many parts of the world, the supply of water is becoming increasingly limited.

This view is supported in EnviroTeach (2000:3) which states that although water is a renewable resource, communities will not be able to carry on as if it is an infinite resource. Should they do so, it is estimated that before the year 2020 South Africa and her people will need more water than is available.

1.4.4 Utilisation

Webster's third New International Dictionary (1993 s.v. *'utilisation'),* defines *utilisation* as 'making useful, turning to profitable account or use, or converting to use'. The Universal Dictionary (1988 s.v. utilisation') defines utilisation as 'putting to use for a certain purpose, making a productive use of, or finding a use for'.

The study presents *utilisation* as a way of making use of or putting to use natural resources such as water, in a judicious manner.

1.4.5 Sustainable / Sustainability

The Universal Dictionary (1988 s.v. '*sustainable),* refers to *sustainable* as keeping in existence, maintaining, prolonging'. Du Plessis, Lundy and Swanepoel (2000 s.v. '*sustainability'*), defines *sustainability* as 'development that meets the needs of the present without compromising the ability of the future generations to meet their own needs'.

Furthermore, Tolba (1987:98), states that *sustainability,* in terms of the utilisation of environmental resources, [sustainability] encompasses the following fact: help for the poor because they are left with no option other than to destroy their environment as they seek the basic needs to ensure survival. Furthermore, sustainability encompasses the idea of cost-effective development using different economic criteria to the traditional approach, that is to say, development should not degrade environmental quality, nor should it reduce productivity in the long run.

Fien (1993:14), defines *education for sustainability* as a process which enables people to understand the interdependence of all life on this planet including the repercussions that their actions and decisions may have both on resources, on the global communities as well as their local one and on the total environment. Living sustainably will always depend on accepting a duty to seek harmony with other people and with the environment. The guiding rules are that people must share with each other and care for the earth's resources.

However, the study refers to *sustainable* as the process of continuously striving for a dynamic balance between using and protecting or conserving the physical and natural environment and its resources.

1.5 SCOPE OF THE STUDY

This is a study of limited scope that means that the breadth or expanse of the research needs to be limited in terms of volume. However the depth of the research should not be compromised.

1.5.1 Delimitation of research

The research has as one of its objectives establishing what the attitudes of members of the Saulspoort communities are towards the utilisation of an environmental resource, water. Since there are 9999 potential respondents in this project, it will be necessary to limit the number of persons to participate in the research project by purposively selecting them. The logistics of this issue will be dealt with in chapter 3 where the research process is discussed in depth.

1.5.2 Chapter demarcation

The contents of this study are organised according to logically sequenced chapters in which the research process, research findings and recommendations are recorded. However, information in one chapter may be linked to and supplement related information in another chapter.

Chapter 1 deals with the orientation to issues such as the background to the study, the statement of the research problem, the nature of the study, the aims and objectives and scope of the study. Concepts fundamental to the study are analysed in order to further contextualise the study.

Chapter 2 reviews current literature on the subject. Included in this chapter is reflection on the use of water in different communities in Moruleng village, the focus area of this study within the Saulspoort region, in some of the Provinces in the country and also in communities beyond the borders of South Africa, e.g in Botswana.

Chapter 3 focuses on the research process and details the research methodology and process whereby the data are collected.

Chapter 4 deals with analyses and interpretation of the data to inform and provide answers to the points outlined in the objectives of the study.

Chapter 5 provides a summary and synthesis of the findings and conclusions as well as recommendations regarding strategies to improve people's attitudes towards the sustainable use of water.

1.6 CONCLUDING COMMENTS

It is hoped that the study will contribute towards understanding what people's attitudes are towards water and how people's attitudes towards the use of water can be influenced in such a way that communities spontaneously utilise water sources responsibly. It is envisaged that this study will provide new insights regarding communities' attitudes towards water. It is hoped that from the outcomes of the study, guidelines for education programmes that encourage individuals to view water as a scarce resource and not a copious commodity will be forthcoming.

Chapter 2

LITERATURE REVIEW

2.1 INTRODUCTION

South Africans, especially those living in rural areas, generally lack an adequate supply of water (Camp 2000: 1). It could be asked whether water consumers in Moruleng, the focus area of this research, appreciate its relative scarcity in their region and whether they exercise appropriate responsibility in its use.

Water is central to physical survival, household use and development (South Africa 1994: 1). Given the fact that water is a scarce resource, saving water should not be seen as a nuisance and something that one has to do. The judicious use of water should be part of one's daily routine and a way of life for all regardless of where they live.

In this chapter, current literature on the issue of water use in like regions will be reviewed. This provides a reflection on communities' water supply, a variety of ways in which communities use water, the implementation and/or nature of payment systems, and community members' attitudes towards water. The issues raised will influence the compilation of the interview schedules to be used in chapter 4.

2.2 AN OVERVIEW OF A VARIETY OF LOCAL AND SADC RURAL COMMUNITIES' ATTITUDES TOWARDS THE USE OF WATER

Gaining an understanding of attitudes of the Saulspoort region communities towards water utilisation will be more meaningful if it is done in relation to observing trends of water usage in other communities. The aim of comparison

and juxtaposition is to establish similarities and differences in circumstances and trends. Though the study focuses on investigating the attitudes towards water utilisation of Saulspoort communities, reviewing similar or related circumstances as they exist among different communities enhances understanding and analysis of the issue. This could enable communities to learn from each other's experiences and could help the Saulspoort Water Forum to consider options and strategies that could successfully address water wastage problems in the Saulspoort region. In addition, one gains a more balanced perspective of individual circumstances and problems when one compares them with similar situations, problems or developments elsewhere. For this reason, the study involves a comparative study of the attitudes of Saulspoort communities towards water with those of other North West Province's communities such as Zandfontein village, Pella village, Madikwe region and Taung region. Other examples of similar communities are drawn from Memel in the Free State, Middledrift in the Eastern Cape and also a community beyond the borders of South Africa, namely Botswana.

2.2.1 The use of water in Zandfontein village

Zandfontein village is located in the North West Province and according to Van der Walt (in Brooke 2000:1) the village has a total population of 7822 according to the 1996 statistics. The water sources used include hand pumps, street pipes and communal stand pipes. The provision of water is the responsibility of the government through RDP water projects. Research has determined that the pattern of water consumption in Zandfontein village is characterised by high peak flows over relative short summer periods during the year.

The study done at Zandfontein on water use shows that less than half of the total flow of 40 liters per household per day is used for domestic purposes. It is found that 31% of water supplied to the Zandfontein community is lost from the system due to leakage, dripping taps and illegal connections. These actions

result in communities often being without water for a long period. In addition, because animals and humans use the same water source, it often happens that community members are hindered from drawing water immediately because they have to wait for the animals to be moved. The unhealthy conditions caused by animals around the sources are problematic and could undoubtedly lead to disease.

Possible solutions to the problems that have been identified are proposals that since the authorities have the responsibility to reduce the physical water losses, they should try to accomplish this by training and educating the community on the ways of using water sparingly. It was also suggested that the water system should be designed in such a way to enable effective water loss control and management. A proper cost recovery system should be put in place since the cost of the provision of water must be recouped. Proper drinking troughs for animals need to be provided to prevent water wastage. This would also relieve the community members from having to wait for the animals to drink first. An added advantage is that it would ensure that the water source is kept hygienic.

2.2.2 The use of water in Pella village

Pella village is located in the North West Province and has a total population of 6865 according to the 1996 statistics (Selaledi 1996: 20). Water sources for the villagers include a few stand pipes, hand pumps and street taps. The water is provided by the government through RDP water projects. Research has determined that the pattern of water consumption in Pella village indicates that use is high especially during the dry periods from Spring to Autumn. It became evident that less than 30% of the total flow is used for domestic purposes, 37% is used by the animals for drinking while 33% of the water consumed is used to irrigate lawns and gardens with crops.

Water wastage practices experienced in the village include illegal connections to draw water into the households and taps that are left open to run freely. Other problems that are experienced are the use of poor quality hosepipes which break or split easily, with the result that water is lost without anyone noticing. This leads to a shortage of water supply to the community. It was also noted that there is a recurrent breaking down of street taps that leaves the community without water for a considerable period of time. Apart from the taps breaking down through wear and tear, it was also noted that vandalization of the street taps was common practice.

Possible solutions to the problems was an introduction of a self-help project which was to be led by a chief and his headmen, local council (to represent the government) and the local community. According to Selaledi (1996:22), there are to be numerous village meetings in which the self-help team attempts to explain the benefits for the villagers in terms of availability of water during the dry seasons and other factors. The message to be propagated throughout the discussions is *''This is not the government water scheme, it is yours. It will only work if you are willing to work and it is you, rather than the government, that will make the decision on how to proceed, how to organize yourselves and to decide the sequence in which various communities will participate''.*

2.2.3 The use of water in the Madikwe region

Madikwe region is located in the North West Province and Selaledi (1996:11) states the region comprises 25 villages with a population of 11000 according to the 1996 statistics. Water sources of the region include a dam, a few hand pumps and street taps that are provided by the government through RDP water projects. An additional source of provision of water to the region is through charitable funds made available to the community.

The consumption of water in the Madikwe region is high during the entire year with 55% of the water supplied being used for domestic uses and 30% used to irrigate gardens with trees and crops while 15% of the water is lost through leakage, illegal connections and dripping taps. The continuous breaking down of the street taps results in communities being without water for indefinite periods which is most inconvenient for the community. Other problems experienced include a lack of involvement of local authorities in the legal and regulatory framework for water management and the absence of a sense of ownership of their resources by the local community. This appears to be caused by a lack of training by local authorities.

Selaledi (1996:11) contends that current water management practices in the Madikwe region are not sustainable and the potential for improvement is large. Possible solutions to the problems mentioned above point to the need for the local authorities to equip communities with skills and information on who is to look after the resources and who is responsible for their maintenance.

2.2.4 The use of water in the Taung region

Taung region is located in the North West Province and is comprised of 94 rural villages with a total population of 194000 according to the 1996 statistics. The region is densely populated and consequently the communities live in cramped conditions. Water consumption and wastage issues are pertinent (Selaledi 1996:5).

The water sources for the region include hand pumps, a few bore holes and street taps. The water is provided by the government through RDP water projects. Water consumption patterns in this densely populated and relatively dry region, where water is a scarce resource show that water consumption is very high and that most of the water is used for domestic purposes. Wastage occurs through leakage, illegal connections and dripping taps. The community regularly

faces the problem of having to deal with the breaking down of taps which results in the decline of water supply to the community.

It is also not uncommon to find that some of the water sources such as taps are vandalized. Since animals and humans share the water sources, community members often are prevented from drawing water and have to stand by and wait their turn. There is an inadequate water supply to the region, but despite this, even where the supply is available, water wastage is pertinent. Possible solutions to the problems proposed is a programme to conscientise the communities and harness community efforts and activities that will raise the level of water awareness in the communities. It has been recommended that the Community Development Committee of Taung region should commit itself to address the basic ways of saving water and feed this information through to the local community members.

2.2.5 The use of water in Memel village

Memel village is located in the eastern Free State Province and has a total population of 7595 according to the 1996 statistics (Fontaine 1997: 5). Water sources on which villagers depend include dams, hand pumps, street taps and a few bore holes. Water is provided through RDP water projects and also by Rand Water who has contributed to the water project in Memel village. Trends in water consumption in Memel village, despite the efforts of Rand Water in providing basic skills of saving water, lead to high flows throughout the year. An amount of 21% of the water supplied to the Memel community is used to irrigate gardens with crops, 44% is wasted through leaking and 35% is used for domestic purposes.

Some of the problems related to wastage experienced in the village include the vandalizing of water sources such as taps and hand pumps. This behaviour leaves villagers without water for long periods of time. Other wastage issues and

problems include illegal connections to draw water into the households and the fact that taps are often left open so that water runs unchecked. Other problems are linked to the fact that both community members and animals drink from the same sources and this results in various problems like having to take turns and having to contend with unhygienic circumstances.

When reviewing wastage issues and problems experienced, it becomes clear why Fontaine (1997:7), believes that there is a need to help the community of Memel village to actively promote water saving as part of their lifestyle. Proposed solutions to problems are that Rand Water should help the Memel community to engender a culture of water saving and to provide motivation for the creation of programmes aimed at providing Memel community with skills that will enhance their ability to succeed in the quest towards the sustainable use of water.

2.2.6 The use of water at Middeldrift village

Middeldrift village is located in the Eastern Cape Province and has a total population of 8563 according to the 1996 statistics (Crous & Rossouw 2000:39). Water is provided mostly by diesel pumps that have been made available by the Department of Housing and Local Government. Water consumption patterns of the region point to high levels of consumption. Most of the water is used for domestic purposes.

It becomes apparent that the Middeldrift community lacks knowledge and understanding regarding the responsible use of water (Crous & Rossouw 2000:41). One of the major problems experienced in the region relates to the water pumps. Pumps are often left unattended and continue to pump water long beyond requirement. The diesel pumps require constant maintenance as they become dysfunctional if not regularly serviced. A dysfuntional pump contributes to water loss and wastage. It is also not uncommon to find that there is

insufficient diesel to run the pumps long enough to provide a constant supply of water.

Other problems related to water wastage include children being left to play with water oblivious to the fact that they are contributing to the wastage of this scarce resource. Furthermore, because most households are not metered and billed for the water they use, they are inclined to use water irresponsibly and subsequently to waste water. In addition, the Department of Housing and Local government often experience problems where the community claims that the Department provides water sources that are not working (Crous & Rossouw 2000:41). One such claim was repudiated when a large water pipe which was blocked was opened and household items such as a table cloth, knives, forks and a bicycle handle were removed. Clearly the Department would not have placed these items in the pipe!

Possible solutions proposed to the problems highlighted above are that the local authorities should equip the community with skills for managing and maintaining their sources. Community members should be trained to repair pumps. A system to collect funds to purchase diesel should be implemented. Alternatively, the Department of Housing and Local Government should provide the community with an adequate amount of diesel.

2.2.7 The use of water in Botswana

During literature studies undertaken, the researcher's attention was drawn to the management of water sources in Botswana which, in comparison with the management of the water sources in communities mentioned in the study so far, appears to be more stable than in any of the communities locally.

2.2.7.1 Location

Botswana is a semi-arid country located north west of South Africa and is one of the Southern Africa Development Communities (SADC). The country has a total population of just under a million inhabitants (Fortmann in Kerr 1998: 22).

2.2.7.2 Water sources in Botswana

Water sources which provide in the needs of the inhabitants include natural water sources such as streams, rivers, pans, puddles and springs and artificially created and constructed sources such as dams which are well distributed across the whole country but especially so in rural areas. Gould (1984: 55), states that subterranean water-catchment is also an engineered source of water in Botswana. This technique or strategy was advanced by the Botswana Ministry of Agriculture which provided grants and loans to rural areas farmers throughout Botswana to build underground rain-water catchment tanks through the programme called Arable Lands Development Programme. The tanks have two basic designs: a dome brick and plaster tank for areas of loose soil, and a chicken wire and plaster tank for areas with more stable soils. The tanks normally with volumes of 10 to 20 cubic meters, collect rain-water from traditional mud-and-dung plastered threshing floors with areas of approximately 100 square meters.

Seasonal water sources by definition hold water only at certain times of the year, resulting to all the communities depending on the constructed dams at certain times of the year. The problems related to the subterranean water-catchment include amongst others, livestock damaging the corrugated iron covers of the plaster- and- chicken- wire- tanks as the cover is essential to prevent evaporation and to stop dirt entering the tank. There was a case where also a

cow fell into the tank and had to be slaughtered there as there was no way to haul it out (Gould 1984:64).

This lack of permanent water source cover is probably the major water source problem experienced in Botswana, nevertheless Fortmann (in Kerr 1998:23), states that although water is a scarce commodity in Botswana, it is rarely charged for. This is because of the traditional notions about water. Most sources, e.g. rivers, pans, springs are viewed as being natural, God-given phenomena. Government constructed dams are perceived to be communal water sources because they are dug on communal land and are filled with rain water and should therefore serve everyone.

2.2.7.3 Water consumption patterns

Water consumption from piped water supplies varies seasonally, not only because of the location of the people, but also because at certain times of the year the natural sources provide more convenient water. Most of the water, 60%, is used to water cattle while 33% is used for domestic purposes and 7% is used for irrigating the crops. According to Gould (1984:56), the original rationale of constructing the tanks discussed previously was to provide water for draught animals and human consumption during the first early light rains when water is still scarce. This was in order that ploughing could begin as soon as the main rains arrived, thus, hopefully leading to increased crop yields.

2.2.7.4 Maintenance and management of water sources

It is stated that the government of Botswana adopted a policy of constructing twenty four dams in the rural areas (Fortmann in Kerr 1998:254). Each dam has the capacity to water four hundred head of cattle while some of the dams are

designated for domestic use. These dams are to be managed by a group of farmers who are trained by the government representatives in three ways:

- Maintenance and repair which means planting grass on the dam wall to prevent rill erosion, keeping the fence and gate in good repair and keeping animals off the dam wall.
- Revenue collection, where the farmers are to collect 72 pula per year, from each farmer in the community that the dam services for each adult animal watered at the dam.
- Regulation, as they are required to limit the number of stock watering at the dam to the equivalent of four hundred adult cattle per day.

However, the farmers are given the authority to punish those who do not abide by the rules of use and management by increasing their revenue collection per year from 72 pula to 150 pula. This effectively limits the number of people transgressing the regulations.

2.2.7.5 Water wastage in Botswana

The research of water utilisation in Botswana indicates that in rural areas there is very limited water wastage. Nevertheless it was found that due to the perception of the communities of dams being constructed on communal lands and filled with rainwater it is difficult to deal with those who transgress the regulations.

Minimum wastage occurs when farmers draw water from the dams in oil-drums using donkey carts for storage in their tanks (Gould 1984: 59). This is because the farmers train and educate the communities about the government's regulations about caring for water sources. The first regulation is about limiting the number of users. This is done by preventing certain categories of people from using the dam especially those coming from outside the country. The second regulation is the restricting type. Although the dams are also intended for

livestock, six dams are limited to domestic use either permanently or seasonally. Sometimes calves and small stock are allowed to use the dam. Since people use less water than cattle, this lengthens the time there is water in the dam. The third regulation is controlling the manner of water use. Where water is used for both livestock and domestic use, cattle are typically kept out of the water, being watered from troughs either inside or outside the fence surrounding the dam. Although this is done to keep water clean for human consumption, it has the added benefit of reducing the amount of silt carried into the water. The fourth regulation is regulating the time of use. Some dams are closed entirely during certain seasons, especially the rainy seasons, generally by padlocking the gate. Other dams are used in sequence, the dam most likely to go dry, is used first, followed by more reliable sources.

2.2.8 The use of water in the Saulspoort region

Saulspoort region is located in the North West Province and is comprised of 28 villages with a total population of 9999 according to the 1996 statistics. Water sources include a few stand pipes, hand pumps, dams and street pipes (See figures 2-7 of water sources). The water is provided by the RDP water project, which was introduced shortly after 1994. The project was an extension of the Tosy project which operated prior to 1994. The RDP water project is run by the regional department of Water Affairs as the developer and the funder of all water projects for the villages, the tribal authority and the Magalies Water Board. These institutions together form the Water Forum.

According to Rail (1999:24), previously water had to be collected from water points and carried to the stands. With the introduction of the water distribution system, Saulspoort region was given the option of a subsidised yard connection at own cost. Almost half of the stands were connected to the system, but many used unauthorised and unmetered connections. The average water demanded at

the connected stands was found to be one hundred and seventeen litres while the use from the stand pipes was only nine litres per day per household.

Water consumption is found to be very high since the water is not metered and those that have been connected, were illegally connected, and consequently not paying for water. It is estimated that 50% of the water is used mostly for domestic purposes, 20% is used to irrigate gardens with lawns while 30% is wasted through illegal connections and other means. Apart from the resultant unaccounted for wastage of water, this practice generally results in the failure of the system and those consumers in the high lying areas or at the end of the distribution system often do not get water at all.

Much of the water supplied to the Saulspoort communities is lost from the systems through leakage, dripping taps, illegal connections and the unnecessary irrigation of gardens. Rail (1999: 1) established that despite the efforts of the Water Forum to conscientise people regarding water usage by embarking on environmental education programmes, inter alia, a programme empowering villagers to actively become part of the process of auditing their daily water consumption, the programme applied to those villagers with metered connections only.

Villagers were taught about the three main ways of saving water in their homes, which are the three R's, Reduce, Reuse and Repair. The Water Forum assisted the villagers to:

- Identify water waste areas.
- Identify solutions to waste areas.
- Group the problems and solutions into categories of reuse, reduce and repair.
- Determine how many leaking taps there are in the villages.
- Determine the amount of water that goes to waste.
- Repair the taps.

- Determine the amount of water saved.
- Act immediately in response to leaks and pipe breaks.

Despite the knowledge the villagers acquired through the programmes, their attitudes towards the use of water apparently remain unaltered.

In response to the non-payment and illegal connections for water services in the Saulspoort region, the Water Forum embarked on a cost recovery campaign. This implies that costs were recovered from the legally connected stands. Rail (1999:2) contends that local authorities compiled a use-friendly account followed by an intensive awareness campaign where every possible opportunity was used to make people aware of the reasons for payment of water services. In addition, the campaign distributed the first account through door to door delivery to make sure that the consumer information on the accounts was as accurate as possible.

According to Rail (1999: 6), the survey was done in designated supply areas to check whether the household was serviced by a standpipe or a street pipe, whether the household was serviced by a standpipe with or without a meter and whether the connection was legal or not. The survey included at least the name of the head of the household and the erf number of the residence. The location of the erven and house connections were marked on a large scale map.

The survey revealed that certain connections were made without official approval ostensibly at the lowest possible capital cost and as could be expected, those unauthorised connections were without water meters or valves. Poor workmanship and the use of inappropriate materials contributed to water wastage from such unauthorised connections. Leakage was unacceptably high. After the cost recovery campaign was launched, at least eighty two percent of households paid for the water services and corrective measures were set to limit the issue of unauthorised connections.

2.3 SUMMARY AND CONCLUDING COMMENTS

When the case studies of water consumption patterns in rural areas are compared, a number of similarities and common issues become apparent. It furthermore seems that the attitudes of rural communities towards water are similar in a number of ways.

Some of these issues relate to the sustainable use of water are clearly of a technical nature, but others plainly have to do with personal attitudes towards the utilisation of the resource, and it is in relation to the latter that this study will pursue its investigation.

The study will next review aspects such as sustainability, reliability, maintenance and management of water by Moruleng community [focus area of the study] to determine whether and how it is possible to ensure that the water supply systems are best used to ensure the sustainability of the resource.

Chapter 3

RESEARCH DESIGN AND METHODOLOGY

3.1 INTRODUCTION

According to Magalies Water Board spokesperson, Mr Montwedi (2002), the Saulspoort Water Forum is working under complex and demanding circumstances. Inefficiency, unfairness and unsustainability often characterise the use and management of water sources in the region. He believes that shaping the communities' attitudes towards responsible water utilisation will be a slow and painful process. However, he believes that this can be achieved through a variety of means and it seems plausible to suggest that the role of education in achieving this objective should not be negated or underestimated. In an effort to determine the relevance of this expectation it is necessary to study the current situation. The nature of the issue being researched points towards environmental research firstly and environmental education research overall.

3.2 THE NATURE OF EDUCATIONAL RESEARCH AND ENVIRONMENTAL EDUCATION RESEARCH

Hopkins (1980:29), states that educational research is a scientific inquiry about an educational question that seeks to provide an answer which contributes toward increasing the body of generalisable knowledge about educational concerns. Day (1993:211) defines research as careful search, inquiry or discovery of a new or collection of old facts, by scientific discovery. Research needs critical investigation. From this definition, Day (ibid) deduces a number of pointers:

- Research is a formal, scientific, systematically conducted inquiry

- The focus of research can involve investigation into inter alia fundamental social or environmental issues.
- The results of research should be applied or contribute to improving or resolving a dilemma.

From these points it can be further reasoned that research has particular characteristics.

- Research is aimed at reaching an understanding of – searching for answers to – a problem.
- Requires accurate and rigorous gathering of information and observation of events.
- Research relies on critical evaluation and interpretation of the data collected so that reliable conclusions can be drawn and practicable recommendations can be suggested.

Environmental research focuses on environmental issues, but not issues necessarily limited to aspects of the natural environment but also human and cultural aspects which constitute the social environment (Desinger & Howe 1992:25). It is also based on a study of natural and social systems and their interactions. According to Le Roux (1998:28), an important aspect of environmental education research is that not only those who have an interest in the research, but also those who will be affected by the outcomes of the research should be involved and consulted in the research process. Le Roux (ibid) emphasises the purpose of conducting environmental education research, that it should be conducted to achieve specific outcomes with relevance to the context and it needs to be realised that research outcomes are not necessarily transferable to other situations since they could be context specific. However this does not mean that it is not possible to make generalisation from the outcomes of the research.

It is imperative to consider the impact of the research on the broader social environment, to ensure that the dignity and welfare of the people to be affected are respected, to see to it that all affected parties involved in the research process should be consulted in relation to the research, the findings and the planned course of action. The action plan must be feasible and sustainable, be to the long term benefit of the environment and in the best interest of the people of the particular environment (Le Roux 1998:29). Furthermore, for environmental research to be meaningful and have practical value, the researcher has the responsibility and should be held accountable to consistently ensure meticulous administration in all aspects of the research processes.

In this study, the focus will be on *environmental education research.* Desinger and Howe (1992:5) point out the aspects appropriate for environmental education research. Specifically mentioned are: human systems which include the interaction between humans and their environment and resources such as the distribution, consumption, management or conservation of natural, abiotic and biotic resources.

In this research study, the researcher will concentrate on research aimed at investigating the attitudes of Moruleng community in relation to water consumption. This will be achieved by using relevant methodologies to address the two aspects of environmental education research as identified by Desinger and Howe, namely the interaction between human communities and the consumption and conservation of an abiotic resources.

3.3 RESEARCH METHODOLOGY OR APPROACH

The research methodology or approach literally means “the way along which’’ as being a word derived from the Greek word *metahodos* (Berg 1995: 229) and describes the way data are collected and analysed, i.e. the overall plan of the research process (Hopkins 1980: 158). The choice of research method is largely influenced by the desired end product and the best way to obtain answers to the research question. The methodology is a distinctive framework in which the methodological stages are spelt out and culminates in the development of a research design (Tuckman 1978: 89).

The research approach decided upon for this study is qualitative. It will entail inquiry into and the observation of the dynamics of an aspect of Moruleng community members’ lives. Data of this nature will be best provided by qualitative research because it is concerned with understanding social phenomena from the participants’ perspectives. Furthermore, a qualitative approach to data collection is preferred since much of the data are presented in narrative form (Glesne & Peshkin 1992: 22). A written account of the data collected is recorded by the researcher and this can be clarified of any ambiguity, misinterpretation or misrepresentation that could arise since the community under study includes subjects who are illiterate and would not be able to complete questionnaires independently, for example.

Qualitative research further considers the researcher as the principal instrument for data collection. This places the researcher in a privileged position since she knows what type of data is needed and how to obtain that. Focus group interview questions can be adapted as the circumstances dictate in order to bring forth data that throws light on the issue at hand and facilitates decision making aimed at achieving solutions (Ferreira & Puth 1988:167). However, this situation also places a greater responsibility on the researcher and tests the integrity of

the researcher to conduct the study in such a way that it is free from bias and manipulation (Macmillan 1991:195).

Perhaps it is necessary to point out the features of the qualitative research as stated by Leedy (1993:141), These features will direct this study.

- Qualitative research tends to be field focused.
- Qualitative research considers the self as an instrument that engages in the situation and makes sense of it, it is a matter of perceiving the presence of behaviour and interpreting the significance thereof.
- It has an interpretive character: inquiries try to account for what they have given an account of and search for the meaning events have for those who experience them.
- Qualitative research displays the use of expressive language and the presence of personal – either that of the researcher or the researched-expression in the text.
- In qualitative research the focus is on particulars
- Specific criteria for judging the success of qualitative research can be identified. Qualitative research becomes credible because of its coherence, insight and instrumental utility.

The researcher will thus use qualitative methods, since as full a picture of the areas which are being investigated needs to be built up as time and facilities permit.

3.4 RESEARCH PROCESS

Research process refers to the constituted steps according to which the research will be conducted. These steps are referred to as the scientific method. The researcher obtains important information about the issue being researched. By following these steps the researcher is able to control the research process and

focus on that which is being studied without becoming side-tracked. Although these steps are helpful in guiding the research process, in practice the steps do not always occur in such a straight forward form nor are they always necessarily accomplished in the specific sequence. However, they do present a good point from which to organise and start a research project (Anderson & Arsenault 1999:27). These steps are:

- Determining the research question
- Reviewing current literature on the issue from which a theoretical framework of the research question can be formed
- Planning the research design and related methodology
- Collecting, analysing and interpreting data from which conclusions can be drawn and recommendations made.

The steps tally with the research that has been conducted thus far and they were well contextualised in chapter 1. Literature was reviewed in chapter 2. The research design and methodology are discussed in this chapter. The research population is identified and the sampling method is also explained.

The actual collecting, analysing and interpreting of the data will be reported on the fourth chapter while the conclusions and recommendations will be dealt with in chapter 5.

3.5 RESEARCH DESIGN

Research design refers to the systematic scheduling of the activities and times at which specific research actions or activities involved in the study will occur (Vockell 1983:150). During the research activities, observations are made of the perceptions, attitudes and the nature of the behaviour leading to the performance of the research subjects (Vockell 1983:150). Vockell deduces that it

is useful to understand the terms used in the preceding description of the research design.

- Observation refers to the act of collecting data about the performance of the subject
- Subject is a person who takes part in an experiment or activity

In brief terms the research design explains who is to collect data, how the data will be collected and where and when this will take place. In essence, research design in the research process is the distinctive framework according to which the data pertaining to the research question will be collected. The research protocol and data collection procedures are clearly spelt out. Any research design operates within a discipline or across disciplines and takes into account inter alia the purpose of the study and deploys a particular set of research strategies (Prosser & Schwartz 1998:115). Researchers tend to move between qualitative and quantitative, or a combination of the two, where research methodologies, a variety of data collection strategies and related tools become topics for deliberation.

In this study, the researcher will collect data from the subject, the Moruleng village, where the process of purposive sampling will be used to identify and select the research subjects.

3.5.1 The research population

The research population will be selected through a process of purposive sampling.

According to Cohen and Manion (1986:100), purposive sampling refers to the researcher's discretion to handpick the cases to be included in her sample on the basis of her judgement of their typicality. The researcher in this way builds a sample that is satisfactory to her specific needs. The sample will be composed of

the subjects who according to the researcher's opinion, contain the most characteristic, representative attributes of the population.

The potential population in this study is 9999 subjects in 28 villages in the Saulspoort communities. One village that is, Moruleng village, will be purposively selected as representative of all the villages. The representative percentage of Moruleng community in relation to a population of 9999 is approximately 3.571%, which makes up a total population of 357. In this village, subject groups who will be asked to participate in focus group interviews will be purposively selected according to the following categories:

- A group of Water Forum members selected from the Water Board personnel and village authorities
- home owners
- Youth

The village authorities will be combined with Water Forum members. It was envisaged that each focus group therefore will be composed of 5-8 members according to the categories mentioned. The researcher will conduct 3 focus groups interviews in total. However, the researcher will initially engage informally with a few children and adults who will not form part of the focus group to get an idea of how water features in their daily life and in their community life and what their attitudes towards water and its use are. The feedback will guide the researcher's thinking when formulating an interview question for each focus group. In addition, the literature study recounted in chapter 2 will also guide the focus of the interview questions.

Furthermore, in recording the behaviour and attitude of community members through photographing their interactions with water in various contexts, a broader section of the community will be observed. The researcher will however limit this aspect of data collection to the community members of the same village from which the focus group respondents come. To record observations in

photographic images, the researcher will undertake a reconnaissance tour of the village to establish where the community accesses and utilises its water. The researcher will decide which of these points best portrays the most common interactions of the community with water.

3.5.2 Research schedule

The focus group interviews will be conducted in Moruleng village between April 22 and April 25 2003 and the permission from the headman to do the research will be obtained in early April 2003. The literature review and the photographs were done and taken in March 2002. The researcher will identify potential respondents for the focus group interview and will obtain their cooperation to attend the particular interview sessions. The interviews will be scheduled at a place known as Moruleng Civil Services as follows:

Focus group	**Interview date**	**Time**
Village authorities & Water Board members	22 April 2003	12:30
Home owners	23 April	15:00
Youth/Children	25 April	10:15

3.6 DATA COLLECTION

During the process of data collection, it is significant to consider a number of facets related to the research being undertaken since the way in which the data will most suitably be collected, is directly related to the data collection tools or strategies that will be employed (Anderson & Arsenault 1999:29). These authors

identify the following questions that should be considered during this step of the research:

- What type of data are required - statistical, qualitative, sensus record?
- Who will collect the information- the researcher alone or together with partners?
- Where, when and how will the data be collected?
- What data collection instruments are required?
- What resources do you have at your disposal?

Considering the steps mentioned above, within the context of this study, it is evident that the type of data required is predominantly qualitative and the study population (selected subjects from the Moruleng village) will provide the information. The researcher alone will collect the information at a given time using three research tools namely focus group interviews and observations supported through photographs and follow-up interviews with persons featured in the photographs.

3.6.1 Data collection tools

During this study, data required by the researcher will be collected by conducting a literature review, doing focus group interviews with villagers and taking photographs. These tools will provide rich data that will need to be analysed and interpreted for further discussion. However, the data collected using each of these data collection tools will differ in nature, but it should be found that they complement each other in providing a comprehensive view of the attitudes of individual groups of respondents and the community as a whole towards water and its use as a scarce natural resource.

3.6.1.1 Literature review

Literature review is conducted during several phases of the research. Initially the researcher needs to become familiar with the broad topic and then proceeds to demarcate and refine the research question to a manageable, focussed sub-topic or research question (Le Roux 2002). This requires a thorough preliminary literature review of the major and authoritative works on the topic.

The researcher conducted a thorough and intensive literature review on water use and attitudes of different communities, including Saulspoort region.

3.6.1.2 Focus group interviews

Focus group interviewing can be defined as a group discussion in which a small number of participants, typically 5 to 8, talk about topics of special relevance to a study under the guidance of the moderator, also referred to as the interviewer (Folch-Lyon & Frost 1981:443). Ferreira and Puth (1988:167) contend that the focus group discussion is conducted as an open conversation in which each participant may comment, ask questions of other participants, or respond to comments by others, including the interviewer.

The researcher, being the moderator, will use simple language and even home language (Setswana) where applicable in the focus group interviews and in follow-up interviews. The recorded data will be transcribed in English by the researcher. A tape recorder to support the data collection during the interviews will be the resource the researcher has at her disposal. The researcher will use the recorded and transcribed data to identify patterns indicating attitude towards water and the significance of water in the lives of the category of respondents. The data will be collated and reported under the identified units of analysis.

a. Guidelines for designing focus group interview guide

The design for the interview guide is a critical task since it establishes the agenda for the group discussion and provides the structure within which the group members may interact (Stewart & Shamdansani 1990:201). In this study, the design will be informed by the different categories sampled for interviewing, thus each category having a different perception and role in relation to the discussion.

Anderson and Arsenault (1999:202), provide guidelines for designing focus group interview guide(s):

- Use open-ended questions. In this study open-ended principal questions will be set for different categories, each category with its open-ended principal question and sub-foci questions which will be listed as areas of investigation for each principal question. The sub-foci questions will be used to enable the researcher to guide the discussion.
- Ask questions of a qualitative nature (i.e. the sub-foci questions in this study) and avoid quantifiers such as 'how much' as quantifiers tend to restrict answers, rather than allow for a full range of responses. This study is qualitative, thus no quantitative questions will be set or asked.
- Avoid questions (sub-foci questions) that have a possible 'yes' or 'no' answer because the main purpose of the focus groups will be to discover why the respondents hold certain views towards the topic (towards water consumption and attitudes towards the use of water).
- The set principal questions and their sub-foci questions should not provide potential responses for the respondents i.e. be leading, thus the researcher's guidance should be minimal.
- The interview should maximise the range of evocative stimuli and responses reported by the participants.

- The focus group interview should bring out the effective and value laden implications of the participants' responses, to determine whether experience had central or peripheral significance.
- The focus group interview should elicit the relevant personal context, the idiosyncratic associations, beliefs and ideas.
- The focus group interview guide(s) must be tested before used. This may take a variety of forms including testing the interview guide(s) with respondents representative of those who will participate in the actual focus group. However, testing the questions with persons of the similar category but who are not included in the focus group, is also appropriate.

b. Pilot testing the focus group interview guide

The interview guide will be tested before used. In this study three members of the Water Board Forum will participate in pilot-testing the interview guide for their category. Informal talks which will be held with members of other categories like adults and youths, will also serve as pilot-testing the guide for their category, bearing in mind that the members should not be part of the focus group.

The feedback from the pilot-testing will inform the researcher of the relevance of the interview guides for each category and whether all the categories are able to answer questions without much struggle. If the guides pose difficulties for the respondents during pilot-testing, the researcher will be able to review them before they are used with the actual focus group respondents.

c. The purpose of focus group interviews

Focus group interviews will assist the researcher to obtain valuable and meaningful data because they provide a natural, relaxed and secure setting where individuals are encouraged to share both positive and negative comments.

The purpose of the focus group interviews in this study therefore will not be to achieve consensus but to exhaust an exploration of the various perspectives held. Anderson and Arsenault (1999:201) state that participant selection is based on commonality and knowledge of the topic to be discussed, therefore several people are engaged in the process at the same time.

In focus groups, the group setting will allow questions to be clarified and modified, which in turn enhances the group discussion and assists in the chain reaction of participant dialogue. In this study, the data collected will have a high face value as it will be in some instances supported by participants in their own language.

d. Format of the focus group interview guide in this study

The interview guide will have an introduction of the subject and an explanation of why the focus group interview is being conducted. The interview schedule will consist of one set open-ended principal question for each category, slightly different from one category to the other. Each question will have sub-foci questions which the respondents need to deliberate and respond to in order for the researcher to collect meaningful, supportive data. These sub-foci questions will enable the researcher to guide the discussion in such a way that the data required to answer the research question will be gathered.

Copies of the interview guides are included as appendices 1,2 and 3

e. How the focus group interview will be conducted in this study

The moderator (researcher) will apply the following steps as suggested by Krueger (1994:189).

- Introduce the interview with purposeful small talk and pre-session strategies. The moderator will create an atmosphere of trust, friendliness and openness from the moment the participants arrive for a focus group.
- Pay attention to the physical arrangement of the group. The group should be seated in a circular manner to ensure maximum opportunity for eye contact with both the moderator and other participants. The moderator will ask each subject to wear a name tag to enhance rapport.
- Effectively handle people who show up unexpectedly or unwanted participants, such as those who arrive under the influence, a spouse, a family member, a friend who provided transportation or someone in a position of authority who is interested in the study. These people can greatly affect the focus group interview, therefore quick and conclusive decisions need to be taken to preserve the quality of the research. Consider letting them wait in another room, or ask them to respond to the focus group questions in writing or if necessary asked them to leave.
- Effectively manage problems during the focus group interviews. A number of problems can arise: group members sometimes fall ill, or receive emergency telephone calls; focus group discussions quickly generate a wide range of views or ideas; it is difficult to manage the time allocated to the interview; focus groups often bring a variety of people with differing sociodemographic characteristics together, individual characteristics often pose awkward problems to the moderator. The moderator must or will be prepared for the unexpected, and will swiftly and firmly guide the group back to its task.
- When beginning the focus group discussion, all group members will be told that their presence as well as their perceptions are appreciated and necessary for the discussion and the research. The moderator will ensure that the discussion flows by encouraging all members of the group to speak, asking follow-up questions or probes or suggest a brief pause. However, the same techniques should not be used frequently as this could interfere with the discussion. They will only be used to elicit additional information when

participants make vague comments or simply say “I agree”, in this case the moderator will ask: “please tell us more”, or “could you please share experiences that make you feel that way”.

- When conducting the focus group discussion, focus group sessions will be tape-recorded and notes taken by the moderator. Special care will be taken that note-taking does not interfere with the spontaneous nature of the group discussion. Group members will be informed at the beginning that the conversation is to be recorded to capture everyone’s comments. It is important for ethical purposes to obtain each subject’s permission in this regard.
- When concluding the focus group interview, the moderator will give a summary of the main points of view which are helpful to pull together the group discussion and verify the information with the participants. It also aids the subsequent analysis. It will last a few minutes following which comments are invited. Then the moderator will conclude by thanking the participants.

The moderator (researcher) will do preliminary data analysis immediately after the group sessions conclude. The researcher will transcribe the recorded data in English where necessary, go through the recorded data, review the hand-written notes and record the big ideas and concepts that were heard. Then patterns of responses indicating attitudes towards the resource will be identified and the data will be collated and reported on as summaries of the major ideas or units of analysis under the identified patterns.

3.6.1.3 Photographs and follow up interviews

Photography can be employed in a variety of ways (Huysamen 1994:85). In this study, photographs will be used to enhance observation and to creatively contribute towards data collection by providing useful data regarding everyday activities including water wastage and drawing of water in Moruleng village. The

researcher will take photographs of how water is being used. The names and contact details of the persons in the photograph will be recorded to facilitate contacting individuals for follow-up interviews. The developed and printed photographs will be carefully studied to identify and extract all data that is related to the research question.

After this, the researcher will interview those individuals captured in the photograph by showing them the photograph and asking them to comment on their actions, thoughts, and experiences as potrayed in the photograph. This data will be recorded and analysed to establish patterns or areas of commonality.

3.7 SUMMARY AND CONCLUDING COMMENTS

The researcher contends that all the steps of the research process should be fulfilled, thus the need for this study to analyse and interpret the collected data in later chapters. Valid conclusions for this research rest on valid and interpretable information in the form of data. To get data of this kind, the researcher incorporates various tools and qualitative methodology to obtain data which give clear and undistorted results and responses for analysis.

In the next chapter, the collected data will be analysed and interpreted.

Chapter 4

DATA ANALYSIS AND INTERPRETATION

4.1 INRODUCTION

According to Macmillan and Schumacher (1993: 266) the aim of analysing and interpreting research data is to test hypothesis, achieve research objectives and to provide answers to research questions. These authors further state that qualitative analysis is a relatively systematic process of selecting, categorising, comparing, synthesising and interpreting to provide explanations of the single phenomenon of interest.

Furthermore, Moustakas in Anderson and Arsenault (1999:13) indicated that there are five basic phases of analysis, which the researcher of this study too was engaged in:

- Immersion with the experience
- Incubation which is a time of quiet contemplation and reflection
- Illumination which is a time of increased awareness, expanded meaning and new clarity
- Explication where new connections are made and one prepares to communicate findings
- Creative synthesis where the research findings and experiences are merged, written and communicated.

In this study, the researcher analysed and interpreted the data that emanated from the literature review, the focus group interviews, the photographs that were used as supplementary and supportive data, and the informal interviews forthcoming from the analysis of the photographs.

4.2 DATA ANALYSIS

The data forthcoming from the research included that resulting from:

- The literature review.
- Interview tape recordings and the notes that were taken during the interview (that mostly needed to be translated into English).
- The photographs that were studied as supportive and generative sources of information.
- Follow up interviews with persons featured in the interviews.

The researcher focused on iterative and conceptual interpretations of both the interviews and the photographs. The conceptual analysis of the literature review is provided as a background to or guidelines for supporting or illuminating the findings from the interviews and photographs.

4.2.1 Iterative analysis and interpretation

The analysis was done in such a way as to extract from the data as much overt and covert information related to the research question in an attempt to establish the attitudes of residents in Moruleng village towards water and its use. This was done to inform the conclusion and recommendations regarding the role of education in addressing the careless use of water as a natural resource.

4.2.1.1 Focus group: Magalies Water Forum and village headmen.

Contact person: Mr Montwedi: 014-558 2724

This group of 14 respondents was comprised of seven members of the Water forum and another seven of the headmen. The researcher posed an interview statement with the probing questions to clarify the statement. The general trends that became apparent in the interpretation of the data on this focus group which were derived from the interview statement and its sub-foci were that

water is a useful resource and that it should be treated with care. However, water wastage is an ongoing problem in Moruleng village. The researcher wanted the respondents to share with her the experiences they have had in relation to this problem.

The response from the respondents was that leakage is the main problem the villagers encounter. This is attributed to negligence and disinterested attitudes displayed by the villagers. Villagers do not report leakages to the authorities or to the councilors. Animals, cattle in particular, open taps with their horns and water is left running unchecked. The researcher learnt that during 1996, water pipes were laid by illegal contractors for those villagers who requested stand pipes. The whole process was illegal and in addition the materials used also point to general disregard for the scarcity of the resource since the poor quality of the material led to leakages and subsequent wastage of water. However, Magalies Water Forum intervened, which they still do, but the problem is not easily controlled, which again points to the incessantly negligent attitudes of the villagers towards water as a resource. The frustration that the forum experiences was confirmed by the respondent's facial expression.

The researcher learnt that illegal draw-offs especially for animals is common in Moruleng. Furthermore people steal water at night using big tanks, vans or trucks. This aggravates water loss and the misuse of the water sources. This indifference towards taking care of water has probably emanated from the attitude of disownership by the villagers towards water sources, since, prior to 1994, they were provided with water sources such as windmills by the then Bophuthatswana Department of Agriculture particularly for the animals. This practice has been discontinued.

The researcher further urged responses and opinions from the respondents by posing a question as to what is at the root of the water problem. It was stated

that ignorance and negligence are at the root of the problem. People choose not to know where water comes from, except that it reaches their taps. They are indifferent to the fact that water needs to be purified and therefore costed. Although there are water projects in Moruleng of which villagers are aware, it is their view that it is not their responsibility to support them but the body (or the government) who initiated them. The researcher probed further by posing the question 'how would you like to see the water problem solved' The respondents responded that villagers should to be made water wise by educating them about more responsible or conservative ways of using water as this will attempt to change their attitudes of disinterest, ignorance, lack of sense of ownership and negligence towards water and its sources.

Villagers should know that they are the eyes and ears of the Water Forum by being responsible and reporting any water problem which may be spotted or of which they become aware. The researcher learnt that each yard is required to have metered connections so that the house owner has to take full responsibility for the water source and the consumption of the water. It was also proposed that there should be night patrols to see to it that water is not stolen during the night. Such activities cause over-use of water and possible depletion and destruction of its sources. The researcher detected an attitude of concern from the speaker's mode of speaking.

4.2.1.2 Focus group: House owners

Contact person: Mrs L.M Mosikari: 073 182 1187

The total number of respondents during this focus group interview was eight. The entire interview was conducted in Setswana. The following research statement introduced the interview: 'Water wastage is an ongoing problem in Moruleng'. The following questions probed the statement in search of background to understanding the issue being investigated. 'How is water wasted and for what reasons does this happen' From the forthcoming responses, the

researcher was made aware of the general attitude of negligence by the villagers. Leakages are not reported, taps are not tightly closed and cattle are allowed to open taps with their horns in search of water.

Children play splash games with water, taps are usually left dripping and nobody sees these actions as waste due to the villagers' indifferent behaviour towards water. These were the predominant sentiments that the researcher picked up during the interview session. It was stated that most of the water pipes are rusty indicating that the material used was of poor quality. Consequently water from these pipes cannot be used for consumption purposes. Sometimes people open taps and leave them running for a long time to let the rusty water run out first, before the water runs clear and is suitable for household consumption. This practice leads to great amounts of water being wasted and lost.

Another issue that respondents raised is that the make of water taps is not the same. Some need to be pushed down hard to allow water to flow. This results in water gushing out in large quantities, running freely outside the container due to the force with which the water exits the tap. Reading into the speaker's unspoken behaviour, it was apparent that nobody cares about what happens when water is collected and the interest is only in getting it. The researcher went on asking 'What importance do you attach to water and how does this affect the way you use water' It was responded that water is life and should be treated with love and care. Examples of what would constitute such behaviour in the opinion of the respondent was that villagers should not wash cars and water lawns with countless liters of water, that water is important in many ways such as for drinking, cooking, washing and bathing.

Every living species on earth needs water to survive. The researcher picked up that the respondents were of the opinion that villagers should have a feeling of admiration for water by taking into cognisance simple ways of using water

carefully. Conservation suggestions included the rationing of water to 5 liters of water per day to cook, teeth should be brushed using a glass rather than from a running tap and lawns and vegetables should be watered with grey water. Nonetheless, it was apparent that villagers showed an attitude of pride and delight when talking about the importance of water and ways of using it in a judicious way.

The following question was posed by the researcher to find out whether the indifferent and negligent attitude towards water that had been portrayed thus far (in the discussion) could in any way be changed for the better: 'How would you go about bringing water wastage to an end if you were given this responsibility' The response was that village councilors should be requested to workshop people on issues pertaining to water and its sources. Pragmatic suggestions mentioned included the disconnection of illegal water pipes, the installation of metered connections so that all villagers would be obliged to pay for the services, the introduction of a system of penalties for those villagers with dripping taps and illegal connections. An attitude of concern was portrayed by the respondents, which suggests that it is believed that the villagers' attitude towards water can be changed should the proper programmes and *processes* be put in place.

4.2.1.3 Focus group: Youth/Children

Contact person: Petunia Malebane: 083 485 8414

This group was comprised of eight participants between the ages of seven and sixteen. The researcher used the following statement to introduce the interview 'Water wastage is an ongoing problem in Moruleng village. Everyday you are involved with using water'. She further investigated the statement by referring to questions that would furnish background to the statement. 'Could you please share with me what role water plays in your life or what do you do with water and how it fits into your community life'.

It was responded that water is used for washing, watering plants and lawns, for drinking, cooking and washing cars and without water the community cannot survive. The community depends on water. At times when it is not available, for example when pipes are broken, villagers are left with no option but to draw water from the dams. The respondents acknowledge and respect water as a scarce resource.

The respondents were asked to explain how water is wasted. It was stated that water is mainly wasted through illegal connections and by dripping taps. Although the respondents had shortly previously acknowledged that water is a scarce resource, it seemed to the researcher that the respondents derive pleasure from and supported these actions. Despite recognising that water should be treated with respect, children are left to play splash games with water and to drink water directly from the tap not using a container. Animals drink from the same sources as people since no drinking troughs have been provided and this causes water to run freely everywhere. The respondents had viewed water as a scarce commodity and had noted that it should be cared for, protected and not contaminated, which according to the researcher showed knowledge of the resource and the principles for its use. However, these latter responses indicated that there was a discrepancy between what they know and what they do. The knowledge is not applied in practice.

The researcher probed further by asking the respondents to suggest ways of solving the problem. It was responded that taps should be tightly closed after use, buckets should be used to wash cars rather than hose pipes, illegal connections should be disconnected and every household should have metered connections so that the residents would be obliged to pay for the services. It was believed that this will enforce residents to be responsible towards water and its sources. In this encounter, an attitude of concern and respect for water was exhibited.

4. 2.1.4 Photographs

Data forthcoming from the interpretation and analysis of the photographs complemented data findings from the focus groups in that the people depicted from the photographs are among the actual respondents of the interviews. The researcher took the photographs (With the help of Technikon Witwatersrand) before the interviews were conducted, and was fortunate to locate the respondents depicted in the photographs and to asked them to participate in the interview sessions together with other respondents. In addition, the researcher went back to the respondents depicted in the photographs and asked them to comment on the photographs, and the events recorded by the photographs.

Figure.1 Respondent from the focus group: Headmen and Water Forum: (from headmen).

The respondent is drawing water from the street tap. In the interview, it was pointed out how water is wasted by leaving the taps dripping and their being not tightly closed. The respondent was asked to comment about his manner of collecting water without using a funnel, and what the implications of his action are for water as a natural resource. The response was that it is a trend in the village for people not to be bothered or to care what happens when water is collected. It was irrelevant whether it splashes everywhere. It is not their concern. He stated that as a headman he tried to be exemplary to other villagers, however, no one followed his example, therefore he too resorted to emulating their behaviour.

Figure.2 Focus group: House owners

In the interview, these people referred to the amount of water wasted using the specific type of the tap shown. This type of tap has to be pushed down hard for

water to come out. A large quantity of water gushes out causing splashes as evidenced the photograph. The researcher asked them to comment on the make of the tap and if it leads to wastage or not. The response was that the availability of water is what matters the most, not the make of the tap, as they are not responsible for it nor the amount of water wasted. The researcher deduced a cynical attitude shown by the respondents which is aggravated by a lack of ownership. Although people know about the correct behaviour towards water, they do not necessarily practice such behaviour.

Figure.3 Focus group: Youth/Children

This group referred to water wastage through illegal connections during the interview. The researcher showed them the photograph and asked them to share with her why they collect water this way. The response was that they know it is improper and unacceptable to collect water illegally with a hosepipe, however,

no one reprimands them so they continue with this action. The researcher learnt that the respondents' behaviour is aggravated or encouraged by the families residing next to the water sources who ask the children to move the hose pipe from one household to the other. Thus the children feel important and believe they are indispensable and that their action is appreciated and significant.

Figure.4 Respondent from focus group: Youth/Children

It was indicated in the interview that water is drawn using tanks, while in actual fact the process is illegal. As with other communities depicted in the photographs, the respondent was asked to comment on this manner of water collection and its implications for water. He indicated that a hosepipe is connected to the tap to draw water into the tank. During this process, much water is wasted as it runs freely for sometimes the hose pipe used does not fit

the tap properly. During this process villagers are denied the opportunity to draw water from the source.

However, the researcher was told that the process usually takes place at night for the local councilors not to notice. Reading into the respondent's unspoken behaviour, the researcher detected an attitude of impatience and of disinterest in the discussion indicating that the pertinence of water wastage is not his responsibility and it does not concern him. His interest is in having water in his drum.

Figure.5 Street taps in Moruleng

The various focus groups in the interview stated that the taps are valuable to them and they find it difficult when they are broken, which indicates an attitude of gratitude and appreciation for the water sources.

Figure.6 A hand pump

The researcher observed that much water was spilled on the ground, which to her conclusion is due to people pumping for animals and allowing them to drink from the ground. This is an example of negligent behaviour and attitude towards the water and its source.

Fig.7 Moruleng dam

Villagers residing next to the dam are compelled to share water with the animals when other sources are sometimes not working due to over use. When the dam is dry, animals drink from the village sources like taps and hand pumps.

4.2.2 **Conceptual interpretation from the interviews**

Villagers are aware that they cannot live without water and that therefore it should be taken care of and be respected as being a scarce natural resource. However, underlying the positive perceptions and orientations towards water and its use, is an attitude of indifference which is manifested in their actions relating to the use of water.

Villagers, attaching value to water, experience the resource as being of much worth which indicates an attitude of dependence, care and admiration. People are aware of the water wastage but their attitudes and actions contribute towards the problem. In the interviews most of the respondents and in the photographs, particularly the headman, were knowledgeable about how valuable water is for the community and what the accepted/preferred attitude should be. However, attitudes reflecting a lack of ownership, negligence, disinterest and ignorance are evident. It is believed that water is a gift from God and it will always be there whether taken care of or not.

The researcher deduced that a substantial number of respondents were well aware of how water is wasted, this was even picked up from their non verbal expressions. Nonetheless, they choose not to accept responsibility for their actions and behaviour such as reporting broken and dripping taps, reprimanding children when they play with water and collect water illegally.

It appears that categories interviewed demonstrated an understanding (knowledge) of water, its origin, its uses and the way it should be used. They could also suggest meaningful ways in which the resource could be protected from mismanagement or misuse. It became clear that knowledge per se was not lacking. They have knowledge about water and nothing more. The knowledge is not put into practice and remains a verbal expression only.

However, the respondents were enthusiastic when suggesting ways of solving water problems, which in turn, they appear to believe, will influence their attitudes. This was observed during discussions through nodding their heads repeatedly to show signs of agreement.

4.2.3 Conceptual interpretation: Photographs

The community members depicted in the photographs were asked to comment on the photographs and their responses indicated attitudes of negligence, and indifference towards water. It is apparent that their interest is in drawing water and nothing further than that. Their verbal and non-verbal expressions tended to exude a sense of irritation such that one is wasting their time by pointing out and focusing on water wastage as an ongoing problem in their village.

The researcher observed that water is wasted mainly by children who probably act upon the instructions of adults. Older people who never scold them for their behaviour encourage their actions. The interaction with community members featured in the photographs, according to the researcher, pointed out that their ways of collecting water, the method of use of water sources that leads to wastage are habitual and established. They are engulfed by their uncaring and disinterested attitudes which are not regarded merely as attitudes but as consistent trends.

The patterns of use that are forthcoming from review of the various case studies, also support Breen's theory (1998:20) that communities are not committed to the concept of payment for services and this aggravates wastage. Together these issues point to a lack of understanding or concern for the sustainable use of a scarce resource. It is also a general perception that anything coming from outside (from the government) is regarded with suspicion and accepted with reluctance even when it is to the community's benefit. It is the general perception that if the villagers made an effort to obtain the service and feel that they have achieved a victory in forcing or persuading the outside body to provide the service, acceptance is much more enthusiastic. Likewise, according to Selaledi (1996:12) it frequently happens that the body providing the capital cost for providing the service has no inclination nor the infra-structure to continue to

operate the service for an indefinite period and prefers to hand over the responsibility to the local community. Generally even the government prefers to construct and transfer a completed supply system to the village council or local authority in order to strengthen the sense of responsibility and ownership at community level. The involvement of all stakeholders on taking over the responsibility of the water sources on completion and putting them into operation is a considerable local asset.

It needs to be noted that a great deal of the water provided is not used for the purpose intended, i.e. domestic purposes. Piped water is also used for watering livestock, irrigation of crops on a small scale and watering lawns. Poor maintenance, mismanagement and illegal water connections are common to most communities and are the cause of much loss.

This dilemma is also recognised by the White Paper on Water Supply and Sanitation Policy (South Africa 1994:26). Residents make connections to the mains to provide private houses with water which in many cases is also used to irrigate vegetables and gardens and this is beyond the basic provision for human consumption as provided for by the RDP policy. In addition, significant amounts of water are unaccounted for, i.e. wasted.

Apart from the general mismanagement and irresponsible attitude towards water utilization - with the exception of Botswana rural communities - no proper water loss control measures seem to have been accommodated for the design for a rural supply system. For example, where a pipeline crosses a village, it is not always easy to get a message of a pipe break to the relevant authorities due to a poor reporting network. Furthermore, there are no active devices such as reservoir level control, flow control, pressure control and time control devices installed to avoid unnecessary spillage and to maximise network efficiency. Communities do not demand proper management measures of the supply

systems therefore the total cost of the system which requires yet more maintenance is, however, much higher due to additional water losses, pipe breaks, illegal system operation and repair costs. Clearly much has yet to be done to improve the sustainable use of water.

4.2.4 Conceptual interpretation: Literature review

The literature feeds well into the focus group questions since the researcher, when conducting literature review and focus group interviews, dwelt much on the following:

- How water is wasted
- The importance of water in the community members' lives
- Water wastage, causes and ways for solving the problem

The researcher used an overview study of local and SADC rural communities to review similar or related circumstances existing among them to investigate particularly the attitudes towards water utilisation of Moruleng villagers (the focus area of the study as representative of the 28 villages of Saulspoort region). It has become apparent that the communities displayed similar practices amongst others:

- High rate of water consumption the entire year
- Illegal connections
- Dripping taps
- Vandalization of water sources (street taps)

Therefore the study sees literature review as on of the fundamental principle for data collection and for the proposed recommendations thereof.

4.3 SUMMARY AND CONCLUDING COMMENTS

The findings from the interviews and community activities depicted in the photographs confirm that water wastage is a pertinent, incessant issue in Moruleng village. This problem is prompted or aggravated by the villagers' attitudes such as negligence and disregard but cannot be ascribed to a lack of knowledge. Nonetheless, the researcher wanted to establish from them how would they would bring the problem to an end. This evoked indications of an attitude of concern as they mentioned different ways of dealing with the problem. The impression that was given was that they were willing to take charge and responsibility for their own actions, indicating that given a chance, they would implement the solutions as soon as possible which points to the fact they know the importance of water but act indifferently.

However, what is interesting is that there appears to be a discrepancy between the responses provided by the respondents in the focus interview and when asked about the photographs. During the focus interview concern about water wastage was expressed, in the informal discussion regarding the photograph, indifference towards the wastage of water was evident. It is evident that people may know about the conservative ways of using water, but do not practice them.

In the final chapter, findings and conclusions of the study and recommendations will be elaborated upon.

Chapter 5

FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 INTRODUCTION

In chapter 2, the role of education in different categories of the communities in relation to various water issues has been alluded to. This chapter views the analysed data in relation to the research question to clarify and explain the existing state of the issue that was the focal point of the research. The proposed recommendations are based on the conclusions drawn and interpreted against the background of the literature review and the data collected through the interviews, photographs and discussions. The recommendations corroborate or add to the knowledge that was forthcoming during the research process, regarding why the problem exists, what issues have contributed towards the existence of the problem, how serious the problem is, how it affects the various components of the environment that are involved and the way forward to address it.

The study puts forward the following findings and recommendations:

5.2 FINDINGS AND CONCLUSIONS OF THE RESEARCH

5.2.1 Uses and provision of water

It has been realised that water in Moruleng village is significant in many ways. Daily water consumption actions include cooking, drinking, washing and bathing (Cf 4.2.1.3) for which the water provision is mainly from taps. Tanks which are sometimes drawn by donkey carts, and buckets, also provide water (Cf 4.2.1.4. fig. 4). Villagers use illegal connections as the means for water provision, where

a hose pipe is connected to the tap and directed to the households (Cf 4.2.1.4 fig. 3). Hand pumps are also used to provide water which, to a larger extent, villagers still depend on as they are the simplest and least expensive methods of supplying water (Cf 4.2.1.4 fig. 6). Village dams are available too as the sources of water supply (C f 4.2.1.4 fig 7).

Despite that, selecting the most appropriate hand pump is no easy matter. Many have been developed but there has been little guidance on how to maintain them. Constant pump breakdowns which have been assumed to be caused by inadequate design, low manufacturing quality, wrong installation or simply the wrong pump selected for the job it has to do. Therefore it is vitally important that useful information be provided to choose a suitable pump for the number of people who are likely to use it, plus the estimated hours of use per day. In the case of Moruleng village, most of the hand pumps provided are made for one to two families to use, not for the general public, as it is the case. Such pumps do not survive continuous use in villages where there is no provision for adequate maintenance.

5.2.2 Water consumption patterns

Water consumption patterns of Moruleng village and that of other communities mentioned in the study are similar, and commonalties can be pointed out (Cf 2.3). Consumption is found to be high since water is mostly not metered (Cf 2.2.8) and consequently not paid for. Trends in consumption in Moruleng, indicated in the text under the heading, 'The use of water in the Saulspoort region', leads to high flows throughout the year, not due to domestic purposes only, which is estimated at 50%, to irrigate lawn gardens estimated at 20%, water wastage through dripping taps and illegal connections estimated at 30%, to cite a few (Cf 2.2.8), which exceed the basic provision for human consumption as provided for by the government. In addition using water for purposes not

intended often results in the total dysfunction of the entire system and denies consumers in the high lying areas or at the end of the system to access water at all (Cf 2.2.8). This perpetuates the cycle of illegal behaviour by encouraging these people to resort to appointing contractors who will connect them illegally to the system. Since there are no water meters (which implies non-payment), consumers use water wastefully.

Therefore the task of instilling shaped attitudes in these communities towards water consumption is at the heart of the challenge this study faces. The task may be daunting, but it is not impossible.

5.2.3 Attitudes of villagers towards water as a scarce natural environmental resource

Moruleng villagers' attitudes towards water and its sources are ambiguous and should be carefully analysed. On the one hand there is the attitude of caring (Cf 4.2.1.3), based on the knowledge of the importance of water for human survival (Cf 4.2.1.3), and on the other an attitude of indifference and negligence toward its use (Cf 4.2.1.1, 4.2.1.2). From the review of the literature describing a variety of local rural communities' water usage patterns and proclivities, it is found that they generally display similar or related attitudes towards water as the Moruleng villagers (Cf 2.2).

Comparison of the attitudes of these communities (Cf 2.2), suggests that the ambiguous attitudes of these communities are inherent. The fact that water and its utilisation are issues of concern, based on its scarcity now and in future, underscores the importance of the study to focus on the issue of establishing and if necessary shaping the communities' attitudes towards water and its utilisation. Failing to do so, their survival as well as that of the coming generations is threatened.

It should not be taken for granted that every person in the community, given the water-wise programmes available or workshops held on water issues by the Water Forum (Cf 2.2.8), has adopted a responsible attitude culminating in responsible actions regarding the use of the water made available to them in their communities. It has not gone unnoticed that workshops and programmmes in place, have had little positive impact on the villagers (Cf 2.2.8). Villagers persist in exhibiting unprincipled, impatient and indifferent behaviour towards the use of water (Cf 4.2.1.4, 4.2.1.2). It could be that these workshops did not address the issue at stake – attitudes - and were regarded as mere 'talk shows' focusing on book knowledge with no implementation or application value.

5.2.4 Attitudes towards water wastage

Water wastage is an unceasing and continual problem in Moruleng. The researcher has indicated that to the villagers the availability of water in their households is the crux of the matter (Cf 4.2.1.4 fig. 2). They are indifferent to where water comes from, how it is provided or accessed and whether it is paid for.

Poor usage of water sources by the local communities and other communities reviewed in the study is evident. Trends that are predominant include water sources that are left open and unattended. Street taps that are not tightly closed after use and are left to drip result in much waste (Cf 2.2.2). Illegal connection systems that are installed (Cf 4.2.1.4 fig. 3), hosepipes used that are of poor quality, which do not always fit the taps properly. Some villagers steal water for their animals during the night. This overusing puts pressure on the water source to the extent that it is in danger of it being damaged or depleted.

However, water wastage cannot be attributed to irresponsible attitudes and action by the villagers only. Poor workmanship and the use of inappropriate

materials installed by contractors, are also to blame (Cf 2.2.8). This is evidence by constant leaking of water pipes, by taps that are easily opened by cattle with their horns leading to water gushing out of the tap in large quantity. It is a trend that children play splash games with water oblivious to the fact that they are contributing to the wastage of this resource (Cf 2.2.6). No one scolds them for their behaviour, which accounts for the children's lack of understanding that such behaviour contributes to water wastage. To them 'every drop does not count' and it seems that they perceive water as always being available as it is an integral part of existence. Wastage is not real to them, they appear not to comprehend this fact (Cf 4.2.1.4 fig.3).

The study further indicates that the local communities believe wherever a community exists, there should be a water supply, otherwise there would not be people living there. The supply may be inadequate, unreliable or inconvenient but basically water is there and it is there to be used. Disregard for the sustainable use of the natural resource is obvious.

5.2.5 Ownership and acceptance of responsibility

There are water projects running in Moruleng village which the inhabitants seem not to appreciate or care for, since it is not their own initiative, but the government's. As a result of this, they lack a sense of ownership and do not accept that they are obliged to act responsibly towards these projects that have been initiated in their own interest (Cf 2.2.8).

It has been deduced by this study that the focal question about these projects, which aggravates the lack of ownership attitude, is 'who owns them? or 'who is responsible for them?'. Water projects tend to be financed in a number of ways including government grants being made available for local communities, sometimes with assistance from international or bilateral agencies such as

UNICEF (Cf 2.2.3). The question of 'who owns it' emerges as a result of the actual construction phase of the project. The construction was never done by local people, but rather through outsourcing the labour to other groups. The study discovered that often the body providing the capital cost and the construction has neither the inclination nor the facilities to continue to operate the project for an indefinite period, and as a result prefers to hand over the responsibility to the local community (Cf 4.2.3). It happens that the community is burdened with an unfinished project without capital to carry it to the end. Often too, a government will prefer to construct and then transfer a completed supply to the local authorities in order to strengthen the sense of ownership and responsibility at village level. Such actions are sometimes viewed by the recipients as seeking to acquire some political advantage by the government (Cf 4.2.3). In essence, there are inevitable occasions when local communities' representatives are inadequately prepared and equipped to accept the responsibility of the gift temptingly offered due to the fact that little is known of it and they are not intensively inducted in how to use and manage it.

Nonetheless, it is acknowledged that a water supply on being completed and put into operation is a considerable local asset (Cf 4.2.3). However, it is insufficient that it be conferred to the communities as a completed project as its ownership is a liability in itself requiring the continuing commitment for operating, maintaining, extending and eventually renewing it.

However, there is a substantial difference amongst villagers, (the headmen and water forum members), for example, the respondent from the headmen, stating that he tried to be exemplary to the villagers (Cf 4.2.1.2 fig 1), but since no one seemed to care about conserving water or following his example, therefore he behaved similarly towards water. However, including the above mentioned respondent, they all are able to acknowledge that sources like water taps and hand pumps are valuable to them and when damaged or broken they suffer. This

would require them to draw water from village dams where sanitation measures are not practiced. Consequently, taking ownership and responsibility for water and its sources should be their first priority, as without water they cannot survive. It is apparent that villagers view water as a God-given resource which should be available to all free of charge (Cf:1.1). Nonetheless, despite water being God-given, it needs to be purified first before it can be used for domestic purposes and this implies costs.

The perceived deterioration of water provision and usage in various communities mentioned in the study has drawn the attention to investigate the possibility of training and educating communities on maintaining and taking care of water sources and supply. Involving the local community, meaning all the communities mentioned in the study, in the management of water has generally not yet been done properly.

5.3 RECOMMENDATIONS

5.3.1 Recommendation No 1: Addressing responsible utlisation of water and its provision

Villagers should be made aware of the basic ways of conserving water by providing them with a Water Wise booklet from Magalies Water Board. Suggestions including rationing water to 5litres for cooking per day, using 'grey water' in the garden for vegetables and trees and washing cars with buckets instead of a hosepipe. It is further recommended that villagers be informed of water harvesting methods as described by the booklet '2020 Vision for Water Project'. This method implies the collection, storage and wise use of precipitation, mainly in the form of rainfall. Several techniques can be used with rain water tanks that collect water from roof gutters as one example.

The collection pipes or gutters as well as the storage container must be clean and covered if water is intended for drinking.

Villagers should be educated about proper methods of drawing water from the source without wasting. For example, containers used should fit the tap properly or funnels should be used. Dams should be sanitised to overcome unhygienic circumstances as sometimes villagers and animals share water from the same source. Rather ensure separate provision. Water pumps are often misused by pumping for animals and allowing them to drink from the ground, which in the long run contributes to water loss and wastage. Villagers should be encouraged to use troughs for the animals.

Villagers should be provided with adequate, preferably pictorial information, on the installation and maintenance of hand pumps. It should also be mentioned whether any special tools are needed to repair the machine. Every aspect of the machines and equipment of the hand pump should be analysed in terms of noting places where wear, blockage, or manufacturing dysfunction is likely to occur as well as every point that needs cleaning. The study recommends educating communities by means of the UNICEF Rural Water Supply Programmes where hand pump projects are emphasised.

Time has arrived for the Moruleng communities to acquire skills through proper programmes such as UNICEF, on manufacturing their own hand pumps that will best suit them and not be dependant on the external help for their maintenance.

5.3.2 Recommendation No 2: Addressing the water consumption patterns of the communities

The way forward to this, requires creative strategies for turning the impervious attitudes of the communities to a common understanding of what constitutes good water consumption patterns. Although it could be difficult to convince villagers to pay fully for water services provided, (since in the past they were promised six liters of water per household per day), the study deems it necessary for them to pay. However, it is the responsibility of the Water Forum to take the villagers to the water purification plant for them to see physically how water is purified and to understand the costs incurred. They should also be informed of the standards that their water should meet as directed or prescribed by the South African Bureau of Standards. Villagers need to be educated about the importance of only consuming 'safe' water and to be educated about the health hazards associated with the use of unpurified or contaminated water.

To address water consumption patterns of the communities effectively, there should be management of water sources by the local authorities who should observe the customary ways of using water by the villagers. However, this should be done by fitting this management strategy into the existing community structures such as the Water Forum. The Water Forum and the village headmen of Moruleng should provide discussion forums where ideas can be aired and water issues discussed. According to Le Roux (2001), a colloquium is necessary at this stage, which is a forum to share, exchange and reflect on and test various ideas.

A colloquium will play an important role as a forum to deal with challenges and to confront tensions, and to identify ways to extend current initiatives. Furthermore, a colloquium offers a way of moving beyond the local realm as this study contributes to collective knowledge about the topic that could be equally

applicable in similar contexts. Studies are important in their own right, but in order to be fully useful to the environmental education community locally and globally, the community should be well conversant with their contents if the impact is to be reflected in local and also environmental policies.

Therefore, the colloquium to be formed in this study, should develop, for example, water-oriented outreach programmes. They should also develop materials relevant to issues pertaining to responsible use of water, conservation strategies and the impact of water wastage in the environment locally, regionally, nationally, and globally.

In addition, it should be ensured that those responsible for the management of water sources develop new skills which will help them to identify water use patterns that are unacceptable. Regarding water as a finite resource having an economic value with significant social and economic implications, and looking at the amount used for irrigation purposes in Moruleng village for instance, it is suggested that water source management be developed within a comprehensive set of policies to guard against abusive use of water. The policies should also reflect instances wherein negligent attitudes are the causes of water wastage.

The study puts emphasis on inculcating policies within the programmes to assist in positively shaping the attitudes of the communities towards sustainable water utilisation.

5.3.3 Recommendation No 3: Addressing the attitudes of the community towards water as a resource

The attitude of Moruleng community members should be positively shaped towards using water sparingly. There should be relevant environmental education programmes in place which will endeavour to work on these attitudes.

There is a need for more trained and skillful personnel to help the water forum members to regularly capacitate villagers on matters related to water, as a means to bring about change in their attitudes. Since it is evident that unless they adjust their attitudes towards water and adopt a more responsible course of action, their survival is threatened. Therefore there should be different educative strategies initiated by the water forum to redress the negligent attitudes of the community member.

It is said that education does not only equip people with skills and knowledge, it also contributes towards shaping attitudes regarding that which people learn about. Ultimately, it shapes their perception of the world at large. Entrenched in the education process is the acquisition of knowledge, skills and attitudes that individuals apply to and incorporate in everyday life. In the context of an individual's personal environment, how much one knows about the elements and resources in one's environment, and what one's attitude towards these elements and resources is, are determined by the extent to which one is knowledgeable about those aspects within that environment.

Therefore to ensure that a resource is used sustainably, it could well be necessary to modify or adapt present patterns of use. Education could be of paramount importance in bringing about these changes and therefore it could be expected that education has a significant role to play in this process.

5.3.4 Recommendation No 4: Addressing the attitudes of the community towards water wastage

The water forum and the village headmen should be encouraged to make specific budgetary commitment to increase the number of personnel to assist in educating all villagers about conservative ways of using water. They should ensure that these allocations are sufficient to allow personnel to reach large and

more diverse groups in a coherent way. It is evident that several large sections of the villagers rely on illegal connections and have no metered connections for the authorities to take the readings and record them to ensure that the users pay for the amount of water consumed. A proper cost recovery system, which is already in use, should be continuously followed for the villagers to get used to the system and the cost of the provision of water to be recouped. The corrective measures including training people to repair the water sources should be set to limit the issue of leakages and dripping taps.

Illegal connections and stealing water during the night are trends in Moruleng, therefore a night patrol system should be put in place to alleviate these problems.

5.3.5 Recommendation No 5: Addressing the issue of ownership through educational means

The Water Forum and the village headmen should encourage continuous village meetings in order to explain to the community members the importance of water projects and how they can benefit from them. They should take concrete steps to promote understanding and support of the projects by making the villagers aware of the fact that projects are not the government's, but theirs. All the stakeholders should be informed and be involved from the inception of the project to its completion, for them to own it. This will be the baseline for change of attitude and the authorities should assist in making the villagers to understand the intentions of the government about the water projects.

In addition, it could be argued that if villagers are consulted on the details of the proposals that most affect them, such as the precise siting of standpipes, their sense of ownership could be enhanced. The wise planner would therefore start with consultation with the community council or other representatives of the

community and also with getting them on board in other ways too. It would seem that consultation and involvement should be central to ensuring that the communities' attitudes towards water are shaped positively.

There should be networking, partnerships and linkages among all the departments, such as the Departments of Health and Social Welfare and Education, other stakeholders such as churches, local governments and other institutions which will act as catalysts for driving the issue of ownership for water sources in the village. These Departments should work in conjunction with the Water Forum in Moruleng village and they should constitute the foundation for the way water should be cared for. However, achieving attitude change is a complex endeavour and requires the collaboration of every one in promoting it.

If networks and partnerships are to be important vehicles for implementing a sense of ownership in Moruleng villagers towards water, then the capacities of such partnerships and networks should also need to be enhanced significantly through openness and better public communication. Therefore it is imperative that the previously mentioned departments and the Water Forum should educate the community to instill in them a sense of ownership of water sources.

It is also recommended that the ownership and responsibility of the water project should not be foisted a reluctant and unwary body. The full implications, both as regards finance and individual involvement, should be worked out in advance. The benefits and the liabilities of the project should be set out in detail and be incorporated into the handing over documents. Community managed water projects are different from projects with community participation. Therefore the communities should manage the projects in order to have control and ownership from the beginning. It should not be a case of community participation where the developing agency invites villagers to participate in whatever way they want, mainly to supply labour, as this would lead to unclear

ownership, control and responsibility of operation between the communities and the developing agency throughout the lifetime of the project.

The study recommends a project that should inculcate in villagers a sense of ownership that should be cultivated if one is to encourage pride and responsible action. The project method is proposed because it provides for purposeful activity and is audience centered. Moruleng villagers should be encouraged to work on a project or projects to build suitable enclosures around their street taps to protect them from being opened by cattle, from children playing splash games and from those who steal water at night (Mhlongo 2003:25). Mhlongo (ibid), states that the project should not only assist villagers to realise self sufficiency, self reliance and dignity with taking part in the project, but they will also develop a sense of ownership in the project.

Villagers involved in a project experience a change in attitude, learn to use independent thought and action and cooperate as a group. However, this does not mean that Moruleng villagers lack water use awareness, but development projects should awaken them to embark on an achievable goal to address existing environmental problems (Mhlongo 2003:26).

The programme initiated by the Water Forum was approached with thought and was well planned, but its use as a teaching strategy was less than successful since the villagers after receiving knowledge, were not committed to stand and work together. The programme also coerced villagers by applying rules and punishment in the form of fines to those with metered connections but not paying for services. The villagers obeyed the rules not because they believed in them, but because they did not want to be punished and have to bear the consequences. Therefore the project proposed should persuade Moruleng villagers to do what they are supposed to do.

6. CONCLUSION

This chapter has provided an overview of the key findings and recommendations to address the existing problem of water wastage in Moruleng village. They have been distilled from the research outputs as a way forward. It is apparent that all stakeholders involved in daily water use and wastage in Moruleng village have a role to play in the implementation of the above recommendations. This will only happen if the Water Forum widely share and accept the recommendations. Such action would encourage and strengthen the existence of networking and partnership by being open on issues pertaining to water provision and utilisation in the village.

The intention of this research is to ensure that its outcomes are to impact on and improve the state of the environmental resource, water, in Moruleng village. Therefore it is necessary to be led by the outcomes of this study to devise strategies through which the problem can be addressed, solved or ameliorated. As it has been deduced, much of this process is achieved through education, that applies equally to people of all ages. However, it is apparent that dealing with people's attitudes can be daunting as attitudes do not change easily. Thus the intention of this study is to make people aware of their attitudes which lead to water wastage, as they might not have realised that.

This study therefore wishes to stress the need for detailed communication strategy and an explicit, user-friendly implementation plan with the local authorities, or the entire colloquium, which should underpin the process of consulting about the findings and recommendations and prepare for their implementation.

BIBLIOGRAPHY

ANC. 1992. *Ready to govern* : ANC policy guidelines for a democratic South Africa. Johannesburg: Umanyano.

Anderson, G. & Arsenault, N. 1999. *Fundamentals of education research*. Philadelphia: Falmer Press.

Ball, M.S. & Smith, G.W.H. 1992. *Analysing visual data*. London: Sage.

Bandhu, D. 1994. *Environmental education for sustainable development*: Proceedings on the Global Forum 93. New Delhi: Calcuta.

Berg, B.L. 1995. *Qualitative research methods for the social sciences*. Second edition. Boston: Allyn & Bacon.

Breen, M. 1998. Waterlines: *Sharing the wealth of water*. Vol 4(4): 56. London: Technical Department.

Brooke, P. 2000. *Meeting a unique management and operational challenges of a larger bulk rural water supply system*. Pretoria: Brooke Patrick Publications.

Camp, S. 2000. *A guide to water saving in South Africa*. Pretoria: Umgeni.

Cohen, L. & Manion, L. 1986. *Research methods in education*. Second edition. London: Routledge.

Cohen, L. & Manion, L. 1994. *Research methods in education*. Fourth edition. London: Routledge.

Crous, P.C. & Rossouw, A.M.M. 2000. *Report to the Water Research Commission*. Port Elizabeth: University of Port Elizabeth.

Cunnigham, P.W. 1994. *Understanding our environment* . New York: Brown Publishers.

Day, D.G. 1993. Is research and development on the right track? Australian examples. *The environmentalist*, 13(3):211-220.

Desinger, J.F. & Howe, R.W. 1992. Environmental education research news. *The environmentalist,* 12(1): 3-7.

Du Plessis, C., Lundy, J. & Swanepoel, P. 2000. *Manual for sustainable neighbourhood development*. Pretoria: Department of Environmental Affairs and Tourism.

EnviroTeach. 2000. *Water and the environment*. Environmental Education Association of Southern Africa: Michael Bateman.

Ferreira, M. & Puth, G. 1988. *Focus group interviewing. In introduction to qualitative research methods,* edited by M. Ferreira & G. Puth. *The Learner and the learning*. Pretoria: Human Sciences Research Council.

Fien, J. 1993*. Environmental education*: *A pathway to sustainability*. Geelong: Deakin.

Folch-Lyon, E. & Frost, J.F. 1981. Conducting focus group sessions. *Studies in family planning*. 12(12): 443-449.

Fontaine, D. 1997. Water as an instrument for social development in South

Africa, in Brooke, P. *2000 Water conference*. Pretoria: Brooke Patrick Publishers.

Fortmann, C. 1998. Managing seasonal man made water sources. Lessons in Botswana, in: Kerr, C. *Community Water Development*. London: Intermediate Technology Publications.

Glesne, C. & Peshkin, A. 1992. *Becoming a qualitative researcher*. An introduction. New York: Longman.

Gould. J. 1984. *Troubled waters run deep*. Vol. 2(4) : 23. London: Macmillan Publishers.

Hopkins, C.D. 1980. *Understanding Educational Research*. Ohio: Merrill Publishing Company.

Huysamen, G.K. 1994. *Methodology for the Social and Behavioural Sciences*. Johannesburg: ITP.

Kerr, C. 1998. *Community Water Development*. London: Intermediate Technology Publications.

Krueger, R.A. 1994. *Focus groups*. Second edition. Thousand Oaks, CA: Sage.

Leedy, P.D. 1993. *Practical research: planning*. 5th edition. New York: Macmillan.

Le Roux, C.S. 1998. *Research techniques for environmental education*. Pretoria: UNISA Unit for training and development.

Le Roux, C,S. 2002. *Literature review: What it is, how it is done and how not to Do.* Seminar presented at the Institute for Educational Research seminar held in Pretoria 25-26 September 2002.

Le Roux, C.S 2002b. Environmental Studies. Pretoria: Copy Master.

Le Roux, C.S. 2003. Towards a visual research methodology. Paper presented at the Environmental Education Association of Southern Africa Conference, Windhoek 20 – 23 June.

Longman Dictionary of Contemporary English. 1991. 'education' p325. England: Longman.

Macmillan, J.H. 1991*. Educational research. Fundamentals for the consumer*. New York: Harper Collins.

Macmillan, J.H. & Schumacher, S. 1993. *Research in Education: A Conceptual Introduction*. 3rd Edition. New York: Harper Collins.

Macmillan. J.H. & Schumacher. S. 2001. *Research in Education: A Conceptual Introduction*. 5th Edition. New York: Harper Collins.

Montwedi, M.P. 2002. Personal Magalies Water Board.

Mhongo, P.N. 2003. *Primary school inservice educators' perceptions of cholera*. Unpublished dissertation in partial fulfillment of the requirements for the degree in Master of Environmental education. University of Zululand.

The New Encyclopedia Britannica. 1990. 'attitudes' p.687. vol.1. Chicago: USA.

Pilane, N. 2000. *Personal interview* 15 August, 2002. Moruleng.

Porrit, G. 1990. *Water: the power, the promise and turmoil of North America's fresh water*. New York : Brown.

Prosser, J. 1998. *Image-based research: A sourcebook for qualitative researchers*. London: Routledge-Falmer.

Prosser, J. & Schwartz, D. Photographs within the sociological research process, in *Image – based research: A sourcebook for qualitative research* edited by J. Prosser. London: Routledge-Falmer.

Rail, M. 1999. *Demand Responsive Approach*. Johannesburg: Mvula Trust.

RDP.1994. *The reconstruction and development programme*. Johannesburg: Umanyano.

Selaledi, P. 1996. *Taung water projects. Community projects.* Matieland: University of Stellenbosch Publishers.

South Africa. 1994. *White Paper on Water Supply and Sanitation Policy*. Cape Town: Government Printers.

South Africa. 1995. *White Paper on Education and Training*. Pretoria: Government Printers.

Stewart, D.W. & Shamdasani, P.N. 1990. *Focus Groups: theory and practice*. Newbury Park, CA: Sage.

Statistics South Africa. 1996. *South Africa: statistics South Africa.*

Tolba, M. 1987. *Sustainable development*: Constraints and opportunities. London: Butterworths.

Tuckman, B.W. 1978. *Conducting educational research*. San Diego: Harcourt Brace Javanovich.

Universal Dictionary. 1989. 'natural resource' p.1028. London: The Reader's Digest Association.

Universal Dictionary. 1989. 'sustainable' p.1527. London: The Reader's Digest Association.

Universal Dictionary. 1989. 'utilisation' p.1587. London: The reader's Digest Association.

Van der Walt, P. 2000. Meeting a unique management and operational challenges of a larger bulk rural water supply system, in: Brooke, P. *Biennial conference and exhibition*. Pretoria: Brooke Patrick Publications.

Van Rensberg, C.J.J., Landman, W. A. & Bodenstein, H.C.A. 1994. *Basic concepts in education*. Halfway House: Orion.

Vockell, E.L. 1983. *Educational Research*. United States of America: Macmillan Publishing Co.

Webster's Third New International Dictionary. 1993. 'utilisation' p.2524. Germany: Kohemann Verlagsgesellschaft MBH.

Wiersma. W. 1991. *Research methods in education: An introduction*. Boston: Allyn & Bacon.

World Book Dictionary. 1989. ‘attitudes’ p.132. Chicago: World Book.

World Book Encyclopedia. 1988. ‘natural resources’ p.64. vol.14. Chicago: World Book.