

**THE LEVEL OF ENVIRONMENTAL EDUCATION AWARENESS REGARDING WATER POLLUTION-RELATED
DISEASES BY LEARNERS WHO LIVE IN THE STJWETLA INFORMAL SETTLEMENT ADJACENT TO THE
JUKSKEI RIVER IN ALEXANDRA**

By

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DECLARATION

This is to certify that “THE LEVEL OF ENVIRONMENTAL EDUCATION AWARENESS REGARDING WATER POLLUTION-RELATED DISEASES BY LEARNERS WHO LIVE IN THE STJWETLA INFORMAL SETTLEMENT ADJACENT TO THE JUKSKEI RIVER IN ALEXANDRA” is my own work produced for the dissertation of MEd in Environmental Education. Sources used or quoted have been indicated and acknowledged by means of complete references.

A.S Mawela (Mr.)

November - 2008
Date

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SUMMARY

Environmental Education is a foundation in strengthening learners and community awareness in all environmental issues, including water pollution-related diseases.

This study aimed at investigating the level of environmental education awareness on water pollution-related diseases by learners who live in the informal settlement. And lastly, if possible and feasible, to propose solutions to the perceived water pollution-related diseases found in this informal settlement adjacent to the Jukskei river in Alexandra Township, Johannesburg.

The research focused on the introduction of the dissertation in Chapter 1; Theoretical foundations of the research in Chapter 2; Research methodology in Chapter 3; Data analysis, interpretation and discussion in Chapter 4; Conclusions and recommendations in Chapter 5. The study provided various definitions of environment, Environmental Education, The goal, Aims & Objective, Classification & Outcomes, Environmental literacy; water pollution-related diseases, the integration of Environmental education in the RNCS & water pollution-related diseases awareness; Education for Sustainable Development; and the relationship between the development of informal settlement and water pollution related diseases.

The outcomes of the investigation indicated that the level of environmental education awareness on water pollution -related diseases by learners at the informal settlement is less at primary level and partially increases at the high schools. In order to increase learners' awareness on water pollution-related diseases across the curricula there should be an adequate integration of Environmental Education in the RNCS.

Key words:

Water pollution-related diseases; Environmental education; Awareness; Knowledge; National curriculum Statement.

ABBREVIATIONS AND ACRONYMS

AS	Assessment standard
DEAT	Department of Environmental Affairs and Tourism
DoE	Department of Education
EE	Environmental Education
EEPI	Environmental Education Policy Initiative
JHB	Johannesburg
LA	Learning Area
LO	Learning Outcome
NGO	Non-Governmental Organisation
RNCS	Revised National Curriculum Statement
SIP	Senior Intervention Programme
UNEP	United Nations Environmental Programme

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Opening statement:

“At the beginning of this Summit, the children of the world spoke to us in a simple yet clear voice that the future belongs to them, and accordingly challenged all of us to ensure that through our actions they will inherit a world free of the indignity and indecency occasioned by poverty, environmental degradation and patterns of unsustainable development. As part of our response to these children, who represent our collective future, all of us, coming from every corner of the world, informed by different life experiences, are united and moved by a deeply-felt sense that we urgently need to create a new and brighter world of hope”.



Figure 1: Children playing in the polluted Jukskei river adjacent to the Stjwetla informal Settlement in Alexandra Township Johannesburg.

Quoted from:

The Johannesburg Declaration on Sustainable Development;
4- September- 2002 (from our origins to the future) Johannesburg South Africa. This quotation is relevant to Figure 1 depicting children playing in the polluted Jukskei river in Johannesburg.

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

The Republic of South Africa is located in a semi arid region of the world. The scarcity of water is a major challenge that demands serious intervention by means of awareness programmes through the use of Revised National Curriculum Statement. According to UNCHS (Habitat) and UNEP Water for African Cities Newsletter (2001:5) it stated that "...it is the function of education and training to give all people respect for water as a finite, vulnerable and valuable resource; knowledge on the multiple benefits and ecological services of water, the relevance of sanitation and hygiene; and basic understanding of integrated water resources management and even the need to change our lifestyles in many areas. Basic education must initiate a holistic, interdisciplinary approach to integrated water management at an early stage" UNCHS (Habitat): www.unchs.org programme.

In 2002 at the Sandton Convention Centre a World Summit on Sustainable Development focused on the reduction of poverty, the improvement of access to clean water, the conservation of biodiversity, the combating of climatic changes and the reduction of the harmful effects of the global economic system on the developing and developed countries. Global awareness of the paramount importance of the environment for man's survival, including the harmful effects of water pollution, is therefore growing. www.worldsummit.co.za . It is therefore of vital important to make children aware of water pollution-related diseases and their aftermath.

The Revised National Curriculum Statement emphasizes the importance of the integration and inclusion of various learning areas; Moreover, "...it seeks to embody these values in the knowledge and skills it develops... it encourages amongst all Learners awareness and understanding..." RNCS intermediate phase (2005:3).

Environmental Education is a learning area within the RNCS that emphasizes the teaching **about** the sustainability of resources for the next generation. In this learning area learners are taught to become aware of the limited resources that are available, as well as the skills and knowledge required for maintaining and sustaining these resources for future generations.

Education is an essential tool for achieving sustainability in conserving water sources in the communities. Learners are influenced in a way that they will understand the problem of water pollution in the informal settlements that are located adjacent to the river. Teaching awareness will hopefully provide learners with the necessary knowledge to combat the problem of water pollution and other related issues in the informal settlements. This research focuses on issues pertaining to the importance of making children aware of water pollution-related diseases in informal settlements adjacent to rivers.

1.2 RESEARCH TOPIC

The level of Environmental Education awareness regarding water pollution-related diseases by learners who live in the Stjwetla informal settlement adjacent to the Jukskei river in Alexandra.

1.2.1 Problem formulation and sub-questions

How can Environmental Education in the RNCS (Revised National Curriculum Statement) assist learners who live in an informal settlement adjacent to a river become aware of water pollution-related diseases?

Sub-questions include the following:

- ❖ What does the process of teaching and learning in the RNCS about water pollution-related diseases, with a focus on wider environmental issues, in the Stjwetla informal settlement entail?
- ❖ What role can learners play in facilitating awareness among each other and elderly members of their community on water pollution-related diseases in Alexandra (Stjwetla) informal settlement?

1.2.2 Aims

- To investigate learners' awareness of water pollution-related diseases in an informal settlement.
- If possible and feasible, to propose solutions to the perceived water pollution-related diseases found in this informal settlement.

1.2.3 Objectives

- ❖ To conduct water quality testing in the Jukskei river adjacent Stjwetla informal settlement in Alexandra township.
- ❖ To conduct interviews with trained RNCS educators; Gauteng Department of Education and other relevant stakeholders such as JHB water; Rand water and Delta environmental centre for education.

1.2.4. Research outcomes

The following aspect need to be paid attention to:

- The level of environmental education awareness on water pollution-related diseases by learners who live in the informal settlements adjacent to the river.
- The integration of Environmental Education within RNCS learning areas with the purpose of enriching learners with relevant knowledge and awareness on Environmental issues at a wider scope.

1.3 THE RESEARCH SITE

Stjwetla, indicated by the arrow in Figure 2, is located in Alexandra Township in Johannesburg. It is an informal settlement located adjacent to the Jukskei river below Roosevelt road, and near the Graveyard in Alexandra. It is located between the line of latitude 26.09.01 south and longitude 28.10.64 east. <http://maps.live.com>



Figure 2: An Aerial Photograph of Alexandra Township where Stjwetla informal settlement is located North of (Johannesburg).



Figure: 3. Concentration of waste at Stjwetla Informal Settlement adjacent to the Jukskei river in Alexandra Township.

People wash clothes near the river as seen by the clothes on the washing line in Figure 3. The community does not handle waste correctly. There is lack of awareness on the correct waste handling and the impact of this method in river water. There is lack of source of water at Stjwetla informal settlement except the Jukskei river.



Figure 4: Dumped waste in the Jukskei River include plastic, paper, disposal baby nappies, dead bodies of animals and tins

Large amount of waste are thrown into the Jukskei river on a daily basis. Some of the items on the river side are washed into the river during heavy rains. This waste attracts flies, which bring diseases in this community. One of the health hazards caused by these waste is that, the area is a breeding ground for mosquitoes and rodents.



Figure 5: Dumping site of waste and wood storage on roofs.

The residents store fuel-wood on top of the shacks' roofs. The stench from the piled up waste is unbearable the health status of the community at risk. Broken glasses and rusty cans impose a hazard to learners who are playing.

Figure 6 illustrates a clean park used for recreational and educational purposes. The park plays a role in making learners aware of correct waste handling since there are dustbins to throw waste inside. Learners are developing the sense of ownership of clean environment. The park is situated at the southern part (up stream) of Stjwetla informal settlement where the river is less polluted. City Park created this park to keep learners away from playing in the polluted Jukskei river.



Figure: 6. Park near the Jukskei River brings awareness to people on correct waste handling and sense of ownership to learners by keeping their park clean.



Figure: 7. The sewage system discharges waste into the Jukskei River

Raw sewerage is discharged further downstream just below the park as seen in Figure 7. The sewage system is located above the Stjwetla informal settlement In Alexandra Township. It is increasing the contamination of water in the Jukskei river. Contaminated water increases the chances bacteria such as E.coli in water.

A small distance from the sewerage pipe the Stjwetla settlement borders the river bank as seen in Figure 8. At this point the river is highly polluted. Water has unbearable odour. Water from this point of a river was collected and was tested by Johannesburg water; as a result, water was found contaminated and un-hygienic.



Figure: 8. Un-hygienic polluted water at Jukskei river adjacent Stjwetla informal settlement.

1.4 MOTIVATION FOR THE RESEARCH

1.4.1 Awareness

According to UNCHS (Habitat) & UNEP Water for African Cities Newsletter (2001:5) stated that "...it is necessary to employ innovative ways to teach the young through awareness and campaigns in schools and generally in the public..." www.unchs.org programme website: www.un-urbanwater.net

The South African White paper on environmental education (Department of Environmental Affairs, 1989:5) stated one of the aims of environmental education as to "stimulate education processes that develop responsible life styles in harmony with the environment as a whole".

At the World Summit Conference that was held in Sandton in 2002, the focus included the alleviation of poverty, the improvement of access to clean water, and the conservation of the earth's diversity. South Africa joined the rest of the world in the agreement of conserving the resources in a sustainable manner. Environmental Education is now being recognized as a school subject and is included in the education curriculum of South Africa (RNCS -Revised National Curriculum Statement 2005). <http://www.worldsummit.co.za>

'Littering' can be described as the bad habit of throwing rubbish anywhere without considering the hazards that emanate from that action. It is clear that the Jukskei river that passes through the Stjwetla informal settlement is a victim of this behaviour. According to Kneale (2003:32) the "...community does not handle waste correctly...large items are washed into the river during heavy rains and attract flies, which bring diseases..."

According to Tyler-Miller, (2003: 12) there are two main sources of pollution, namely non-point sources, which are hard to identify, and point sources, which are identifiable. This study will investigate these two sources of pollution in the area of Stjwetla by means of using observation method. The researcher chose the Stjwetla

informal settlement in Alexandra for various geographical, personal and professional reasons. One of the geographical reasons is that, the development of informal settlements is currently a widespread problem, impacting negatively on the quality of water in South African rivers. Personal and professional reason is to investigate the level of environmental education awareness by learners on water pollution-related diseases in the informal settlement.

In Volume 1 of the Assessment Guide on the Quality of Domestic Water Supplies by Pietersen and Manyaka (1999: 6) 'water pollution' is described as "...when water is rendered less fit for use as a result of human activities". Most of the typical human activities that cause problems of water pollution are as a result of dense human settlements, particularly if the settlements have poor sanitation facilities.

Poverty is one of the core sources of littering, of water pollution in most of the informal settlements in South Africa. The concept 'informal settlement' includes the illegal occupation of land. There are more than 188 informal settlements around Johannesburg. Most of these settlements are located in a flood plain and are built of boxes, corrugated iron, plastic, wood, glass and scrap material. The community cares little about the importance of the quality of the water in the rivers. The rubbish that is being thrown into the river is a clear indication of how much the informal settlement community cares about the quality of water in the river. Kneale (2003:34) stated that residents in Alexandra are "...ignorant; ...residents are unaware of disposal methods,...they lack awareness of correct waste handling..."

The oil from the car scrap-yards, human waste, and the dumping of plastics, tins and rubble are some of the most important aspects that are disturbing the normal functioning of the ecosystem in the Stjwetla settlement. The concept 'flood plain' means a low-lying area that is located alongside a river and that is covered by water when a river overflows its banks. Flood plains become the most disastrous areas for most of the informal settlements, especially during heavy rainfall. "Between 1985 and

1999, floods killed about 275000 people, that is, 96% of them in developing countries” Tyler- Miller (2003:343).

Based on the above background, namely the continuous threat to the environment caused by littering, and water pollution. The following serves as a focal research question that will guide this study, namely “How can Environmental Education in the RNCS (Revised National Curriculum Statement) assist learners who live in an informal settlement adjacent to a river become aware of water pollution-related diseases?

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1.5. THE FOCUS OF THE STUDY

The United Nations Environmental Programme (1978: 140) describes environmental awareness as a way to help social groups and individuals acquire sensitivity to the total environment and its allied problems. The knowledge gained assists social groups and individuals to acquire a variety of experiences in and get a basic understanding of the environment and its problems. One of the aims of environmental education is to make people environmentally knowledgeable and skilled achieving a balance between quality of life and the quality of the environment

With reference to the above statement, the researcher would like to focus on the principle of the Department of Environmental Affairs and Tourism (1999:6) in approaching the research investigation, namely, “...to encourage active participation in learners of all ages by using diverse learning environments, a broad spectrum of educational approaches, and all the available teaching aids to prevent and address environmental problems”.

A holistic approach to teaching and learning creates an atmosphere where learners are able to understand the nine principles of sustainable living in Environmental

Education. In this research the following principles, as stated by Van Rooyen & Viljoen (2003:27), will be emphasized, namely

- * respect and care for the life of the community;
- * improve the quality of life;
- * conserve the earth's vitality and diversity;
- * minimize the depletion of non-renewable resources;
- * keep within the earth's carrying capacity;
- * change personal attitudes and practices;
- * enable communities to care for their own environments;
- * provide a national framework for integrating development and conservation; and
- * create a global alliance.

1.6. DEMARCATION OF THE STUDY

This research will focus on learners between the ages 12-17 years who live at Stjwetla informal settlement located in Alexandra Township adjacent to the Jukskei river; who attend Sandtonview combined School, the Bovert Primary School, Eastbank High School, Ikageng Primary School and Kwabekilanga High School in Alexandra Township. The principle reason for working with children is to acquire the information first-hand and to make learners part of the research. The researcher chose randomly (choosing the second child on the class list irrespective of gender consideration) boys and girls from the high and primary schools to become participants in order to get different perspectives with regard to water pollution-related diseases and other related problems, such as littering, and poor sewage systems. According to Strauss & Myburgh (2003:1) "...a sample of respondents is drawn from the population in such a way that each one of the **different** respondents in the population has the same probability of being drawn".

Two educators who work in Alexandra Township schools will be requested to be interviewed on learners' attendance; Revised National Curriculum Statement; and water pollution-related diseases. In case a participant withdraws, a replacement will be found. Participants have to be able to communicate in English or in any of the following languages: Sotho, Tshivenda, Xitsonga or IsiZulu, since the majority of people in Alexandra Township speak these languages.

1.7. INVOLVED STRUCTURES/PARTICIPANTS

- Sandtonview combined School, Bovert Primary School, Eastbank High School, Kwabekilanga High School and Ikageng Primary School.
- The Delta Environmental Centre for Education (Environmental Education Specialist).
- Johannesburg Water (Goudkoppies Laboratory).
- Rand Water (Educational Specialist located at Delta Environmental centre for Education)

1.8 ETHICAL ACCEPTABILITY

According to Strauss and Myburgh (2003:61) ethical acceptability' forms the basis of data collection; therefore it should be taken into consideration. All participants should be informed about their roles in the research project.

Group of learners according to their school were informed of their role by means of a letter that was read to them by the educator after they have been randomly selected.

- Their voluntary participation and freedom to withdraw.
- The purpose of the research and how the data will be collected and used.
- Respondents' confidentiality.

- Participation in the research would not have any detrimental consequences for the respondents.
- Respondents would be familiarized with the nature of the instruments to be used in collecting the data.

1.9. CONSENT

According to Strauss & Myburgh (2003:68) “....the process of collecting data is in essence the meeting of the researcher and the respondent, resulting in the researcher obtaining data from the respondent in the most effective way”. Based on the above quotation, participants would be informed about where (school), when (during school hours) and how (by means of a questionnaire) the data would be collected. Collected data would be analyzed during the research.

1.9.1. Ensuring confidentiality

Participant’s names shall not appear on the research document. Written documents that ensure participants’ confidentiality shall be issued to participants if needed. Monitoring devices such as video and digital recordings was not used, but tape recorders.

1.9.2 Language used

Participants will be interviewed in English. Those who do not understand English will be given the opportunity to use any of the following languages, namely Tshivenda, Xitsonga, IsiZulu or Sotho, since learners from this informal settlement are composed of the ethnic groups who speak these languages.

Translations will be done were the participant responds to questions in one of the above-mentioned languages other than English. Translated data will be read to the

participant concerned to validate the information, and he or she has to agree with the recorded data. All participants responded in English.

1.9.3 Safeguard measures

Participants will not be at any risk or harm whether physically, legally, socially, economically or mentally during the course of the research. All activities with regard to the acquiring of knowledge from the children will take place in class within the school premises. All schools responded well to the request of conducting research in their schools.

1.10. SIGNIFICANCE OF THE RESEARCH

1.10.1. The school

Learners will participate in reading, and acquiring the first experience on answering questionnaire on water pollution. The lesson prior the post-questionnaire will assist learners to become aware of some of environmental problems within the schools premises, for example, littering, water pollution and waste of water from taps.

1.10.2 The informal settlement households

Learners will be aware of environmental problems in their informal settlement, such as littering, water pollution and water pollution-related diseases. They will relate some of the environmental problems with what they have learnt during the lesson presented by the educator prior the post questionnaire.

1.11 CONDUCTED AUDIT BEFORE THE RESEARCH

The researcher identified the following critical Environmental issues on the behaviour of learners; and the nature of the informal settlement.

1.11.1 THE LEARNERS

Learners who live in the informal settlements do not know how to bring about awareness of the environmental problems that they encounter. The auditing clearly indicates that most of the learners play in the Jukskei river or near the river, and this makes children so vulnerable to the diseases, as a result of the outcomes of contaminated/ polluted water. See Figure 9 showing learners playing in Jukskei river.



Figure 9: Learners playing in the polluted Jukskei river in Johannesburg.

Moreover, learners play in the dumping places, as seen in Figure 10, located near the Jukskei river. The two boys were observed playing there after school placing their health at risk as they are vulnerable to various diseases.



Figure 10: Learners playing in the dumping area adjacent to the Jukskei river

1.11.2 How polluted is the Jukskei river?

The observation indicates that Jukskei river is a dumping ground as seen in figure 11.



Figure 11: Jukskei river used for dumping waste

In Figure 12: There is large amount of waste that is dumped carelessly as well as clothes being washed in the Jukskei river. The dumping of waste products is accelerating the pollution level and thereby increases the chances of water being contaminated by various diseases. The researcher observed washing being done by group of ladies sitting on the left hand side of the photo.



Figure 12: Human activity cause water pollution at Jukskei river

1.11.3 The informal settlement

The throwing of rubbish and papers into the river and surrounds (littering); a poor sewage system that is discharging raw waste into the river; removal of vegetation by

eradication of plants for settlement purposes; overcrowding of shacks with too many people; an unsafe environment, example, floods, crime and fire hazards, since the houses are located on the flood plain and are built of boxes, plastic, corrugated iron, and wood, in a clustered manner.

1.12 RESEARCH METHODS

The investigation is primarily based on the principles of qualitative and quantitative research. Strauss and Corbin (1991:17) refer to qualitative research as any kind of research that produces findings which are meaningful, testable and scientifically free from contradictions. This type of research focuses on understanding rather than predicting or controlling phenomena. For the purpose of this study the research will focus on the qualitative; inductive and quantitative research methods. The triangulation method was used, making use of questionnaires, interviews and observation. According to Strauss & Myburgh (2003:41-42) (in qualitative research it is important to bear in mind that triangulation of methods, techniques and even approaches are utilized to get an in depth exploration and eventual description of the phenomenon under investigation". In page 47 Strauss & Myburgh stated that "when conducting an investigation that is quantitative in nature, most researchers commonly accept that three categories of techniques exist, namely observation, questioning and measuring"

1.12.1 Inductive research

In this research the researcher will make use of three data collecting methods, that are observation, interviews, and by questionnaire. According to Henning, Van Rensburg and Smith (2004:81) observation is described as "...the researcher's version of what is there". According to Strauss and Myburgh (2003:11) observation is made on

particular events or phenomena in a situation and then on the basis of the observed events, inferences may be made about the entire situation. Interviews will be conducted to acquire the information first-hand and to provide the participants the opportunity to actively participate in the research process. Interviews will help the researcher to focus on the selected responses needed for the topic. Open- and close-ended interviews will be used. A tape recorder will be used to record the conversation between the interviewer and the interviewee.

1.12.2 Qualitative and quantitative research

Qualitative research

According to Strauss and Myburgh (2003:41) the researcher should be sensitive about the phenomenon under investigation. Any data that may shed light on the problem and aim under investigation must be included. Techniques such as interviews and observation will be used to gather data. The researcher will act as investigator in search of clues, material, and evidence to provide an eventual description of the phenomenon. Analysis of data involves examining, sorting, categorizing, evaluating, comparing, synthesizing and contemplating the coded data, as well as reviewing the raw and recorded data, according to Lawrence and Neumann (1997:402).

According to Bless and Smith (2003:13) data processing allows the researcher to generalize the findings from the sample used in the research to the larger population in which the researcher is interested. The processing and consolidation of data will be done in this research to achieve the aim of the study. After collecting data from observation, interviews, and questionnaires it will be processed and consolidated and later coded.

Quantitative research

Observation technique; questioning; and questionnaire are used when conducting an investigation under quantitative research. Strauss & Myburgh (2003:47) stated that "observation process therefore entails that the researcher or observer has a list of certain specifics that she/he will observe, often called an observation schedule" in page 49 they indicated that "...the interview in the case of a quantitative strategy entails that a schedule of questions, based on the conceptual framework is formulated. These questions are then read to the respondent that she or he answers...A questionnaire is a set of questions that a respondent should answer. It is usually in a written/printed form. The questionnaire could either be given to the respondent to complete or read to the respondent...".

Validity and reliability, according to Strauss and Myburgh (2003:56) "...is the degree of consistency or stability of data collected by the same or similar instrument on occasions when it should theoretically produce the same results". For example, if someone conducts research on the same topic as someone else in another context, the research must come to the similar conclusions, based on the original criteria. In this research, the criteria selected for assessing the impact of informal settlement water pollution should be such that research in another part of the country would produce consistent results with the same research methods used.

1.13 DATA COLLECTION METHODS

1.13.1 Interview method:

Interviews were conducted with key individuals to the following institutions: Delta Environmental Centre for Education; Rand Water; Gauteng Department of Education District 9; Johannesburg water Goudkoppies laboratory; Sandtonview educator and Bovert primary educator; and Stjwetla informal settlement residents, but only one

representative was recorded. Questionnaire is designed specifically to the interviewed institution. Tape recorder is used to record the interview; and data is edited before it is transcribed.

1.13.2 Questionnaire:

There are two sets of questionnaires designed. The first questionnaire is designed for the purpose of gathering data from school learners. There are five schools used to gather data using the questionnaire: namely: Sandtonview combined school; Ikageng Primary school; Boverit Primary school; East Bank high school; and Kwabekilanga high school. A pre-questionnaire and post-questionnaire is used to gather data from school. The second set of questionnaire is based on interviewing the following institutions: namely: Delta Environmental Centre for Education; Rand water; Gauteng Department of Education district 9; Sandtonview combined school educator; and Stjwetla informal settlement residents, but only one representative resident will be recorded. Each institution has its own questionnaire.

1.13.3 Observation method:

The researcher will conduct field observation at Stjwetla informal settlement. The researcher will observe the following observation schedule:

- Human activities that contribute to water pollution;
- Organisms/aquatic animals found in the Jukskei river;
- How polluted is the Jukskei river? Observed human activities will be recorded and photos will be taken.

The observer will use a checklist to observe those aquatic animals that are not available in the Jukskei river. The Observer will use the checklist that determines whether the water is clean, slightly polluted; moderately polluted; and highly

polluted. The checklist will be accompanied by an evaluation rubric to assess the observed outcomes on the checklist. The observed data will be recorded.

The researcher will observe the degree of pollution at the Jukskei river through looking at waste material available in the river; observed waste material in the river will be recorded. Secondly, the researcher will take one litre bottle of water from Jukskei river at Stjwetla informal settlement to be tested at Johannesburg water (Goudkoppies laboratory), and the results will be analyzed through the help of assistant Laboratory water testing technician.

According to Strauss and Myburgh (2003:55) the above will assist in providing the reliability, validity, sensitivity, suitability, feasibility, and ethical acceptability of the information of the research. The above-mentioned methods on data collection will be used in this research to gain information from the participants. According to Loubser (2005:147) "...assessment types should be used to supplement one another, as each should form part of the learning situation at appropriate times and in relevant situations". In this research the participants' pre-knowledge will be actualized in order to find out what they know about water pollution as an environmental problem in their informal settlement, and also what they understand about water pollution-related diseases.

1.14 CONTENT CLASSIFICATION

For the sake of providing a global view of the investigation, the proposed content classification consists of the following:

1.14.1 Chapter one: Introduction

This chapter includes the introduction, research topic, research question, aims and objectives of conducting this research, the outcomes of the research, where the research has been conducted, the motivation to conduct the research, the

demarcation of the field of study, involved structures, ethical acceptability, description of how the consent will be conducted when collecting data; Moreover, the researcher will include the significance of the research, and the conducted audit in the place of research. Furthermore, the researcher will look at the research methods that will be used, methods of collecting data, classification of content, research limitation and the conclusion.

1.14.2 Chapter two: The theoretical foundation of the research.

The researcher will focus on the following theoretical foundation of the research, namely: Environmental Education and Revised National Curriculum Statement, Water pollution-related diseases; Sustainable development; and the development of informal settlements.

1.14.3 Chapter three: Research methodology.

The researcher will pay attention unto the following research methodology that is to be used when conducting this research, namely: Qualitative and inductive research methods. The researcher will use the interviews; questionnaire; and observation method as data collection methods.

1.14.4 Chapter four: Data analyses, interpretation and discussion.

In this chapter the researcher will interpret, and analyze questionnaire's data gathered from five schools, namely: Sandtonview; Kwabekilanga; Ikage; Bover; and East Bank high school. The interpretation and analysis will be based on pre- and post-questionnaires activities that learners will write. Bar graphs will be used to interpret

the data. The interpretation and analysis of the observation conducted will be done based on the observation schedule, namely: - Human activities that contribute to water pollution in the Jukskei river; - Organisms/aquatic animals that are found in the Jukskei river; - and how polluted the Jukskei river is. Interviews conducted to various institutions such as Sandtonview educator; Delta environmental centre for education; Rand water; Stjwetla informal settlement resident will be analyzed and interpreted in this chapter.

1.14.5 Chapter five: Conclusions and recommendations.

In this chapter the researcher will focus on summarizing the outcomes of the analyzed questionnaire; interviews; and observation conducted during the research.

Moreover, the researcher will pay attention unto the recommendations of the research study.

1.15 LIMITATIONS OF THE RESEARCH

The limitations of the research will be included in the last chapter. Some of the conditions considered as limitations that may be encountered during the collection of data which are beyond the researcher's control include:

- The illness of children who are participants in the research. If many of the children are sick at the same time or on the day that certain data have to be collected, that can have a negative impact on the research.
- Uprisings or revolts in the informal settlement could also disturb the time-frame set to collect the data, because household members will not be co-operative during interviews. This could lead to a delay in gathering relevant data.

- The revolts of children or educators at school can also lead to a delay in gathering data, since learners are part of the participants in this research. The researcher does not have control over strikes.
- Unfavourable weather conditions such as storms, floods, windy weather, and too cold or too hot weather conditions, may influence the dates set for collecting data.

1.16 CONCLUSION

In this chapter the aims and objectives of the study were discussed. The motivation for the study and the educational focus were elaborated on to present the background of the research problem. The ethical acceptability and the significance of the research were also highlighted.

In chapter two the researcher will indicate the theoretical foundation of the research.

CHAPTER 2

THEORETICAL FOUNDATION OF THE RESEARCH

2.1 INTRODUCTION

According Van Rooyen & Viljoen (2003:15) "Educating the population to view and use the environment in a responsible manner and to behave in such a way that we leave an environment of the same and even better quality to our children, is central to modern education". There exists a great need for relevant education for the learners of our society for the betterment of the environment to be able to cope with the various challenges influenced by political changes, innovative technologies, economic globalization, demographic shifts, and also the establishment of informal settlements and the restructuring of the workplace, in order to sustain our environmental resources. Through environmental education, learners' behavior towards society, nature, and themselves is shaped. Meyer (2004:13).

In this chapter the researcher will focus on the theoretical foundation of sustainable development, water pollution-related diseases in informal settlements, the development of informal settlements on flood plains, and the integration of Environmental Education in RNCS.

It is difficult to define the concept 'environment education' without narrowing it to a specific field of study. In this research the researcher will use various sources to narrow the definition to the extent that it will support the theme of the research. In this case 'education' will be seen as an environmental problems-awareness tool. It will ensure that learners acquire the knowledge; to become aware; to care about the environment, and to develop sensitivity through the environment.

According to Oelofse; Zukulu; Wilson & winter (2007:270) "...often poor people will move to an area where there are environmental hazards. This is the only cheap land

available in the city where they can develop an informal settlement without the risk of being evicted” The development of informal settlements will be looked at as one of the major factors that influence and contribute to the problem of water pollution.

The research will concentrate on the concept of water pollution-related diseases; this will include the theoretical findings of related concepts on how water is being polluted. Attention will also be given to how environmental awareness of water pollution should be conducted at school level through integrating Environmental education to the Revised National Curriculum statement.

It is the purpose of this research to make use of RNCS in assisting learners who live in an informal settlement adjacent to a river become aware of water pollution-related diseases?

2.2 THEORETICAL FRAMEWORK

The researcher will focus on Water pollution-related diseases, the integration of environmental education in RNCS and education for Sustainable development And the relationship between the development of informal settlement and water pollution as represented in Figure 13.

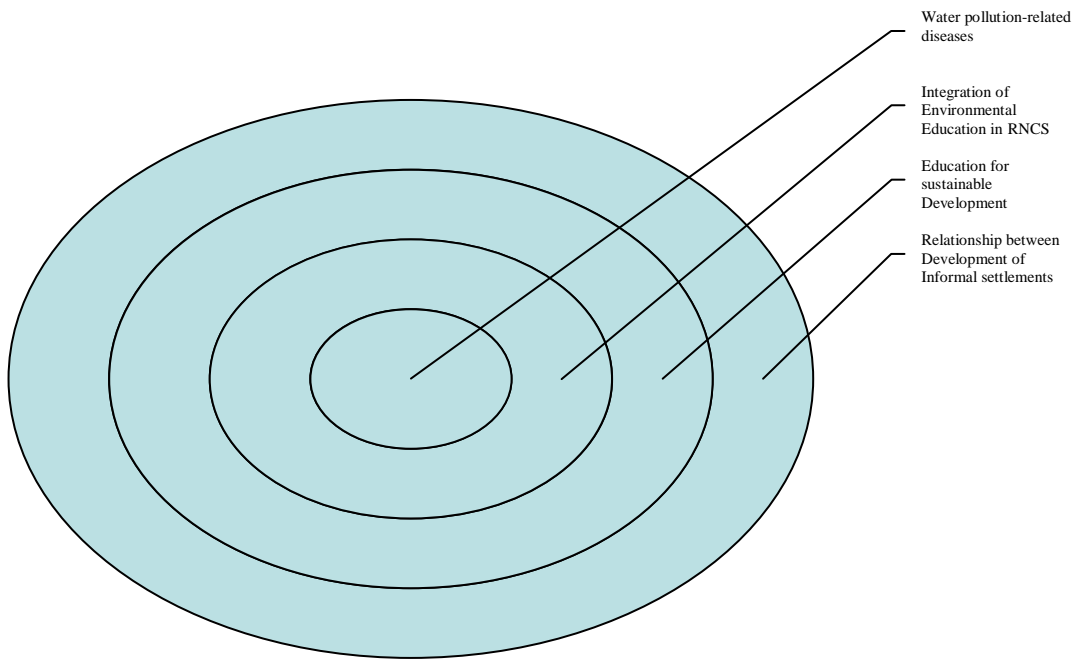


Figure 13: Theoretical framework Model that focuses on Water pollution related diseases; integration of Environmental education in RNCs; Education for Sustainable development; and Relationship between the development of informal settlement and water pollution.

Table 1: Water pollution related diseases; integration of Environmental education in RNCS; Education for Sustainable development; and Relationship between the development of informal settlement and water pollution.

Integration of Environmental Education in the RNCS	Water pollution-related diseases	Education for Sustainable development	Relationship between the development of informal settlements and water pollution.
<p>1. Description of the concept Environmental Education</p> <p>2. The goal of Environmental Education</p> <p>3. Aims and objectives of Environmental Education</p> <p>4. Outcomes of Environmental Education</p> <p>5. Classification of Environmental Education</p> <p>6. Environmental literacy</p> <p>7. The White Paper on Environmental Education</p>	<p>1. Description of the concept 'Water pollution'</p> <p>2. Common diseases caused by water pollution</p> <p>3. What are some of the water pollutants and the problems they cause?</p> <p>4. Coverage of the awareness of water pollution-related diseases in the RNCS</p>	<p>1. Description of the concept Sustainable Development'</p> <p>2. Education for sustainable development</p>	<p>1. Description of the concept informal settlement'</p> <p>2. How informal settlements influence water- pollution related diseases.</p> <p>3. The role of the informal settlements in learners' Performance at school.</p>

2.3 ENVIRONMENTAL EDUCATION

Figure 13 and Table 1 are elaborated on in section 2.3.

2.3.1 The concept 'Environmental Education'

According to Allers (1997:4) Environmental Education is described as "...education about, for, in and through the environment. It is further basically a process that seeks to develop the necessary awareness, ethics, values, knowledge, skills, and commitment to allow people to become environmentally literate in order to be proactive in securing a proper functioning and healthy environment that is sustainable". To elaborate on the concept "environment" one can follow the description in Van Rooyen's article in the Environmental Education curriculum guide (2003:3) that indicates that "...our environment is our world...the environment comprises of the natural environment (which includes sun, air, water, earth, physical cycles that supports life), the social environment (which includes humans and the human-created world of buildings, farms, machines, governments, economies, religions and cultures); and the personal environment (which includes the way a person thinks, feels...")

According Hawkins (1994:166) in the Oxford School Dictionary, the concept 'education' implies a "...process of training people's minds and abilities so that they acquire knowledge and develop skills". Therefore, Environmental Education can be described as a method of promoting effective learning and teaching, and helping learners to become aware; to acquire the understanding, skills and values that will enable them to participate as active and informed members in the development and maintenance of an ecologically sustainable society.

2.3.2. The goal of Environmental Education

The 1975 Belgrade Charter, written by twenty world experts on Environmental Education indicate that the goal of Environmental Education is to "...develop a

citizenry that is aware of, and concerned about the total environment and its associated problems, and that has the knowledge, attitudes, motivations, commitments, and skills to work individually and collectively towards solutions of current problems and prevention of new ones" Van Rooyen & Viljoen (2003:13).

The goal of Environmental education is to see to it that learners at school level are aware and become the participants in all green issues (environmental issues) that are found in their environment.

2.3.3 Aims and objectives of Environmental Education

Education is mainly based on learning through our senses, namely a sense of hearing, touch, smell, sight and taste. Environmental Education can hardly be taught at school without using these five senses. When learners hear, they take notice; when they see, they remember; when they smell, they associate; when they taste, they recognize; but when they touch (do), they understand and remember. Allers (1997:8) stated that "with concrete learning the learner is more actively involved in the learning process than in the case with abstract learning". Engleson & Yorkers (1992: 126) stated that "With concrete learning the learner uses more of his/her senses than in the case with abstract learning".

Engleson & Yockers (1992:14) describes the aim of Environmental Education as a way "...to help students become aware, skilled, knowledgeable, dedicated citizens, who are committed to work, defend, improve, and sustain the quality of the environment on behalf of present and future generations of all living organisms". Van Rooyen & Viljoen (2003:28) summarizes the aim of Environmental Education as follows "... to foster a universal environmental ethic in which citizens unite in a common cause according to the slogan 'Think globally, act locally in the interest of sustainability". In essence the aim of Environmental Education is to focus on developing a citizen that is informed, aware, has skills and the correct attitudes and values that are needed to maintain a dynamic equilibrium between quality of life and the environment.

There are different objectives of Environmental Education that is necessary towards achieving its aims. Environmental Education has five objectives, namely “perceptual awareness; knowledge; environmental ethic; citizen action skills; and citizen action experience”. The perceptual awareness objective encompasses receiving, responding, and feelings, thoughts, distinguishing senses, and developing skills in measuring, observing, predicting, interpreting, and analyzing. The knowledge objective encompasses environmental experiences, the use of the senses, concrete and abstract learning, the age of the learner, and the degree of sophistication of subject matter. Environmental ethic focuses on learning the right and wrong doings, and self- imposed moral codes such as values, attitudes, and beliefs. The citizen action skill and citizen action experience focus more on the responsibility that citizens have towards the environment. Citizens must be trained and have the skills and experience for them to manage the environment effectively. Allers (1997:7-11)

2.3.4 Classification of Environmental Education

Environmental education is classified in three categories, according to Allers, (1997:4) “...education *about*, *for*, *in* and through the environment”. It is further basically a process that seeks to develop a necessary awareness, ethics, values, knowledge, skills and commitment to all people to become environmentally literate...” Teaching *about* the environment is when learners acquire knowledge or information about environmental issues. This process can take place in the classroom. Teaching *in* the environment could entail learning through fieldwork or in laboratories, namely hands-on learning. Children observe, touch, experience and feel the environment. Knowledge acquired in the classroom is used in the practical environment. Teaching *for* the environment means making children aware of the environmental problems to the extent that they develop the interest to address those problems.

2.3.5 Outcomes of Environmental Education

Environmental Education involves a learner-centered approach. It allows learners to play a role in planning their own learning experiences. Van Rooyen & Viljoen (2003:31). Learners acquire knowledge, skills and values so that they become aware of any problems that they may encounter in their environment. Effective environmental education has to ensure that learners understand the teaching and learning that have taken place in class. They must be able to analyze green issues in their environment based on the knowledge acquired in class. They have to be able to conduct investigations and have a sense of responsibility towards their environment. The outcome of Environmental Education is to see to it that learners are able to observe, gather data, measure, analyze, synthesize, investigate, diagnose, be disciplined, and are able to make decisions that are effective. Environmental Education should prepare learners to be able to address problems in their environment in a sustainable manner Van Rooyen & Viljoen (2003:3).

2.3.6 Environmental literacy

According to Allers (1997:5) environmental literacy is described as "...the capacity to receive and interpret the relative health of environmental systems and to take appropriate decisions and actions to restore, maintain and improve the health of those systems". Moreover, he describes an environmental literate person as someone with "...an awareness of sensitivity to the total environment; the capacity to move from environmental awareness to knowledge and action; a set of values and feelings of concern for the environment; the motivation for actively participating in environmental improvement and protection; skills for identifying and solving environmental problems".

Van Rooyen & Viljoen (2003:15) indicates that environmental literacy is "...educating the population to view and use the environment in a responsible manner and to behave in such a way that we leave an environment the same and even of better

quality to our children". In essence, environmental literacy should promote awareness. Teaching and learning at school level must enrich learners with the knowledge and skills that will enable them to act effectively on any green issue in their environment. Environmental literacy has three levels namely, nominal, functional, and operational. The three levels of literacy emphasize the importance of knowledge, feelings, attitudes, values, skills, and behaviour. According to Van Rooyen & Viljoen (2003:16) the school plays an important role in assisting the development of environmental literacy. Environmental literacy should inculcate the internal locus of a child, that is, a child must feel that he/she is responsible, able to provide a solution to a problem, and to feel in control of the situation. He continues by stating that Environmental literacy must "...provide a curriculum that gives learners the opportunity to acquire in-depth knowledge of environmental issues; provide a curriculum that will teach learners the citizenship skills needed for issue remediation...". It is essential for environmental literacy to implement the curriculum models stipulated by Van Rooyen & Viljoen (2003:16), namely "...creation of a separate specialist Environmental Education course...; incorporation of an environmental dimension into established and usually related courses and disciplines...or cross-curricular model".

2.3.7 The White Paper on Environmental Education

Realizing the importance of Environmental Education locally, nationally and globally, the Education Curriculum Policy on Environmental Education was initiated. The EEPI (Environmental Education Policy Initiative) was established in 1992 (Loubser, 2005:52).

According to Clacherty (1992:12) "...some members of the EEPI (an open-process state/civil society initiative) were more comfortable with a 'neat' and efficient management-hierarchical approach to policy development, while others favoured a more 'messy', participatory and open-ended approach..." The outcome of EEPI deliberations during the NECC (National Education Co-ordination Committee)

Conference in 1993 state that "...this conference...therefore resolves that...the curriculum will develop the understanding, values and skills necessary for sustainable development and environment that ensures healthy living".

In the 1995 White Paper, a principle was established on education and training (DoE 1995) on environmental education curriculum development work stating that "...environmental education, involving an interdisciplinary, integrated and active approach to learning, must be a vital element of all levels and programmes of the education and training system, in order to create environmentally literate and active citizens and ensure that all South Africans, present and future enjoy a decent quality of life through the sustainable use of resources" DoE (1995:18). The Revised National Curriculum Statement defines 'environment' as a cross-curricular phase organizer in curriculum 2005. All learning areas have environmental education embedded within them.

The Revised National curriculum Statement (2005:11) indicates the critical outcomes envisage learners who are able to "identify and solve problems and make decisions critical and creative thinking; work effectively with others as members of a team, group, organization and community; organize and manage themselves and their activities responsibly and effectively; ...demonstrate an understanding of the world as a set of related systems by recognizing that problem-solving contexts do not exist in isolation". The above mentioned critical developmental outcomes recognize the ability of learners to identify, think, and solve problems while working with others. Therefore, if learners can be well exposed and aware of environmental education issues, and so can easily put their hands on in addressing some of environmental challenges. In page 4 of the RNCS states that "the curriculum aims to develop the full potential of each learner...it seeks to create a lifelong learner who is confident and independent, literate, numerate and multi-skilled, compassionate, with a respect for the Environment and the ability to participate in society as a critical and active citizen". The curriculum aims at equipping learners with relevant knowledge that will

Make children aware and respect their environment; but their hands and creativity in making effort to address environmental issues are partially tied up by un-broad approach of environmental issues in the nine RNCS learning area.

<http://www.education.gpg.gov.za>

2.4. WATER POLLUTION-RELATED DISEASES

2.4.1. Description of water pollution-related diseases

Water pollution-related diseases are diseases that are caused by drinking water that is contaminated. Contaminated water is found in areas that have a high concentration of unwanted substances in water, such as oil from industries, insecticides from crop farming industries, waste from households, and the use of rivers by community members as toilets, commercial waste such as washing of clothes in rivers, and the discharge of human waste products from sewage systems makes river water to be unfit for human consumption. Polluted water is water that is not safe, not healthy for people and animals to drink or wash in. <http://www.randwater.co.za>

2.4.2 Common diseases caused by water pollution

A common disease such as malaria is classified as a by-product caused by polluted water in stagnant water in rivers. Mosquitoes carry diseases and infect people who live in the nearby residential areas. Cholera is also one of the diseases that are common in people who use contaminated river water, especially in areas where there are no or few toilets. According to Oelofse; Zukulu; Wilson & Winter (2007:300) "...polluted water also increases the risk of water-borne diseases such as cholera. These diseases usually affect the poorest citizens of an area as they use untreated water".

The "Quality of Domestic Water Supplies, volume 1, Assessment Guide" (1999:92) indicates that diarrhea is one of the major health hazards caused by drinking water with an elevated sulphate and magnesium concentration. Furthermore, water with too great a concentration of sodium and cadmium can place a strain on the kidneys and the heart in babies (1999:90); moreover, the concentration of potassium in water may result in vomiting, and also disrupt the heart function (1999:88). Too much concentration of manganese in water may cause brain damage and give rise to diseases resembling Parkinson's illness. Water with a high concentration of fluoride plays a role in the discoloration of teeth.

Water quality guidelines Volume 2 (1996:57) states that "the presence of bilharzias parasites in water bodies poses a health risk to recreational water users due to infection by schistosome cercariae entering the body through skin during contact with contaminated water".

According to water quality guideline volume 1 (1999:50) "...Faecal coliforms are bacteria which normally inhabit the digestive system of all warm-blooded animals, including humans...are found in water where the water is contaminated with faecal waste of human or animal origin...their presence indicate the possible presence of diseases-causing micro-organisms such as bacteria, viruses or parasites which may give rise to gastro-intestinal diseases, typically characterized by diarrhea, and sometimes by fever...". Learners found in informal settlements are more exposed to faecal coliforms bacteria, since the bacteria are mostly found in surface water near dense human settlements. Water quality guideline volume 1 (1999:36)

In the informal settlements children like to have some of the recreational activities in the river such as swimming. Water quality guidelines volume 2 (1996:11) states that "The water body used for contact recreational activities may be the source of infectious diseases as a result of microbial contamination. Such diseases may be contracted either by ingestion of contaminated water or through contact with the skin, especially mucous membranes...depending on the type of waterborne disease

and on the physical health of the person infected through contact recreational activities, the person may either recover completely from the disease, or suffer permanent harm or damage from the disease, or if severe enough may die as a result of it...through contact with the skin or penetration of the ear, microbially or chemically contaminated water may cause skin and ear infections and irritations... depending on the nature of infection and the organ affected, the effects of such infections may be permanent" (1996:12) "long term exposure to water contaminated with known or potential carcinogens can give rise to carcinogenic problems for participants of contact recreational activities" (1996:13) "unpleasant or bad odours can arise from a number of sources, such as rotting of dead vegetation, contamination of the water bodies by domestic sewage...can be chronic if the conditions producing them last long period of time...". It is therefore important to make learners aware that playing in the river where water is contaminated is a health hazard.

2.4.3 Water pollutants and the problems they may cause

In many cases water pollution becomes a problem for all aquatic animals such as fish, frogs, and aquatic plants that depend on water. According to Tyler-Miller (2003:345) pollutants such as "...human and animal waste,...sewage, animal, feedlots, paper mills, and food processing facilities" cause diseases in our community; "...large populations of bacteria decomposing these wastes can degrade water quality by depleting water of dissolved oxygen-consuming aquatic life to die". Besides that, "...surface run-off, industrial effluents, and household cleansers can make fresh water unusable for drinking or irrigation, cause skin cancers and crippling spinal and neck damage, damage the nervous system, liver, and kidneys (Lead and Arsenic) harm fish and other aquatic life, lower crop yields and accelerate corrosion of metals exposed to such water". Furthermore, "...sewage, manure, and run-off of agricultural and urban fertilizers can cause excessive growth of algae and other aquatic plants, which die, decay, deplete water of dissolved oxygen, and kill fish.

Drinking water with excessive levels of nitrates lowers the oxygen carrying capacity of the blood and can kill unborn children and infants (“blue-baby syndrome”).

2.4.4 The awareness of water pollution-related diseases in the Revised National Curriculum Statement

The Revised National Curriculum Statement (2005:5) states that “the curriculum can play a vital role in creating awareness of the relationship between human rights, and a healthy environment...” in page: 6 the RNCS emphasizes the principle of integration of all learning areas and learning outcomes together with the assessment standards, “...integration ensures that learners experience the learning area as linked and related. It supports and expands their opportunities to attain skills, acquire knowledge and develop attitudes and values encompassed the curriculum...learners must not deal with assessment standards in isolation...link must be made within and across learning outcomes and learning areas...” The question remains, ‘how adequately Environmental Education has been integrated into these 9 learning areas? Learning areas such as the social sciences, Geography, the natural sciences, Life orientation, Technology, English, Mathematics, the Vernacular languages, and Economic management sciences cover some of the environmental issues. Tyler-Miller (2003: v) in his introduction, states that “...I feel ethical obligated to give up my research on the corrosion of metals and devote the rest of my life to research and education on environmental problems and solutions”. This is one statement that is supposed to be well respected by our education system today, since it shows how important Environmental Education is. The statement indicates the need to educate our children on environmental issues more deeply than a simple integration that does not value the importance of that learning area.

Meanwhile, in all the RNCS learning areas there are minimal sections that cover concepts related to water pollution-related diseases. Very little has been covered in learning areas such as social science/geography that emphasizes on awareness of the dangers of water pollution-related diseases. According to the RNCS (2005:14-15) the

outlined learning outcomes on nine learning areas do incorporate some of the environmental education related issues, but has less/ inadequate information related to awareness on water pollution-related diseases. RNCS has stipulated the following Lo's, namely in "...Eng Lo 5: thinking and reasoning (the learner will be able to use language to think and reason , as well as to access, process, and use information for learning); in Maths Lo 5: data handling(the learner will be able to collect, summarize, display and critically analyze data in order to draw conclusions and make predictions and to interpret and determine chance variation); in Natural Sciences Lo1:scientific investigation(the learner will be able to act confidently on curiosity about natural phenomena and to investigate relationships... and environmental context), Lo2: constructing science knowledge(the learner will know and able to interpret and apply scientific, technological and environmental knowledge), Lo3: science, society, and the environment(the learner will be able to demonstrate an understanding of the relationships between science and technology, society and the environment); Social Sciences-geography Lo1:Geographical enquiry(the learner will be able to use enquiry skills to investigate geographical and environmental concepts and processes), Lo2: geographical knowledge & understanding(the learner will be able to demonstrate geographical and environmental knowledge and understanding), Lo3: exploring issues(the learner will be able to make informed decisions about social and environmental issues and problems); Arts and Culture Lo4: expressing and communicating(the learner will be able to analyze and use multiple forms of communication and expression in Arts and Culture); Life Orientation Lo1:Health promotion(learner will be able to make informed decision regarding personal , community and environmental health), Lo3:personal development(the learner will be able to use the acquired life skills to achieve and extend personal potential to respond effectively to challenges in his or her world); Economic Management Sciences Lo2: sustainable growth and development(the learner will be able to demonstrate an understanding of sustainable growth, reconstruction and development, and to reflect critically on its related processes); and Technology Lo3: technology, society and the environment(the learner will be able to demonstrate an understanding of the interrelationships between science, technology, society, and the environment)..."

while agreeing that the RNCS has all the necessary learning outcomes in each learning area, one also wonder why Environmental education has very little content covered in each learning area. There is a need to make use of the available LO's in each learning area to integrate Environmental education issues such as water pollution -related diseases. <http://www.education.gpg.gov.za>

While the statement of the national curriculum for grade R-9 was being published in terms of the government notice 1445 in October 1997, RNCS (2005:2) Allers (1997:3-4) indicates that "...the present school programmes have done little to inform students of the crucial issues and critical choices confronting society, though this seems to be changing...our students are going to be making complex and difficult decisions. It is therefore important that we provide the best information available to our students concerning these issues". On this note, Allers was aware that learners should be equipped well under RNCS integration of all learning areas for them to be able to make informed decision and to address environmental issues.

2.5. EDUCATION FOR SUSTAINABLE DVELOPMENT

2.5.1 What is sustainable Development?

The former Norwegian Prime Minister, Mrs. Gro Harlem, states that 'sustainable' means "...development that meets the needs of the present without compromising the ability of future generations to meet their own needs"(1987) 'Sustainability' means the use of natural resources at a controlled rate whereby man does not damage the environment and ensures the resources are not depleted. It can also be described as an attitude that people should develop on how resources should be utilized. People should be careful not to use resources faster than the earth can replace them, that is, to ensure that modern development does not damage the environment. Sustainability ensures that the human lifestyle can be improved without degrading the earth's resources. According to Fulcher (1999:176), the concept 'sustainable development' "... is aimed at reducing poverty; incorporating human and economic development

with the need to protect the environment; resources must be protected for the future generation. Resources extraction must therefore be restricted". Furthermore, Fulcher (1999:176) indicates that the best ways to achieve sustainability "...is to protect freshwater sources, protect natural resources, and protect biodiversity hotspots".

The concept 'development' implies different things to different people, all depending on where they are living and what their needs may be. In the informal settlement area development will include basic needs such as food, shelter, and clothing, better health-care services, sanitation and water supply, houses, improved educational facilities, and better employment opportunities, to mention a few.

Allers, as quoted by Camp & O'Donaghue (1994:361) defines the concept 'sustainability' as a way "...that human activity would not degrade the planet's carrying capacity forever for other humans. Sustainability refers to those things that make life possible on a continuing basis - supplying most human needs, but not all of their wants".

In his speech Prime Minister of Britain Tony Blair (2003- 02-24) he stated that "in thirty years' time there will be two billion more people on the planet. Already 40% of the population is short of fresh water; on current trends this will rise to 50% by 2030, in west Asia it will be 90%...There are already over billion urban slum dwellers. With the population of the world's cities due to rise by another billion by 2010, this will only increase. The World Bank recently estimated that nearly one fifth of preventable diseases in the developing world are caused by environmental factors, such as urban air pollution and unclean water". <http://www.number10.gov.uk/Page3073>

In his interview before the World Summit on Sustainable Development in Johannesburg Dr. Bjorn Lomborg, author of controversial book "The skeptical Environmentalist" told Reuters that " it is not realistic to believe that people struggling to find their next meal would worry about the environment 50 years ahead" (FreeRepublic.com "Conservative News Forum 2003-04-01 page 1)

Lombard further stated that “we can not achieve sustainability before we have developed ...Sustainability easily ends up prioritizing future generations at the expense of the current generations. Development has the advantage of both helping people today and creating the foundation for an even better tomorrow” .

<http://www.freepublic.com/focus/news/738304/post>

2.5.2 Education for sustainable Awareness on water pollution

The time to learn about environmental issues such as water pollution-related diseases in all learning areas should be considered. Awareness on what children should learn about the informal settlements and water pollution must become a priority in our education system, for reasons such as better health for all children, more awareness about water pollution-related diseases, and knowledge of environmental issues, such as unpolluted rivers and the surrounding environment.

According to Kneale (2003: 32) on awareness and education strategy in Alexandra, the reasons why waste lying around on streets, open areas, street corners and also illegal dumping by residents is “...lack of awareness of correct waste handling and impact of incorrect waste handling,... and all larger items are washed into river during heavy rains and attracts flies, which bring diseases, clogs up drains, rivers and pipes,...the area becomes a breeding ground for mosquitoes and rodents...” In page: 33 Kneale indicated that “illegal dumping by residents is an indication of no sense of ownership... and not enough space in informal dwelling areas...” in page 35 Kneale stated that “residents dump waste on pavements outside schools, and shows carelessness and ignorance...lack of awareness...” in page: 36 Kneale indicated that dumping of waste all over is also influenced by “Overcrowding...not enough dustbins; And no choice for dead dogs, nappies...and all are carried to Jukskei river”

Furthermore, kneale in page: 42 indicated that “hair salon owners/car wash owners throw waste water into the drains, reason,... they do not care; lack of knowledge on how to re-use; Ignorance; and lack of awareness and the impact that waste have in human health” In page 45 Kneale stated that residents urinate in public areas, and sometime use toilets incorrectly, reasons being that, there are no public toilets. All of

the above indicate by Kneale is a true reflection of how rivers are being polluted; lack of knowledge from the community that is leading to ignorance. As a result the community's health is at risk. According to UNCHS (Habitat) and UNEP Water for African Cities Newsletter (2001:5) stated that "...it is the function of education and training to give all people respect for water as a finite, vulnerable resource; knowledge on the multiple benefits and ecological services of water, the relevance of sanitation and hygiene; and basic understanding of integrated water resources management and even the need to change our lifestyles in many areas. Basic education must initiate a holistic, interdisciplinary approach to integrated water management at an early stage". www.unchs.org programme website: www.un-urbanwater.net

Education brings about the need and wants to change a person's attitude and behavior regarding sustainable awareness. The researcher agrees with Mckeown (2002:7-9) where he states that "...sustainable development aims to improve the quality of life of human beings while at the same time living within their ecological means". According to the White Paper on Environmental Education (1989: 6) "...an attempt will be made, in co-operation with the responsible educational bodies, to ensure that the principles of environmental education are included in all appropriate educational curricula". Allers (1997:4) stated that environmental education "...is a process that seeks to develop the necessary awareness, ethics, values, knowledge, skills and commitment to allow people to become environmentally literate..." The Revised National Curriculum Statement was introduced to fulfill and to ensure that principles of Environmental Education equips learners with the awareness on environmental issues across the curricula.

2.6 THE DEVELOPMENT OF AN INFORMAL SETTLEMENT

2.6.1 The concept 'informal settlement'

An informal settlement is an area that has been established by a group of people without the authorization of the town planner. A group of people occupies a site, (a piece of land where the settlement is located) without proper housing infra-structure, communication network (roads, telephone lines, power lines), water supply or sewage system. According to Oelofse; Zukulu; Wilson & Winter (2007:270) "poor people are more vulnerable to environmental hazards. This occurs because they have less choice about how they can respond to environmental impacts. They are also more vulnerable as their health and quality of life is already compromised by higher levels of poverty".

The Global Urban Development Magazine on informal settlements and the Millennium Development Goals (2006: 1) state that "...in most of the cities, according to the United Nations Human Settlements Program (UN- Habit), the worsening state of access to shelter and security of tenure results in severe overcrowding, homelessness, and environmental health problems...; the UN-Habit defines slums as contiguous settlements where inhabitants are characterized as having (i) insecure residential status; (ii) inadequate access to safe water; (iii) inadequate access to sanitation and other basic infrastructures and services; (iv) poor structural quality of housing; (v) overcrowding.

According to the South African Report on Human Settlements (2006:2) it states that "The most significant question today with regard to housing and human settlements is whether or not development in the field of sustainable human settlement since 1994 has served to further the course of sustainable development , with respect to the inter-linked pillars of environmental, social and economic sustainability...poor environmental quality of these settlements was exacerbated by the lack of basic services". Moreover, in page 15 it indicates that "...South Africa does not have a policy to address the needs and priorities of people living in informal settlements"

<http://www.gov.za>

This is an indication of how informal settlements develop and the emanation of problems such as water pollution globally. The overwhelming problems regarding the lack of every basic need impacts negatively on the resources available and the provision of basic services. The Government is resistant to offer basic services to slum areas, since it will be viewed as a first step towards the recognition of land occupied illegally.

2.6.2. How informal settlements influence water pollution-related diseases.

According to Hodgkinson & Wilson (2007:178) people living in informal settlement often have "...no sanitation..., no proper sewage system..., raw sewage flowing into wetlands and rivers; litter and refuse dumped...and no rubbish removal services". Even though it is a debatable issue, often where there is poverty there is much negligence with regard to care for the environment at large. The lack of basic needs often compels the residents of informal settlements to contravene the moral for the sake of survival. The dumping of waste products into the river is one of the options since the municipality does not render services to informal settlements. People relieve themselves in and near the river, since there are neither toilets nor sewage system that supports the implementation of toilets in the area. Hodgkinson & Wilson (2007: 178) stated that water- borne diseases are influenced by "rivers used for washing, drinking exposed to untreated effluent..." Learner's possibility of being infected by diseases from contaminated water is extremely high where children live in areas without basic needs such as proper sanitation, a sewage system; clean water and a clean environment. The report by the UN-Habitat supports the expression of "a healthy mind in a healthy body".

2.7 CONCLUSION

This chapter focused on an overview of the literature on concepts such as water pollution-related diseases, Environmental Education and awareness in the RNCS, sustainable development, and the development of an informal settlement. By means of a literature review the researcher tried to indicate the importance of learning to become aware of how children and everybody else can establish a relationship with the environment and thereby avoid water pollution, and staying away from contaminated water that can lead to water pollution-related diseases. The essentiality of the awareness of the environment and the sustainability of teaching Environmental Education to children who live in informal settlements were highlighted.

In chapter three the researcher will indicate the methods that will be implemented to achieve the aims and objectives that were stipulated in chapter one of this research.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 INTRODUCTION

This research study is primarily based on the principles of qualitative research. Strauss and Corbin (1991:17) refer to qualitative research as any kind of research that produces findings which are meaningful, testable and scientifically free from contradictions. This type of research focuses on understanding rather than predicting or controlling phenomena. For the purpose of this study the research will focus on the qualitative and inductive research methods.

The inductive research strategy indicate that the researcher should make use of three data collecting methods, that is, observation, interviews, and questionnaires. According to Mouton and Marais (1988:91) the theory of triangulation influences the reliability and validity of data since it is based on the principle of inclusion of multiple sources of data collection methods in a research project.

3.2 RESEARCH METHODS

The researcher will focus on classroom based activities to actualise the pre-knowledge of learners on water pollution-related diseases awareness. Two sets of activities have been designed for learners to complete: the first set of activities will be completed in class (actualisation of pre-knowledge), while the other set of activities will be completed by learners after the lesson on water pollution and related environmental issues. Since the research is focusing on education, the researcher shall interview an educational curriculum specialist from District 9 in Johannesburg, an Environmental Education Specialist from Delta Environmental Centre, and Rand water Environmental Specialist located at Delta. Residents of Stjwetla informal settlement, but only one representative will be formally

interviewed for recording; two educators will be interviewed, One educator from Sandtonview combined School and another one from Bovert Primary school; and a Specialist in water testing at Goudkoppies laboratory (Johannesburg Water) with the aim of validating the danger of water pollution on children and the importance of educational awareness both in class and outside. The interviews will be recorded, edited and transcribed. The researcher will conduct an observation at Stjwetla informal settlement, checklist will be used as an observation tool, and the observation will be accompanied by an evaluation rubric that will be used to assess data obtained during the conducted observation.

3.3. THE REASON FOR SELECTING STJWETLA INFORMAL SETTLEMENT

The researcher is an educator who teaches 90% of the learners from Alexandra Township Settlement of which Stjwetla informal settlement is part of.

Figure 14 depicts Alexandra Township; Stjwetla informal settlement (top arrow); and the location of high schools in to the south-east namely: Eastbank high school (middle arrow) and Kwabekilanga high school (bottom arrow).



Figure 14: Eastbank high school (middle arrow) and Kwabekilanga high school (bottom arrow).

The researcher works with NGO's from Alexandra Township. He is familiar with the site (Stjwetla informal settlement) and has seen littering, washing of clothes in the river, raw sewage flowing in the Jukskei river, as some of the environmental issues facing the site. The researcher is involved in educational programmes that are being conducted by the Department of Education as a result of the poor grade 12 academic performance of learners in this area, that is the Senior Intervention Programme ("SIP"). The researcher was involved in an Aids Orphans Project as a project facilitator at Sandtonview School. The project is presently working with the NGO (Shomang) to supply more than 450 children with clothes, food, and stationary, and to give children Christmas parties. The Alexandra Renewal Project is engaged in assisting families who are living on the flood plain with RDP houses. The Johannesburg City Park is working hard to develop parks near the Jukskei River.

3.4 QUESTIONNAIRES

According to Strauss and Myburgh (2003: 49) there are four important instruments in collecting data that utilizes questioning as a technique, namely (i) the interview, (ii) checklist, and (iii) the questionnaire and (iv) the critical incident. In this research the researcher used the triangulation method, namely: interview; Questionnaire instruments and a checklist for collecting data.

Sets of questions were designed specifically for the institutions intended to be interviewed. Two sets of questionnaires were designed for learners, the first one is based on actualizing the pre-knowledge of children; the second questionnaire is focusing on establishing the knowledge that children have acquired in class on water pollution-related diseases and other environmental issues. A checklist was used during the observation. Strauss & Myburgh (2003:51) stated that "it is not possible to select a questionnaire that is illustrative of all possible formats of questionnaires. Further, it is also acknowledged that it is possible to criticize all questionnaires and most of the time every single question". The questionnaires were designed to suit what the researcher wanted to attain.

3.5 RESEARCH DESIGN

The researcher will collect data from five different schools around Alexandra Township, namely: Sandtonview combined school; Boverit primary school, Ikageng primary school; Eastbank high school; Kwabekilanga high school. The below arrow in Figure 15: indicate Boverit & Ikageng primary schools. These schools are situated to the south of the Stjwetla informal settlement.

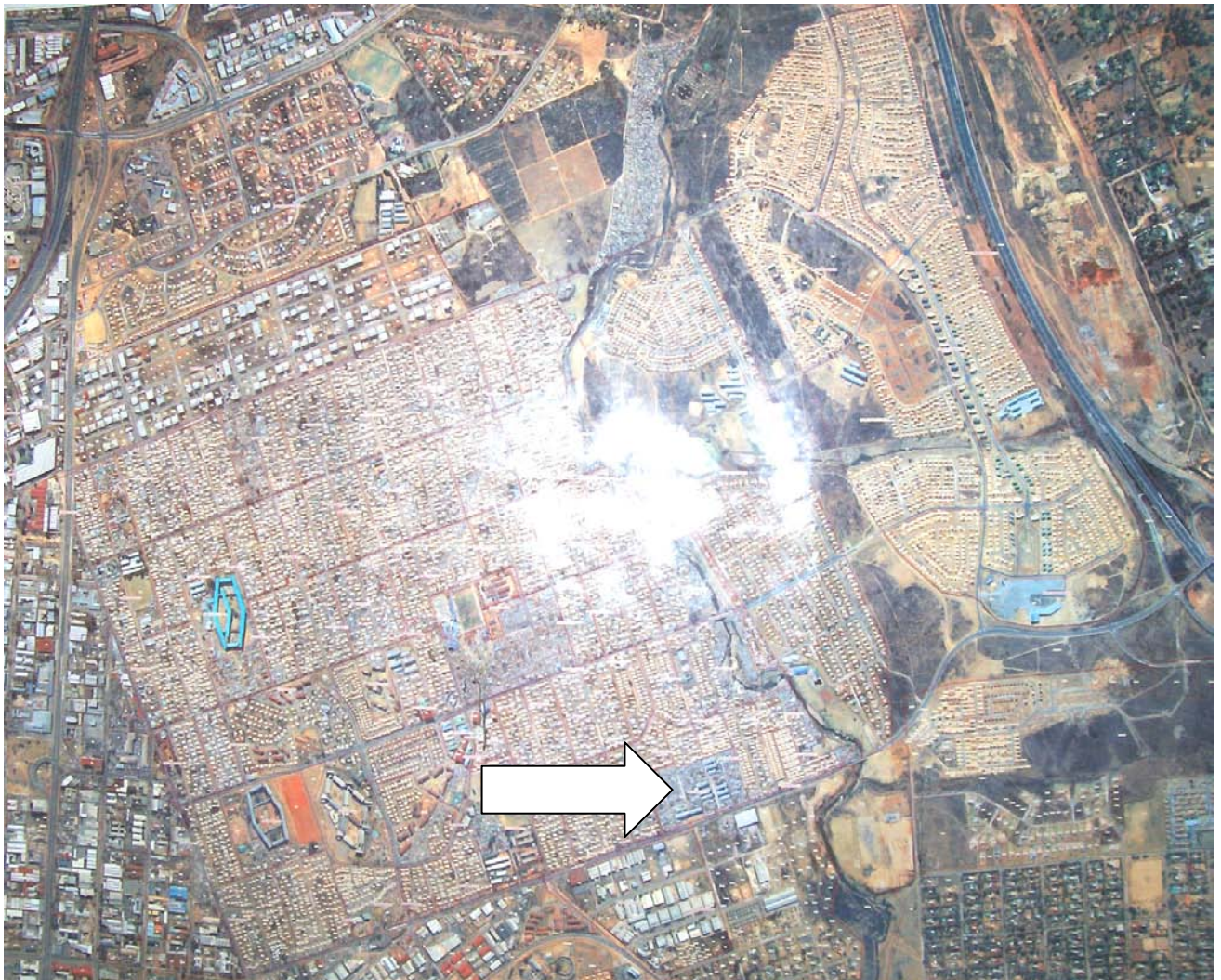


Figure 15: Boverit primary school, Ikageng primary school

Only senior phase learners in grades 7 and 9 will participate in the research. Hundred learners from grades 7 and 9 in five schools will be randomly selected (The second learners will be selected on a class list irrespective of gender

consideration or age). For the sake of consistency and reliability, the same learners who wrote pre-test will be used to write the post-test. Learners between the ages of 12 to 17 will be involved in the research. This age group is used for the purpose of determining whether there is any statistical significant difference between the younger and the older children. For the sake of educating and empowering the learners and bringing awareness of water pollution-related diseases in the informal settlement to them, all learners in a class will be taught. Senior phase grade 7 social science educators of the selected schools will be given a lesson plan based on water pollution to teach the specific classes before they answer the post-questionnaires. The senior phase social science grade 9 educators of the selected schools will also be given a lesson on water pollution to teach before the learners answer the post-questionnaires. In this case the same group of children who have answered the pre-test questionnaire will also answer the post-test questionnaire. The aim of the pre-questionnaire is to determine the quality of the RNCS learning areas' environmental knowledge that is imparted to the respondents, particularly with regard to awareness, water pollution-related diseases, and local water quality issues. The aim of the post-questionnaire is to determine if there was a difference in the knowledge and awareness as a result of the learning that took place in the classes.

The informal settlement of Stjwetla is located in Alexandra Township (Johannesburg). Stjwetla is located alongside the Jukskei River. The researcher selected five schools that are located within a range of 5 km around Stjwetla informal settlement. The researcher is a cluster leader of geography in Johannesburg district 9, and has a personal relationship with all the schools in this area, and has been working as a director of a Non-Governmental Organisation under Alexander Renewal Project, known as Shomang Sebenzani Development Initiative, for the past five years, supplying food, clothes, and stationary to most of the orphans who attend schools in this area.

3.5.1 The participating schools:

- Sandtonview School is a combined primary and high school and a previous model C school in Bramley Park situated 1km from Alexandra Township and 3km from the Jukskei River, and approximately 5km from Stjwetla informal settlement. There are 800 learners in the school. 19 grade 7 learners and 22 grade 9's participated in the project. More than 700 of the learners come from Alexandra Township.
- Bovert Primary School, a government school in Alexandra Township, situated less than 1km from the Jukskei River and 4km from Stjwetla informal settlement 21 grade 7 learners participated in the project.
- Eastbank High School is located 2km near Stjwetla informal settlement, situated less than 600m from the Jukskei River. 21 grade 9 learners participated in the project.
- Ikageng Primary School is located in Alexandra Township, less than 1km from the Jukskei River and 4km away from Stjwetla informal settlement. 7 learners from grade 7 participated in the project.
- Kwabekilanga High School is located in less than 2km from Stjwetla informal settlement. It is approximately 700m from the Jukskei River. 10 grade 9 learners participated in the project.
- All the participants in this project are from three primary schools and three high schools. The total number of learners who participated in this research project is hundred (100).

3.6 DESCRIPTION OF APPENDIX 1

The first activity is based on the actualisation of pre-knowledge. It is a pre-prepared activity based on closed-ended questions on water pollution awareness. Only senior phase grades 7 and 9 learners answered the questions. Learners were to indicate whether the ten statements are true, false, or they are not sure.

The second activity for grades 7 and 9 learners consists of 8 statements. It is a closed-ended questionnaire based on a pre-test on water pollution. Learners are to study a picture and answer the questions. Learners are provided with two possible answers, one is correct and the other one is wrong, and they are to choose the statement relevant to the question.

Only grades 7 and 9 learners are to answer the questions of the third activity. The activities are based on the actualization of pre-knowledge. They are to answer the first open-ended questions based on sustainable development. Learners are to first read the extract and then answer questions based on what they have read. The other extract is based on the quality of water for domestic use. Children are to read and answer the open-ended questions.

The fourth activity is based on the danger that learners who play in polluted water are exposed to. Only grades 7 and 9 learners are to answer this activity. They are to study the picture supplied and answer the closed-ended questions. There are two possible answers and they are to choose the correct answer.

The fifth activity is an open-ended questionnaire based on the danger of residing in an informal settlement. This questionnaire is to be answered by grades 7 and 9 learners only. They are to read an extract and then answer the questions.

The sixth activity is based on the learners' school attendance, with possible reasons for non-attendance. Learners from grades 7 and 9 will participate in answering the questionnaire. The questionnaire is open-ended and will allow the children to express their own opinions.

Activity seven is based on children who are in grades 7 and 9. It is an open-ended questionnaire that allows children to apply the knowledge acquired inside and outside the classroom. The activity is on water pollution in rivers. Children are to read a supplied extract and answer the questions.

3.7. Observation

Observations were conducted to collect data from the specific area where research was being conducted (Stjwetla informal settlement). According to Strauss and Myburgh (2003:45) "observation is at the basis of all research". In this case the researcher will focus on two of the five scientific observation steps indicated by Strauss and Myburgh (2003:45) "1. A natural phenomenon is observed; 2. Conclusions are drawn from what happens..." Moreover, Strauss and Myburgh (2003:45) indicated that "the researcher reports what she or he observes". The researcher used a qualitative observation technique. According to Strauss and Myburgh (2003:47) "the observation process therefore entails that the researcher or observer has a list of certain specifics that she/he will observe, often called an observation schedule...when observing qualitatively, observation is much more open when compared to observation as a quantitative technique".

The researcher observed the following observation schedule

- (i) Human activities that contribute to water pollution in the Jukskei river.
- (ii) Organisms/aquatic animals that are found in the Jukskei river.
- (iii) How polluted is the Jukskei river?

Observed scenarios on the field of research are recorded as data. Photos were taken as evidence of the observed scenarios. Questionnaire has been designed to formally record one interviewee representative member of the Stjwetla informal settlement residents.

3.8. INTERVIEWS

Interviews were used to collect data from the selected institutions. Five selected institutions were purposefully selected, namely Delta Environmental Centre for Education, and Rand Water, Gauteng Department of Education District 9, Johannesburg Water, an educator from Sandtonview combined and Bover Primary

School; and Stjwetla resident. All interviews are recorded on a tape recorder, and Language/data was edited before transferred into writing. Interview questions were designed to meet the criteria designed to gather information. The Delta Environmental Centre for Education was interviewed to gather knowledge of RNCS and the Methods used to impart knowledge based on environmental issues, more especially on water pollution-related diseases. Data was collected from an interviewee who is an Environmental Education Specialist. An Ecological Environmental Education Specialist was interviewed from Rand Water with regard to water pollution-related diseases. Both the Delta environmental education specialist and Rand water ecological environmental education specialist were interviewed at the same time.

The focus in the interview with the Gauteng Department of Education, District 9, was to find out how well Environmental Education is integrated in all the learning areas, and also to ascertain the effectiveness of the RNCS in Environmental Education. A subject specialist (facilitator) of RNCS was interviewed. Furthermore, the main idea of interviewing Johannesburg Water was to get more information with regard to water pollution-related diseases and the dangers that they may have for children's health.

Lastly, two educators were interviewed to gather experimental and relevant knowledge on the Revised National Curriculum Statement and its relevancy with regard to the integration of Environmental Education learners' awareness of water pollution-related diseases.

3.9. CONCLUSIONS

This chapter gave a description of the research design on data collection processes. The processes to collect data have been selected with the idea of ensuring reliability and validity of the outcomes. Besides that, the elaboration on the choice of Stjwetla informal settlement in Alexandra Township has been clearly motivated. The choice of schools and questionnaires were explained. The selected

institutions for the interviews were motivated. Questions are set for the specific institution or individuals to be interviewed. And all interviews were recorded on a tape recorder, edited and transcribed into writing. The process of collecting data through the use of observation method has been indicated; specific observation schedule has been indicated.

In chapter 4 more and detailed analyses, discussions and the interpretation of data obtained by means of the research methodology stipulated in chapter three will be given.

CHAPTER FOUR

DATA ANALYSES, INTERPRETATION AND DISCUSSION

4.1 INTRODUCTION

In this chapter the data gathered by means of the responses to the pre- and post-questionnaires was analyzed and interpreted, as well as the interviews that were conducted with professionals and other stakeholders from Johannesburg Water, Delta Environmental Education Centre, the Department of Education, District 9, Sandtonview educator and Bovert primary educator, and the elderly member of Stjwetla informal settlement.

The first part of the analysis focused on learners' responses to the questionnaires. Each of the five schools was given a letter of the alphabet as a means of identifying the school, namely, A: Sandtonview; B: Bovert Primary School; C: Ikageng Primary School; D: Eastbank High School; and E: Kwabekilanga High School. Learners were randomly selected (second learner was selected on a class list irrespective of gender or age) from each school. Three primary schools and three high schools were part of the research. Only grades 7 and 9 learners were selected. Data were gathered from a total of 100 learners from the above-mentioned schools.

4.2 INTERPRETATION OF THE RESULTS

The number of participants was classified according to their gender. The statistics from the primary and the high schools were analyzed separately, and then compared by means of bar graphs. The number of learners, according their gender and age in both primary and secondary schools is indicated by means of a bar graph, as well as the number of learners who answered or

responded to the questions. This also applies to the degree of knowledge and awareness that learners have on the questions asked.

4.3 ANALYSIS OF THE QUESTIONNAIRES

The analysis of the pre- and post-questionnaires was conducted concurrently, with the purpose of comparing the different outcomes from the pre- and post-questionnaire responses. There are two sections to each questionnaire, namely; (i) biographical information; (ii) knowledge of water pollution-related diseases and general environmental awareness. The results were converted to percentages, and then illustrated by means of a bar graph.

4.3.1 Biographical information of learners

4.3.1.1 Age; grade and gender of the learners from the primary schools.

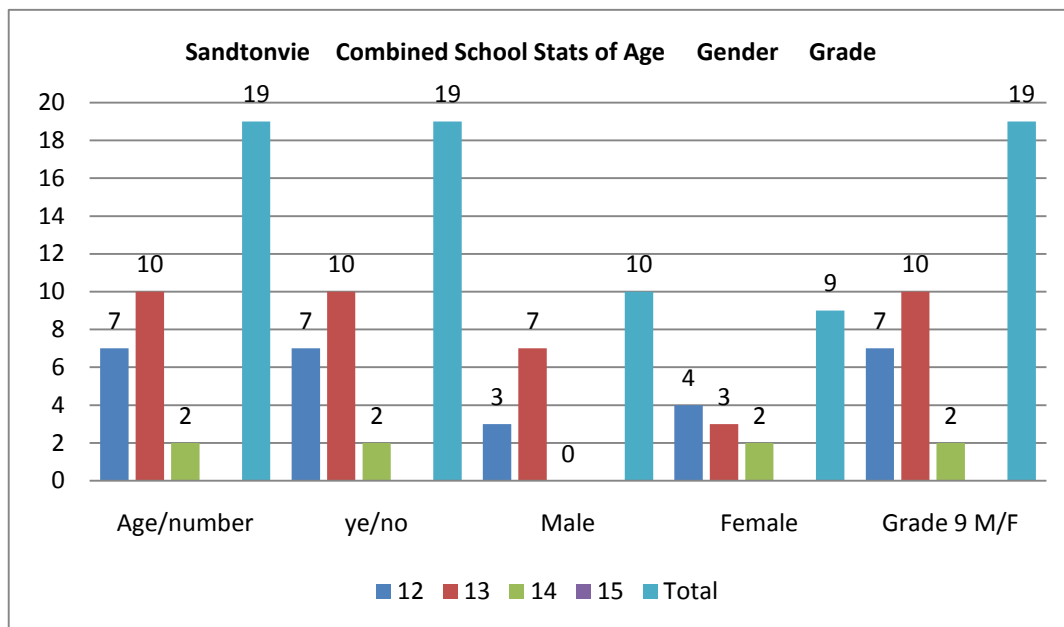


Figure 16: Sandtonview Stats of Age; & Gender; Grade 7 Bar Graph.

Most of the learners from Sandtonview Primary School are 13 years of age and a few are at the age of 12 years, with a small number 14 years old. There are

more boys than girls. These learners never answered a questionnaire on water pollution before.

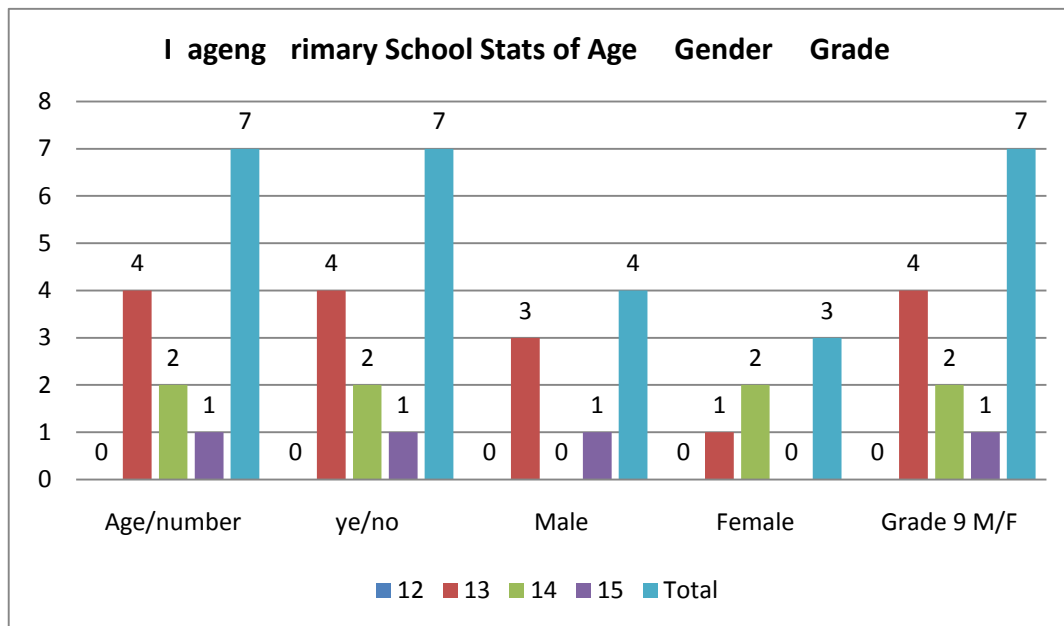


Figure 17: Ikageng Stats of Age, & Gender, grade 7 bar graph

Most of the learners from Ikage Primary School are 13 years old; 1 male at the Of 14 and 15 years of age. And has more or less the same number of boys and girls. These learners never answered a questionnaire on water pollution before.

Figure: 18 indicate that 21 learners never answered a questionnaire on water pollution before. Most of the learners at Bovert Primary School are 13 years of age, 1 male and 3 females at the age of 12 indicated by blue colour; and 5

male and 10 females at the age of 13 indicated by red colour. There are more girls than boys.

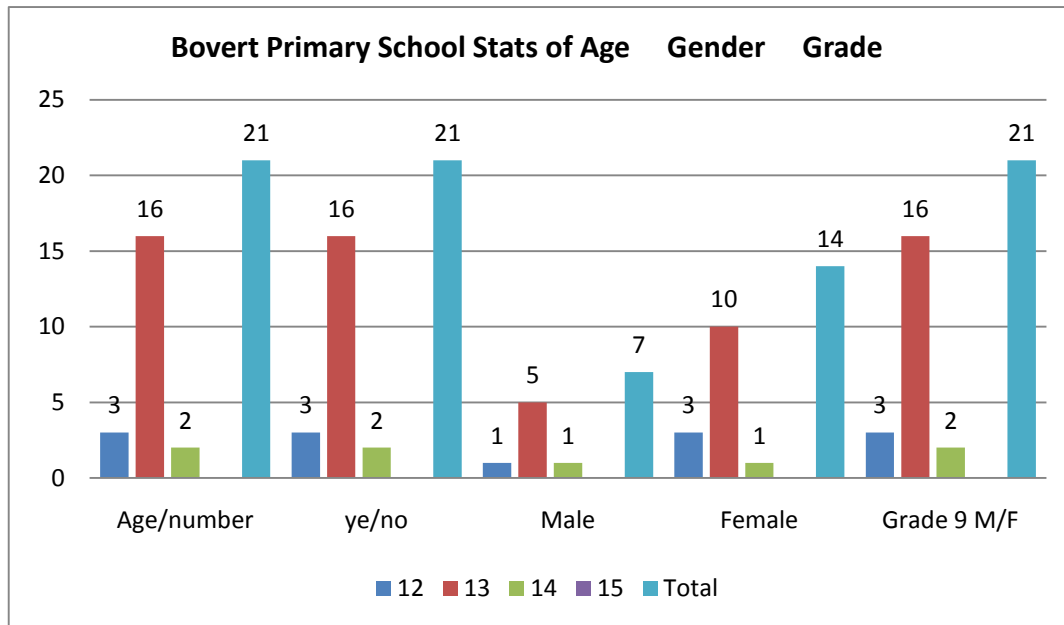


Figure 18: Bovert Stats of Age & Gender of grade 7 bar graph.

Analysis of gender and age

The age bar graph indicates that most of the learners at Bovert, Ikageng and Sandtonview Primary Schools in grade 7 are between the ages of 12 and 13 years. According to the bar graphs above, 21 learners in grade 7 from Bovert participated in the research of whom the majority are 13 years old, and a few are between 12 and 14 years; while Ikageng has 7 and Sandtonview 19 learners who are between 12 and 15 years in grade 7. Bovert, Ikageng and Sandtonview have a total of 47 learners in grade 7 between 12 and 15 years of age. These learners from Alexandra were selected randomly using a class list irrespective of gender or age by the class educator and researcher from the schools to participate in the research. Twelve is the average age of learners in

grade 7. From 47 children 35 were between the ages of 13 and 15 years, which are older than the average age of learners in grade 7. All learners never answered a questionnaire on water pollution before.

4.3.1.2 Age; grade and gender of the learners from the high schools.

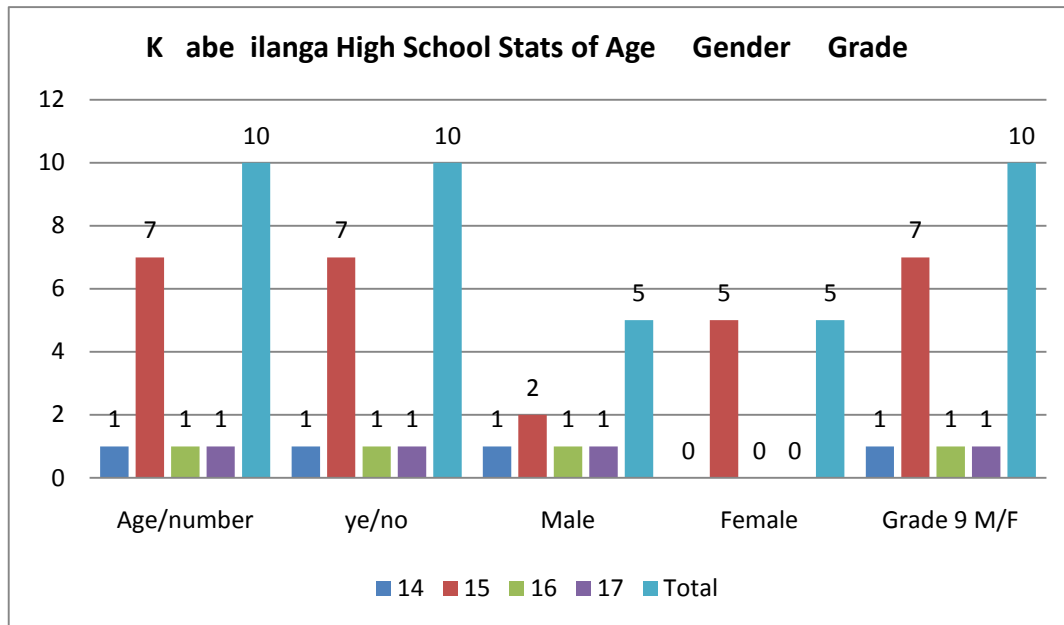


Figure 19: Kwabekilanga Stats of Age, & Gender of grade 9 bar graph.

Only 1 male at the age of 14 indicated by blue colour; 7 females and 2 males indicated by red colour; Most of the learners from Kwabekilanga high school are at the age of 15 years. There are more or less the same number of boys and girls. 10 learners never answered questionnaire on water pollution before.

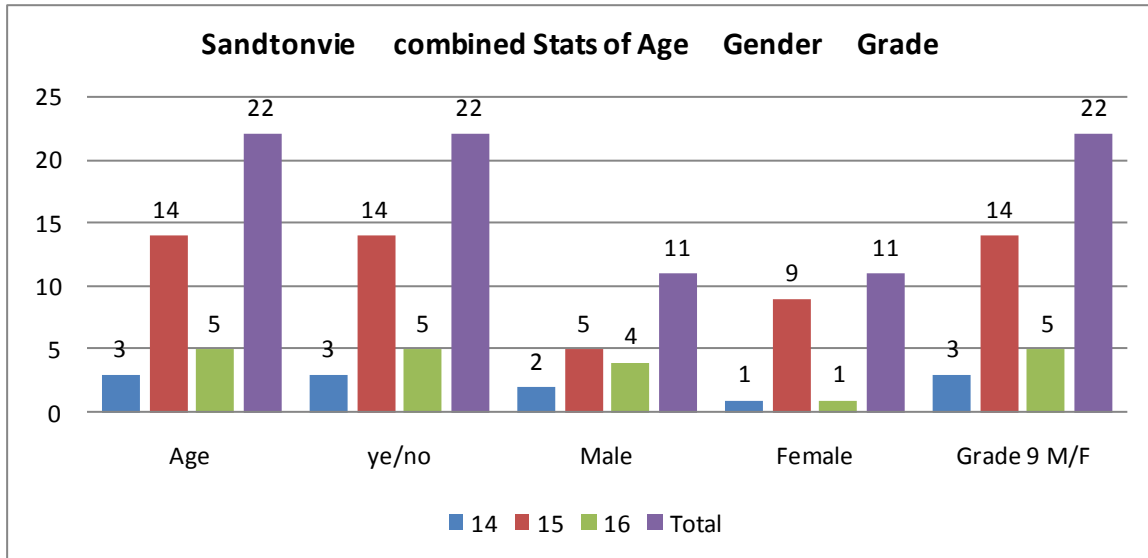


Figure 20: Sandtonview Stats of Age & Gender of grade 9 bar graph.

14 learners from Sandtonview combined school are at the age of 15 years indicated by red colour; where as 5 learners are at the age of 16years indicated by light green colour, while only 3 are at the age of 14years indicated by blue colour, with more boys than girls. 22 Learners never answered a questionnaire on water pollution before. There are 2 males and 1 female at the age of 14years indicated by blue colour; 5 males and 9 females at the age of 15 years indicated by red colour; 4 males and 1 female indicated by light green colour.

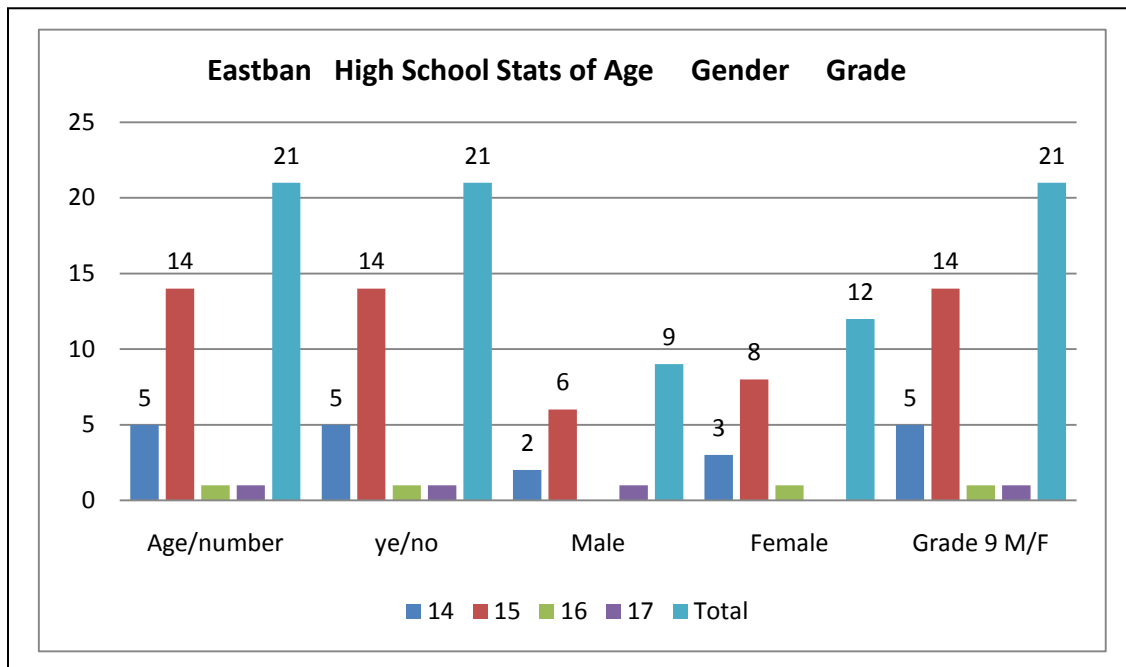


Figure 21: Eastbank Stats of Age & Gender of grade 9 bar graph.

14 learners at Eastbank high school are at the age of 15 years indicated by red colour; and there are 5 learners at the age of 14 indicated by blue colour; only 1 learner is at the age of 16 indicated by light green colour, and 1 learner at the age of 17 indicated by purple colour. There are more girls than boys. 21 learners never answered a questionnaire on water pollution before. 2 males and 3 females at the age of 14 indicated by blue colour; 6 males and 8 females at the age of 15 indicated by red colour; 1 female at the age of 16 indicated by light green colour; and 1 male at the age of 17 indicated by purple colour.

Analysis of gender and age

The age bar-graph indicates that most of the learners from Kwabekilanga, Eastbank and Sandtonview Combined Schools who are in grade 9 are between the ages of 14 and 17. According to the bar-graphs above, from Kwabekilanga 10 grade 9 learners who participated in the research, the majority, were 15 years old; while Sandtonview had 22 and Eastbank 21 learners who were between 14 and 16 years old in grade 9. Kwabekilanga, Eastbank, and Sandtonview had a total of 53 learners in grade 9 between the ages of 14 and 17 years who were selected randomly from the schools to participate in this research. From a class list the school educator assisted the research by randomly selecting learners who live in Alexandra Township irrespective of gender consideration. Fourteen is the average age for learners to be in grade 9. From 53 children, only 9 learners were 14 years old and 44 were between 15 and 17 years of age. The ratio of 44 learners between ages 15-17 implies that there is a high failure rate of children from Grade 1-9. All learners never answered a questionnaire on water pollution before.

4.4 KNOWLEDGE OF WATER POLLUTION-RELATED DISEASES AND AWARENESS OF ENVIRONMENT ISSUES

The information obtained by means of the questionnaire designed for the assessment of learners' knowledge of water pollution-related diseases and their general awareness of the environment is analyzed per grade. Learners are assessed firstly by means of a pre-knowledge questionnaire to ascertain their knowledge of water-pollution related diseases and general environmental awareness issues. Educators will present a lesson on water pollution and related diseases; learners will later be tested by means of a post-questionnaire based on what they have been taught. The information obtained will be analyzed as follows: learners' results will be analyzed per activity. The

outcome of each activity will be indicated by means of a bar-graph. The outcomes of the results will be linked to the findings of the Jukskei River water testing results from Johannesburg Water, as a way of finding a relationship between water pollution-related diseases, lack of knowledge and awareness under the RNCS learning areas on water pollution-related diseases, and the performance of the learners.

4.4.1 The pre-questionnaire

Below are pictures of Boverit; Kwabekilanga; Sandtonview; and Ikageng schools. Figure 22: is Boverit Primary school; Figure 23: is Kwabekilanga high school; Figure 24: is Sandtonview Combined school; and figure 25: is Ikageng Primary school.



Figure 22: Boverit primary learners completing questionnaire



Figure 23: Kwabekilanga High school learners completing Questionnaire



Figure 24: Sandtonview learners completing questionnaire



Figure 25: Ikageng Primary learners completing questionnaire

4.4.1.1 Activity 1

Bovert, Sandtonview and Ikageng Primary schools' grade 7 learners.

The questionnaire:

Actualization of pre-knowledge.

Focus: Awareness of water pollution in the informal settlement.

Each child is expected to supply the following details before completing the questionnaires.

Please make use of a black pen to complete the questionnaire.

Table. 2: Learners information tool.

School's name	
Surname	
Names	
Grade	
Age	
Gender	
Have you completed a questionnaire on water pollution?	Tick the relevant answer: YES..... NO.....

	Learning Area	Learning outcome	Assessment Standard
Main focus learning area	Social Science	LO:1;2;3	AS: 1
Links with other learning areas	Natural Science	LO:2;3	AS: 2

Adapted from Van Heerden (2006:14) Building Capacity for Sustainable Living.



Fig. 12: Study this picture and answer the questions below.

Key: The following keys have been used for this questionnaire:

T= True
F= False
N= Not Aware

Make a cross in the relevant block.

The above picture displays an informal settlement	T	F	N
This settlement is located alongside a river	T	F	N
There are tarred streets between the buildings	T	F	N
People have problems with water supply in this area	T	F	N
Houses in this settlement are known as shacks	T	F	N
The area looks very clean	T	F	N
People living in this area have decent jobs	T	F	N
Buildings have been constructed with boxes, plastic and zinc	T	F	N
People in this settlement own plots of land	T	F	N
Most of the people in this settlement are foreigners	T	F	N
Total mark	/20		
Educator's signature			

Table. 3: Activity 1 assessment tool.

i. The results from the primary schools:

Bovert, Sandtonview, and Ikage Primary Schools.

Chart that indicates the outcomes:

Marks	Males	Females	Total	100%	Comments
0-5 marks	0	0	0	0	0% Below average
6-10 marks	3	10	13	28%	Average
11-15 marks	11	9	20	43%	Satisfactory
16-20 marks	6	7	13	28%	Excellent
Number of Children	21	26	47	100%	

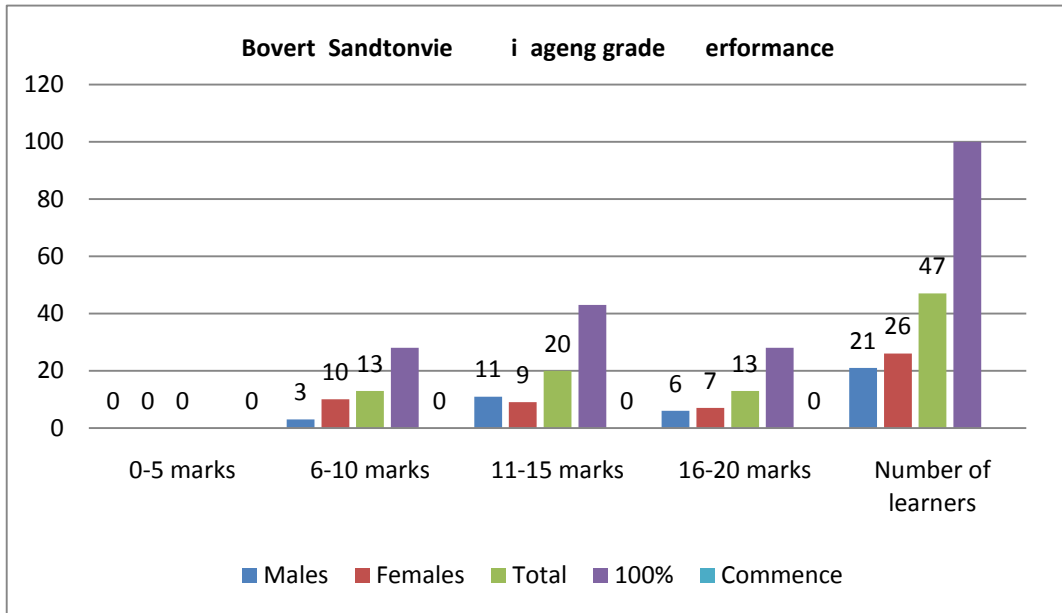


Figure 26: Graphs illustrating the performance of learners at Bovert; Sandtonview & Ikageng primary schools

ii. The results from the high schools:

Sandtonview, Eastbank, and Kwabekilanga High Schools.

Marks	Males	Females	Total	100%	Comments
0-5 marks	0	0	0	0%	Below average
6-10 marks	1	6	7	13%	Average
11-15 marks	13	14	27	51%	Satisfactory
16-20 marks	11	8	19	36%	Excellent
Number of Children	25	28	53	100%	

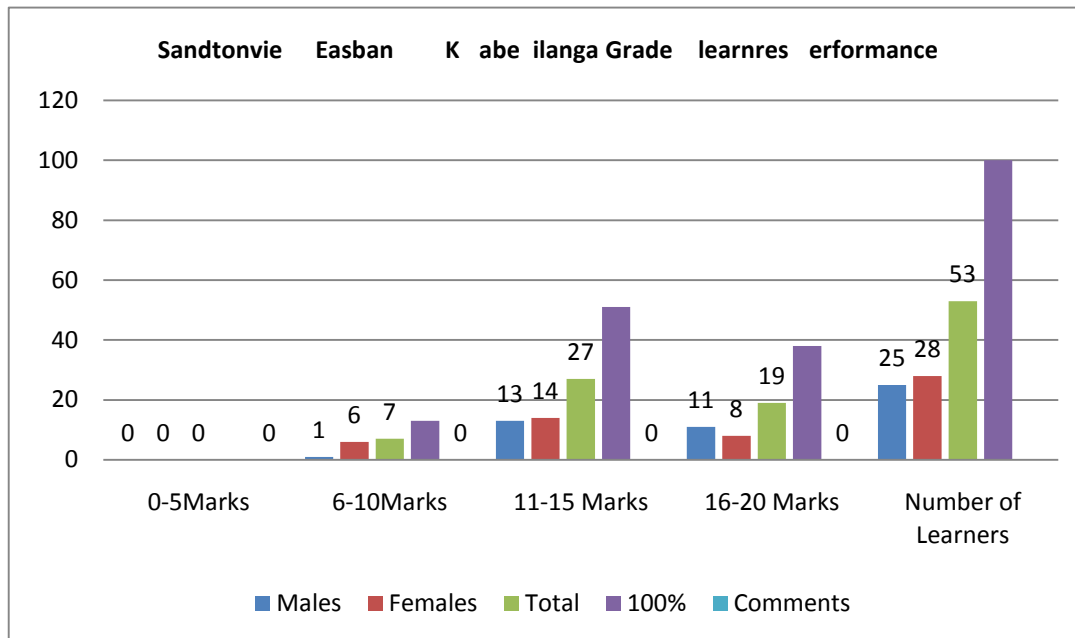


Figure 27: Graphs illustrating the performance of learners at Sandtonview; Eastbank & Kwabekilanga.

Analysis of the Primary schools' and High schools' results.

A high number of grade 7 learners from Bovert, Sandtonview and Ikage Primary Schools scored an average percentage. Their awareness on water pollution is very minimal. Thirteen learners scored between 6 to 10 out of 20 marks, which are equivalent to an average performance; twenty learners scored between 11 to 15 marks out of 20, which is equivalent to a satisfactory performance; 13 learners scored between 16 to 20 marks out of 20 marks. These few learners

have a good knowledge of issues relating to informal settlements and water pollution. The overall performance indicates that 28% of the learners need more knowledge on water pollution awareness. They could benefit from more teaching and learning across the RNCS learning areas on the relationship between water pollution and the informal settlements.

The performance of learners from Santonview, Kwabekilanga, and Eastbank High Schools shows an improvement: 13% of the learners scored below 10 out of 20 marks, whereas 51% scored 11-15 marks out of 20 marks, and 36% scored between 16 to 20 marks. The comparison between primary and high school marks indicates that as learners progressed to a higher level they acquire more knowledge of, amongst others, water pollution and informal settlements. Both in the primary and in the high schools, statistics indicate that girls have a better understanding of the concept of water pollution in the informal settlement.

4.4.1.2 Activity 2

Bovert, Sandtonview and Ikageng Primary Schools.

The questionnaire:

Actualization of pre-knowledge

Focus: Water Pollution-related Diseases

Each child is expected to supply the following details before completing the questionnaire.

Make use of a black pen to complete the questionnaire.

School's name			
Surname			
Names			
Grade			
Age			
Gender			
Have you completed a questionnaire on water pollution?		Tick the relevant answer: YES= NO=	
	Learning Area	Learning outcome	Assessment Standard
Main focus learning area	Social Science	LO:3	AS: 2
Links with other learning areas	Natural Science	LO:3	AS: 2
Links with other learning areas	English	LO: 5	AS: 3

Adapted from Van Heerden (2006:14): Building Capacity for Sustainable Living



Figure 28: Dumping waste in Jukskei river

Study this picture and answer the following questions.

Each statement has been supplied with two possible answers. Choose the correct answer. Make a cross in the space opposite the correct answer.

Water in the river is polluted by	Plastics and papers	Chemicals from the industries
Polluted water	Smells very bad	Smells in an acceptable way
Diseases caused by polluted water	Cholera and diarrhoea	Aids and malnutrition
Polluted water can be used for	Irrigating crops	Drinking
Fresh water comes from	Rivers and dams	Sea and acid rain
Aquatic animals are found in	Fresh water	Polluted water
What is the purpose of water treatment?	To make it suitable for domestic use	To benefit the company that is treating the water
Some of the uses for domestic water are	Drinking; food preparation; bathing; laundry	Watering the garden; washing cars
Total marks		/16
Educator's signature		

Table. 4: Activity 2 assessment tool.

i. The results from the primary schools:

Bovert, Sandtonview, and Ikage Primary School.

Chart that indicates the outcomes:

Marks	Males	Females	Total	100%	comments
0-5 Marks	0	0	0	0	0% Below Average
6-10 Marks	9	16	25	53%	Average
11-15 Marks	10	9	19	40%	Satisfactory
16-20 Marks	2	1	3	6%	Excellent
Number of Children	21	26	47	100%	

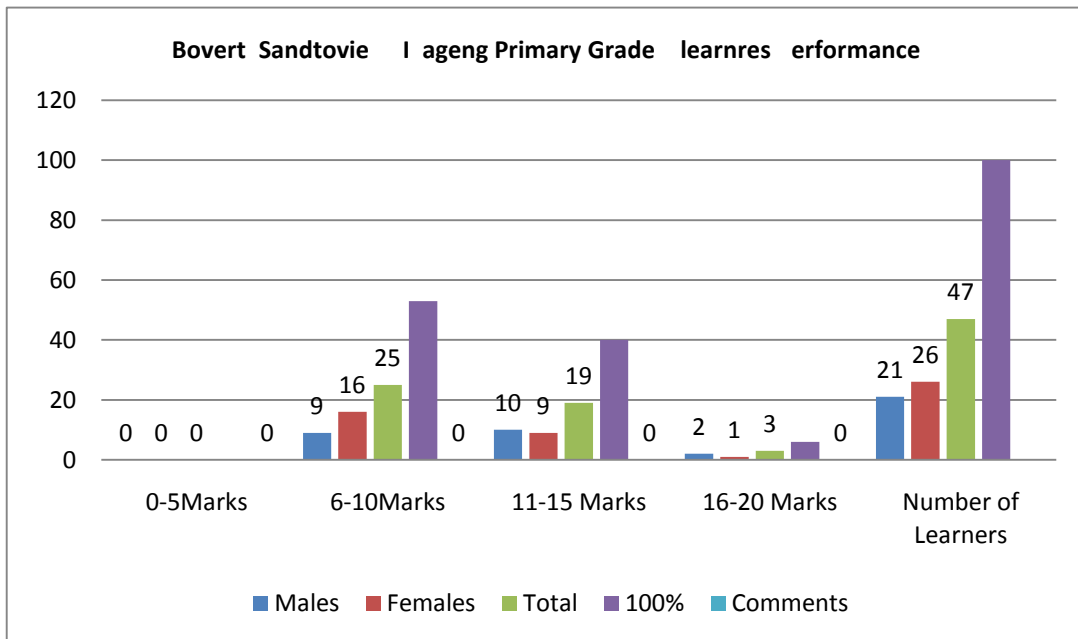


Figure 29: Activity 2. Primary schools performance stats bar graph.

ii. The results from the high schools.

Chart that indicates the performance of grade 9 learners at Sandtonview, Eastbank, and Kwabekilanga High Schools.

Marks	Males	Females	Total	Percentage	comments
0-5marks		1	2	3	6% Below Average
6-10marks		8	12	20	38% Average
11-15marks		16	11	27	51% Satisfactory
16-20marks		0	3	3	6% Excellent
Number of children	25	28	53	100%	

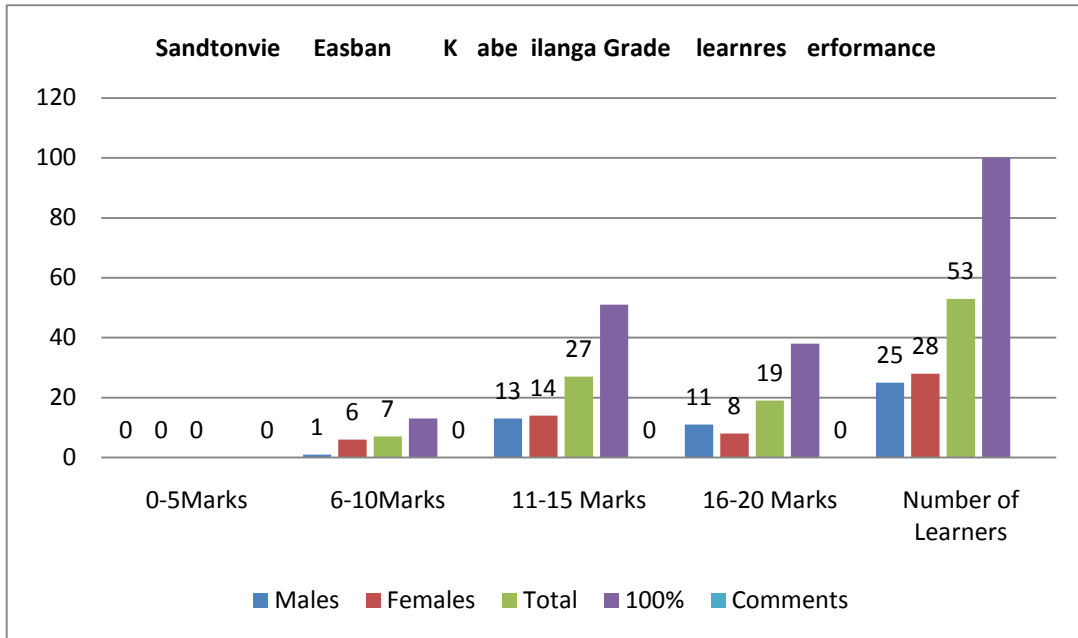


Figure 30: Activity 2. High schools performance stats bar graph.

iii. Analysis of the primary schools' and high schools' results.

The outcomes of activity 2 on water pollution-related diseases show a greater challenge at both the primary and high school levels. The majority of children were at an average level of understanding of the concept 'water pollution-related diseases'. About 53% primary school learners and 38% high school learners are at an average level, although there is an indication of a sharp decrease in knowledge at the high school level. About 6% of high school learners scored less than 6 marks out of 16 marks. 51% of learners at the high school indicate a good understanding of the concept 'water pollution-related diseases' against 40% of primary school learners. Both in the primary and in the

high school, girls indicate a better understanding of water pollution-related diseases than boys.

4.4.1.3 Activity 3

Bovert, Sandtonview, and Ikage Primary Schools.

The questionnaire:

Actualization of pre-knowledge.

Focus: Scarcity of water and the dangers of using polluted water.

Each child is expected to supply the following details before completing the questionnaire.

Please make use of a black pen to complete the questionnaire.

School's name			
Surname			
Names			
Grade			
Age			
Gender			
Have you completed a questionnaire on water pollution?		Tick the relevant answer: YES= NO=	
	Learning Area	Learning outcome	Assessment Standard
Main focus learning area	Social Science	LO:3	AS: 3
Links with other learning areas	Natural Science	LO:3	AS: 2
Links with other learning areas	English	LO: 5	AS: 3

Adapted from Van Heerden(2006:14): Building Capacity for Sustainable Living

Read the extracts below and answer the questions that follow:

Extract 1 (Adapted from: Building Capacity for Sustainable Living):

“Water covers three-quarters of our planet. More than 97% of all the water is salt. The remaining 3 % is fresh water. ... Only 3% of the total available fresh water is found in rivers and lakes. Water is a remarkable resource on which most forms of life are dependent.”

Questions

1. What per cent of water is salty? 2
.....
2. What per cent of water is classified as pure water? 2
.....
3. Mention two areas where we find fresh water. 4
.....
.....
4. Can people, animals and plants survive without water? 2
Support your answer.
.....
.....

Extract: 2

(Adapted from: Quality of Domestic Water Supplies, Volume 1)

“According to Water safe for use: Water in blue and green classes is safe for lifetime use. Water in yellow classes may be safe for use under certain conditions, but should be used with caution: it is important to sample and assess the quality of water in the yellow class regularly. Expert advice should be called upon to determine the real threat to sensitive users. Sensitive groups should also be informed when water falls into the yellow class. Water falling into the red class should be considered unsafe for use

and should be treated. Water in red classes may be used for short-term emergency supply, but only where no alternative supplies are available. Water falling into the purple class should be considered unsafe for use and should be treated. Water in the purple class is unsafe even for short-term emergency use.”

Questions:

1. Under which two water classes is water safe to drink without condition? 2
a).....
b).....

2. Which water class can be used when there is no alternative for a short time?
a) 2

3. If you were to advise people on safe water to drink, which class of water? Would you advise people not to drink at all? 2
a).....

5. Which group of people would you pay the most attention to when supplying yellow class water to the community and why? 4
a)..... (b).....

i. Results from the primary schools:

Bovert, Sandtonview, and Ikage Primary Schools.

Chart that indicates the outcomes:

0-5Marks	0	0	0	0% Below average
6-10Marks	13	9	22	47% average
11-15Marks	7	15	22	47% good
16-20Marks	1	2	3	6% excellent
number of children	21	26	47	100%

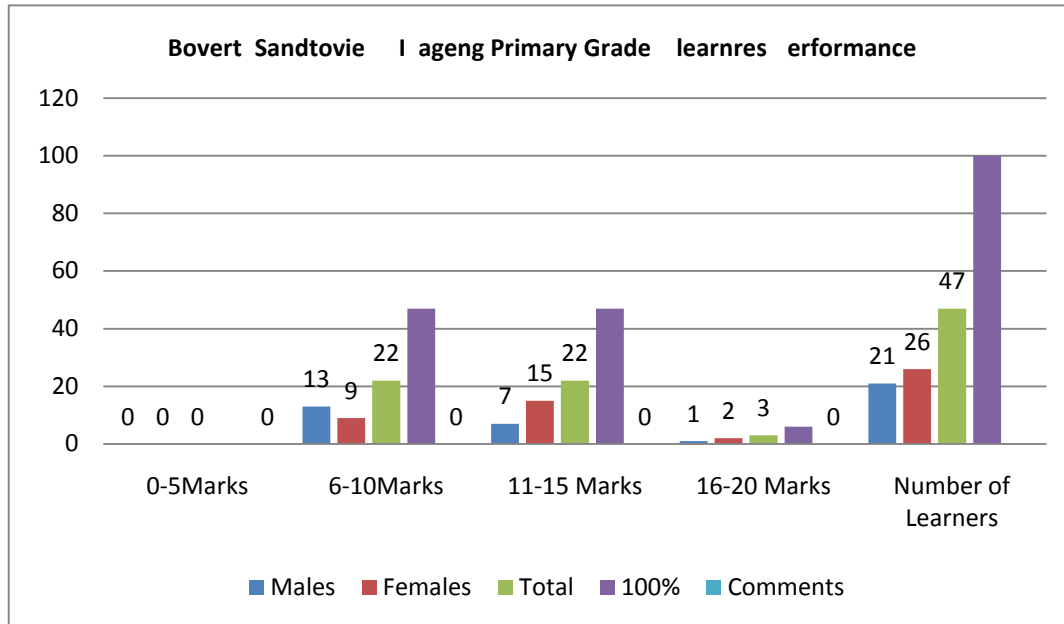


Figure 31: Activity 3. Primary schools performance stats bar graph.

ii. Results from the high schools.

Chart that indicates the performance of grade 9 learners at Sandtonview, Eastbank, and Kwabekilanga High Schools.

Marks	Males	Females	Total	100% Comments
0-5marks	1	0	1	2% Below average
6-10marks	10	9	19	36% average
11-15marks	12	15	27	51% good
16-20marks	2	4	6	11% excellent
Number of children	25	28	53	100%

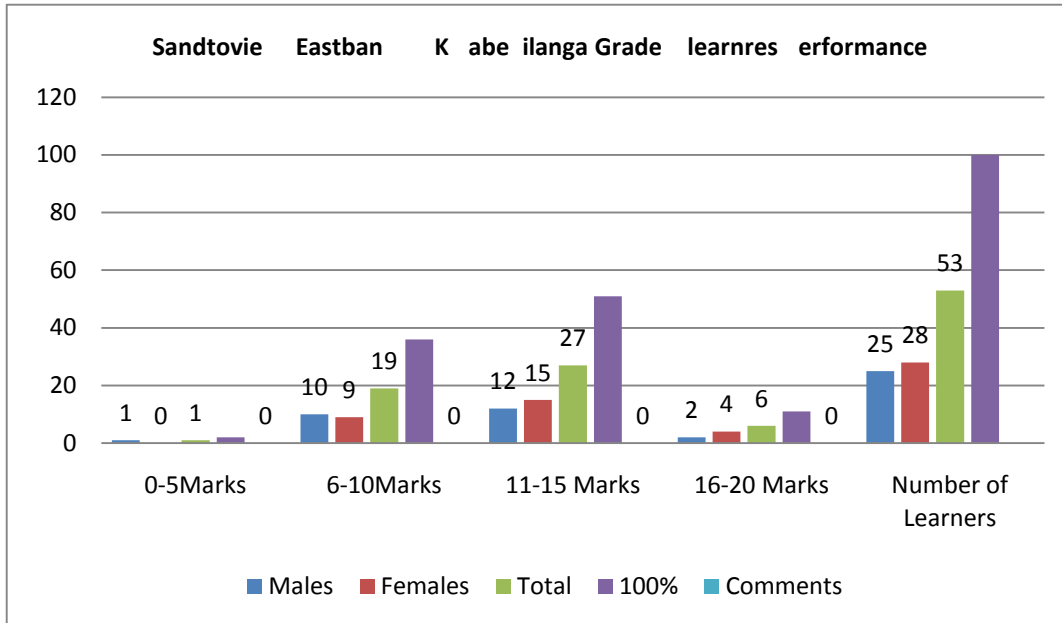


Figure 32: Activity 3 High schools performance stats bar graph.

iii. Analysis of the primary schools' and high schools' results.

The readings from the bar graphs clearly indicate a wider gap of knowledge with regard to the scarcity of water and the dangers of using polluted water. Learners indicated that they do not know the different classes of water. Furthermore, they do not know which group of water is more dangerous or more suitable to drink, and that poses a very great danger to the lives of children and the community at large. The social sciences and natural sciences learning areas have to play a greater role in imparting knowledge on the issues mentioned above.

4.4.1.4 Activity 4

Bovert, Sandtonview, and Ikage Primary Schools.

The questionnaire:

Actualization of pre-knowledge.

Focus: Dangers of playing in polluted water.

Each child is expected to supply the following details before completing the questionnaire.

Please make use of a black pen to complete the questionnaire.

School's name	
Surname	
Names	
Grade	
Age	
Gender	
Have you completed a questionnaire on water pollution?	Tick the relevant answer: YES= NO=

	Learning Area	Learning outcome	Assessment Standard
Main focus learning area	Social Science	LO:2;3	AS: 2
Links with other learning areas	Natural Science	LO:2;3	AS: 2
Links with other learning areas	English	LO: 5	AS: 3

Adapted from Van Heerden (2006:14): Building Capacity for Sustainable Living



Figure 33 Learners crossing the river after school.

Study the picture above and answer the questions that follow.

Choose the correct answer and write it on the dotted line.

1. Which danger are these children exposed to? (diseases; car accidents).
..... 2
2. Which group of people is crossing the river? (students; swimmers).
..... 2
3. From which residential areas do these children come? (suburbs; informal settlement).
..... 2
4. These children have a problem of going to school. (during floods; when crocodiles are hungry).
..... 2
5. Do you think these children are crossing the river (with shoes on; barefooted).
..... 2

[10x1=10]

- i. **The results from the primary schools:**
Bovert, Sandtonview, and Ikage Primary Schools.

Chart that indicates the outcomes:

Marks	Male	Female	Total	100% comments	
0-5marks		2	2	4	9% Average
6-10marks	18	25	43		91% Excellent
number of learners	20	27	47		100%
Number of Learners	20	27	47		100%

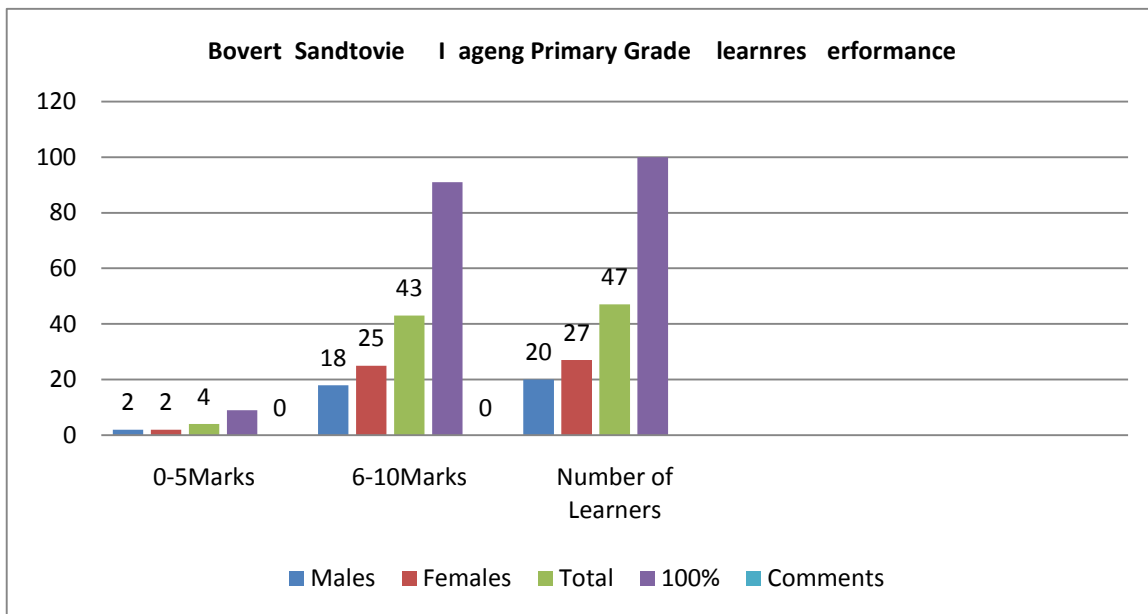


Figure 34: Activity 4. Primary schools performance stats bar graph.

- ii. **The results from the high schools:**
Sandtonview, Kwabekilanga and Eastbank. High Schools.

Chart that indicates the outcomes:

Marks	Males	Females	Total	100%	Comments
0-5marks	5	3	8	15%	Average
6-10marks	20	25	45	85%	Excellent
number of learners	25	28	53	100.00%	

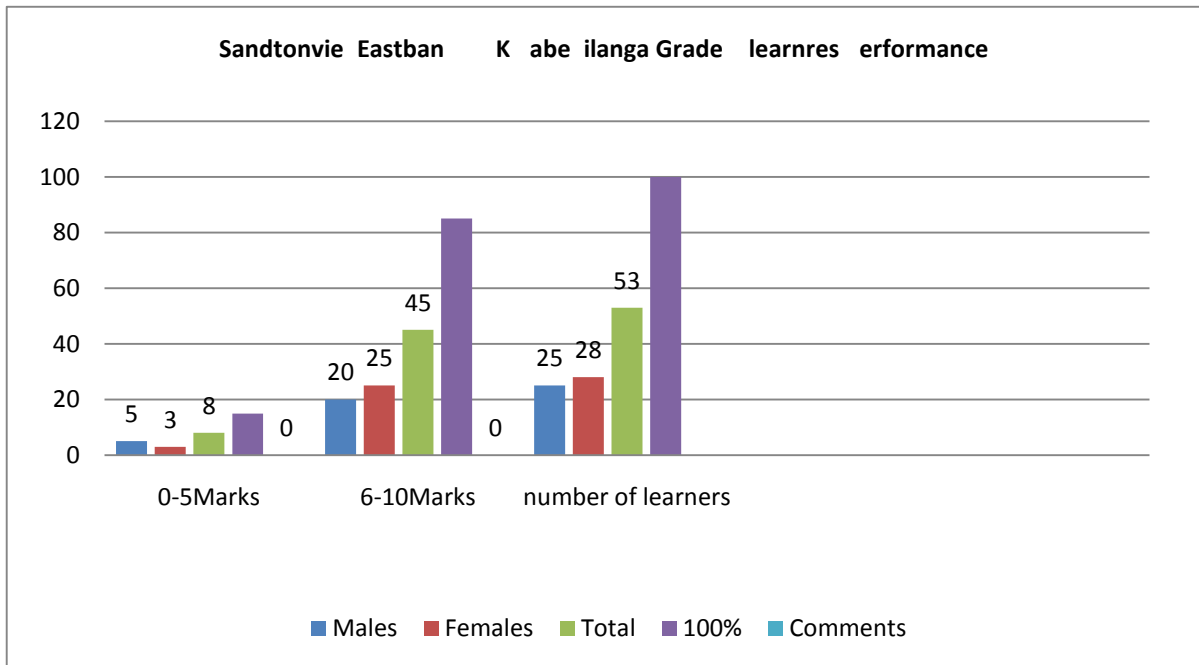


Figure 35: Activity 4. High school performance stats bar graph.

iii. Analysis of the primary schools' and high schools' results.

The bar graphs clearly indicate a very close gap between the knowledge of the primary and high school learners with regard to the dangers of playing in polluted water. The majority of the learners indicated that they know the consequences of playing in polluted river. Only 9% of the learners at the primary and 15% at the high school still lack knowledge regarding the dangers of playing in polluted water. Furthermore, most of the girls are more knowledgeable about water pollution than boys in both the primary and the high school.

4.4.1.5 Activity 5

Bovert, Sandtonview, and Ikage Primary Schools.

The questionnaire:

Actualization of pre-knowledge

Focus: Dangers of staying in informal settlements.

Each child is expected to supply the following details before completing the questionnaire.

Please make use of a black pen to complete the questionnaire.

School's name			
Surname			
Names			
Grade			
Age			
Gender			
Have you completed a questionnaire on water pollution?		Tick the relevant answer: YES= or NO=	
	Learning Area	Learning outcome	Assessment Standard
Main focus learning area	Social Science	LO:3	AS: 2
Links with other learning areas	Natural Science	LO:3	AS: 2
Links with other learning areas	English	LO:5	AS: 3

Adapted from Van Heerden (2006:14) Building Capacity for Sustainable Living

Read the extract (adapted from City Vision, dated 8-14 August 2007) and answer the questions about Alexandra Township that follow:

“ Three people died and 200 were left homeless on Sunday morning after 75 shacks caught fire when people were still asleep...the fire was caused by a man who came home drunk at around 2am...seventy-three shacks were destroyed in the incident. What made the fire even worse was the kind of material people used to build their shacks. There were many shacks built from cardboard material and it is very difficult to contain fires in those situations...”

Fill in the correct answer on the dotted lines:

1. Mention one thing that can disrupt children studying in an informal settlement? 2
2. What are dangers that you, as a learner, are exposed to when the incident mentioned in the extract takes place?.....;..... 2
3. What caused the incident mentioned in the extract?
..... 2
4. How did the materials mentioned in the extract cause the fire extinguishers not to be able to control the fire?..... 2
5. How many people died in this incident? 2

[10x2=20]

i. The results from the primary schools:

Bovert, Sandtonview, and Ikage Primary School.

Chart that indicates the outcomes:

marks	males	females	total	100%
0-5marks	14	12	26	55%
6-10marks	8	13	21	45%
number of children	22	25	47	100%

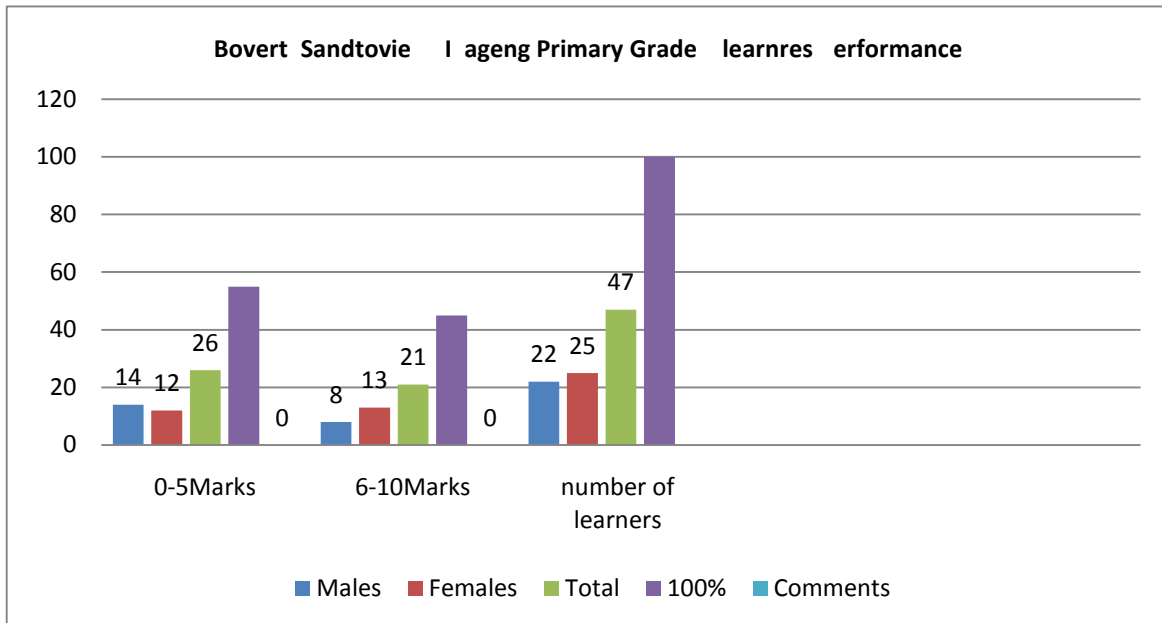


Figure 36: Activity 5. Primary schools performance stats bar graph.

ii. The results from the high schools.

Chart that indicates the performance of grade 9 learners at Sandtonview, Eastbank High and Kwabekilanga High School.

Marks	Males	Females	Total	100%
0-5marks	14	14	28	53%
6-10marks	11	14	25	47%
Number of children	25	28	53	100%

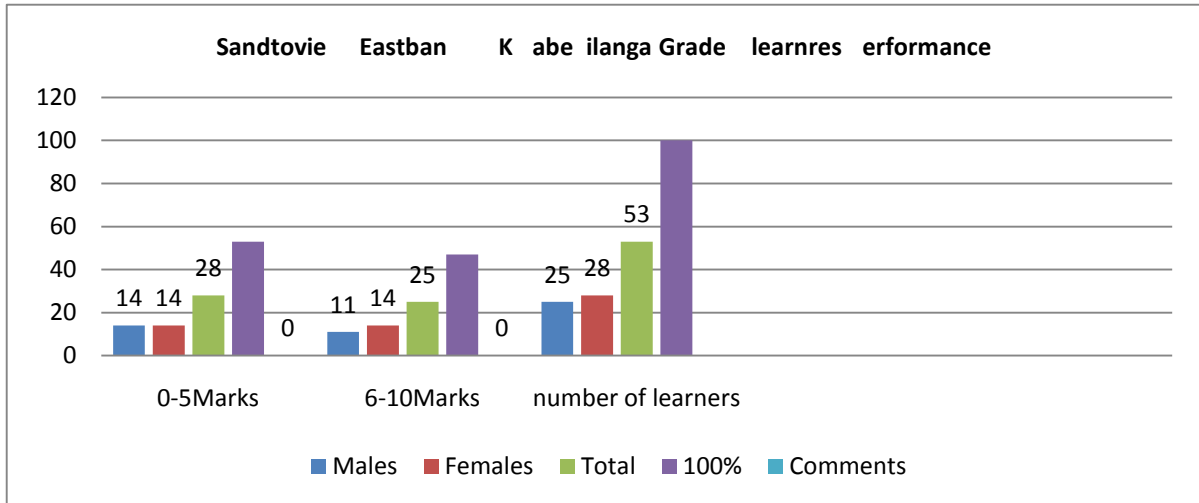


Figure 37: Activity 5. High schools performance stats bar graph.

iii. Analysis of primary schools' and high schools' results.

It is clear that children from the informal settlements do not have a very good knowledge of the dangers that they are exposed to while staying in the settlement. The Revised National Curriculum Statement should play a major role in making children aware of these dangers. Fifty eight percent of primary school learners do not fully understand the problems that they are exposed to while residing in an informal settlement, whereas 53% of the learners at the high school are unaware of the dangers of residing in an informal settlement.

4.4.1.6 ACTIVITY 6

Bovert, Sandtonview, and Ikage Primary Schools, and Eastbank, Kwabekilanga, and Sandtonview High Schools.

The questionnaire:

Actualization of pre-knowledge

Focus: Fresh water and preventive water pollution methods.

Each child is expected to supply the following details before completing the questionnaire.

Make use of a black pen to complete the questionnaire.

School's name			
Surname			
Names			
Grade			
Age			
Gender			
Have you completed a questionnaire on water pollution?		Tick the relevant answer: YES= NO=	
	Learning Area	Learning outcome	Assessment Standard
Main focus learning area	Social Science	LO:1;2;3	AS:2
Links with other learning areas	Natural Science	LO:2;3	AS: 2
Links with other learning areas	English	LO:5	AS: 3

Adapted from Van Heerden (2006:14): Building Capacity for Sustainable Living

Read the following extract adapted from Environmental Science, 9th ed. by Tyler-Miller (2003: 364) on how we can reduce water pollution, and answer the questions that follow.

“According to environmentalists, a more sustainable approach to dealing with water pollution requires that we shift our emphasis from pollution cleaning up to pollution prevention by (1) reducing the toxicity or volume of pollutants (for example, replacing organic solvent-based inks and paints with water based materials), (2) reusing wastewater instead of discharging it (for example, reusing treated waste water for irrigation), and (3) recycling pollutants (for example, cleaning up and recycling contaminated solvents for reuse) instead of discharging them.”

Open-ended questions:

1. List two reasons why water is so important to us.
.....
..... (2)
2. What are the two major things that you think are contributing to the shortage of fresh water in our country?
.....
..... (2)
3. Mention some of the effective ways that can be used to increase the supply of fresh water in our country.....
..... (6)
4. How would you define the concept ‘water pollution’?
.....
..... (2)
5. Most of the streams are polluted by (list two).....;
..... (2)
6. Indicate some of the effects of water pollution on human health
.....
..... (2)
7. Indicate two ways to reduce water pollution in the informal settlements?
..... (4)

[20]

i. Results from the primary schools:

Bovert, Sandtonview, and Ikage Primary Schools.

Chart that indicates the outcomes:

Marks	Males	Females	Total	100%
0-5marks	21	22	43	91%
6-10marks	0	2	2	4%
11-15marks	1	1	2	4%
16-20marks	0	0	0	0%
Number of children	22	25	47	100%

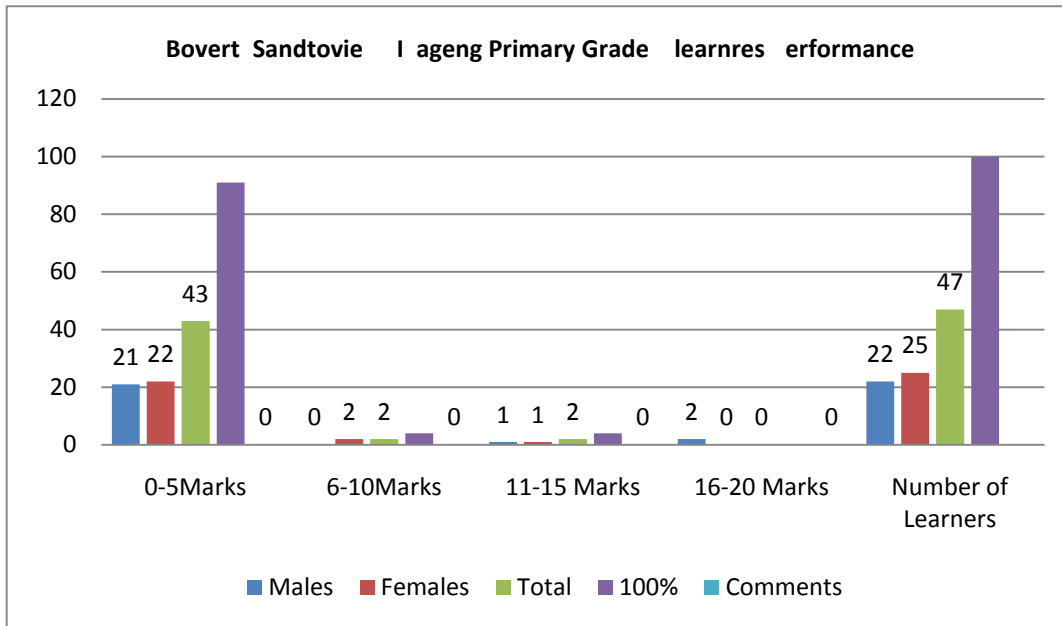


Figure 38: Activity 6. Primary schools performance stats bar graph

ii. Results from the high schools:

Sandtonview, Eastbank, and Kwabekilanga High Schools.

Chart that indicates the outcomes:

Marks	Males	Females	Total	100%
0-5marks	22	16	38	72%
6-10marks	2	8	10	19%
11-15marks	0	5	5	9%
16-20marks	0	0	0	0%
Number of children	24	29	53	100%

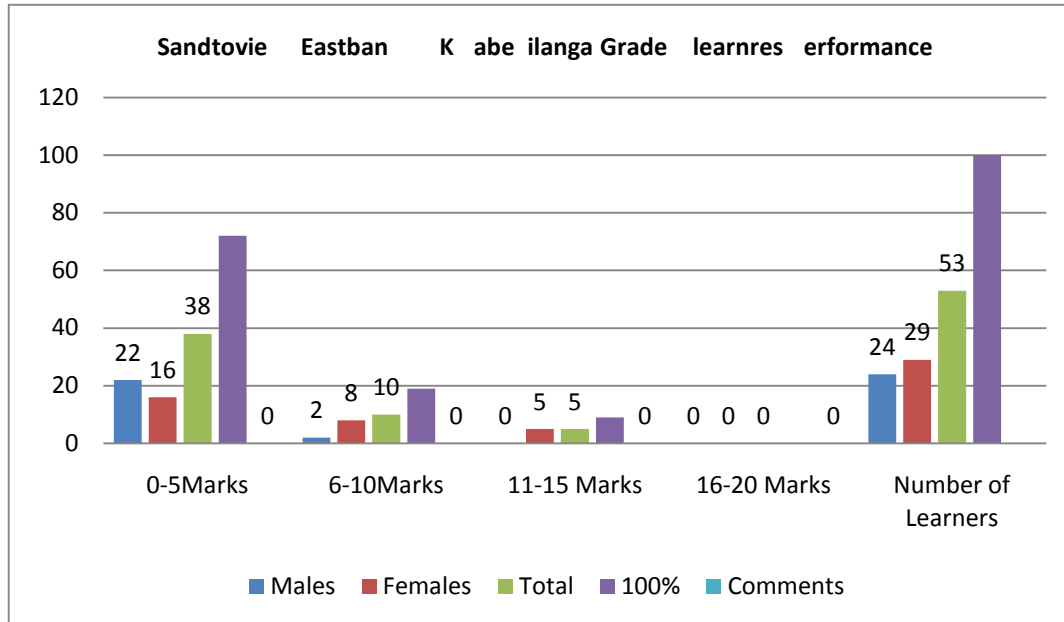


Figure 39: Activity 6. High schools performance stats bar graph.

iii. Analysis of the primary schools' and high schools' results.

Children across the senior phase do not possess adequate knowledge about the importance of fresh water in our community/country. The knowledge of primary school learners is too sparse: about 43% of the primary school learners who took part in the research obtained less than 5 marks out of 20; 38% of the high school learners scored less than 5 marks out of 20 marks. The graphs indicate that the majority of the learners who were part of the research on fresh water and preventive water pollution methods need to be taught and made aware of the importance of fresh water.

4.4.2 The post-questionnaire.

4.4.2.1 Activity 7

Bovert, Sandtonview, and Ikage Primary Schools and Eastbank, Kwabekilanga, and Sandtonview High Schools.

The questionnaire:

Focus: Sources of water and water supply.

Individual task:

This activity has been adapted from “Environmental Management in School” by Raath, Stone, and Van Heerden, (2006: 50).

Instruction:

Fill in the correct term or phrase in column B that suit the description in column A

E.G. Throwing of papers & tins in the river = Water pollution

Column A	Column B
I supply water to people in towns and cities.	
I drink water which comes from taps.	
I transport human waste and dirty water to a storage tank.	
Water from the sky fall into me.	
This system works with water and human waste.	
I store a lot of water for human and animal consumption.	

Total=12

Table. 5: Activity 7 assessment tool.

- i. Results from the primary schools:
Bovert, Sandtonview, and Ikage Primary Schools.

Chart that indicates the outcomes:

Marks	Males	Females	Total	100%
0-5marks	21	21	42	89%
6-10marks	1	4	5	11%
Number of children	22	25	47	100%

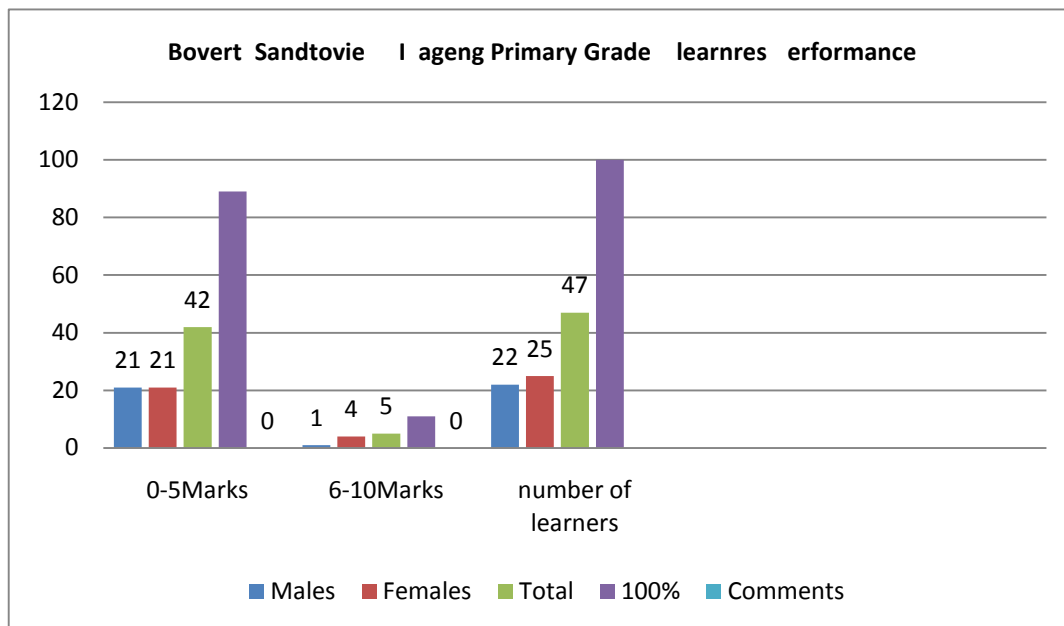


Figure 40: Activity 7. Primary schools performance stats bar graph

- ii. Results from the high schools:
Sandtonview, Eastbank, and Kwabekilanga Primary.

Chart that indicates the outcomes:

Marks	Males	Females	Total	100%
0-5marks	21	23	44	83%
6-10marks	4	5	9	17%
Number of children	25	28	53	100%

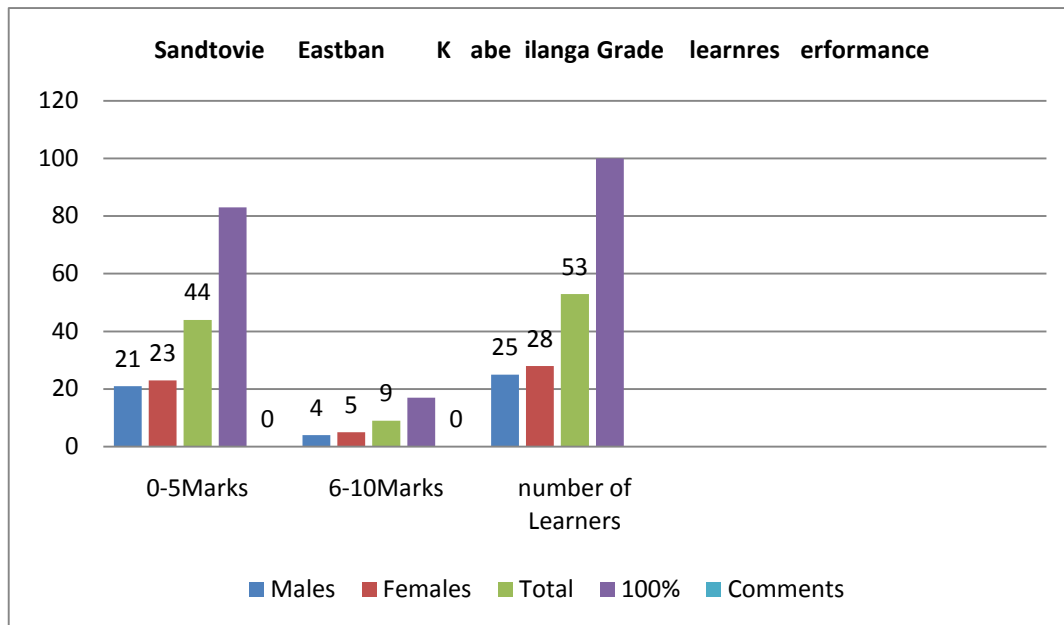


Figure 41: Activity 7. High schools performance stats bar graph

iii. Analysis of the primary schools' and high schools' results.

It was deduced that learners across the senior phase lack basic knowledge on sources of water and water supply. From primary school to high school 80% of the children indicate a huge gap in their knowledge with regard to the sources of water and water supply. There is a greater need to integrate environmental education concepts in the RNCS to cover a wider scope of awareness on water pollution and other related concepts such as water sources, scarcity of water and water supply. This will mean that if children do not know the sources of water and water supply, they will easily use polluted water, or easily pollute water.

4.4.2.2 Activity 8

Bovert, Sandtonview, and Ikage Primary and Eastbank, Kwabekilanga, and Sandtonview High Schools.

The questionnaire:

The location of the informal settlement and its hazards for schoolchildren

Please make use of a black pen to complete the questionnaire.

School's name			
Surname			
Names			
Grade			
Age			
Gender			
Have you completed a questionnaire on water pollution?		Tick the relevant block: YES= NO=	
	Learning Area	Learning outcome	Assessment Standard
Main focus learning area	Social Science	LO:3	AS: 3
Links with other learning areas	Natural Science	LO: 2;3	AS: 1; 2
Links with other learning areas	English	LO: 5	AS: 3

Adapted from Van Heerden (2006:14) Building Capacity for Sustainable Living
 Answer the questions below by supplying a correct answer in the provided spaces.



Figure 42: Baby nappies washed by water from polluted Jukskei river

Study the picture above before you answer these questions.

Table.6: Activity 8 assessment tool.

Would you say that the above picture portrays an informal or a suburb settlement?	(2)
Mention one reason why this settlement is located near the river.	(2)
Identify a woman washing clothes near the river and indicate one environmental problem that this activity will cause.	(2)
Besides the abovementioned problem, what is the other common environmental-related problem that is visible in the picture?	(2)
Identify two building materials of shacks in this informal settlement.	(4)



Fig. 43: Jukskei river, a dumping ground and learners play ground

Study the picture above and answer the questions in the stipulated spaces.

Identify children in the picture. What are the two most possible health hazards that the children are exposed to?	(4)
Do you think that these children are safe from diseases? If no, what are the two types of diseases that could possible affect the health of these children?	(4)

If these children are infected by the above-mentioned diseases, would that affect their performance in class? If yes, indicate how?	(4)
How would you easily advise these children so that they may not be contaminated by water pollution-related diseases?	(4)
Which project can you start at your school to make other children aware of water pollution-related diseases?	(2)

Total= 30

i. Results from the primary schools:

Bovert, Sandtonview, and Ikage Primary Schools.

Chart that indicates the outcomes:

Marks	Males	Females	Total	100%
0-5marks	10	9	19	40%
6-10marks	9	10	19	40%
11-15marks	1	5	6	13%
16-20marks	1	2	3	6%
21-25marks	0	0	0	0%
26-30marks	0	0	0	0%
number of learners	21	26	47	100%

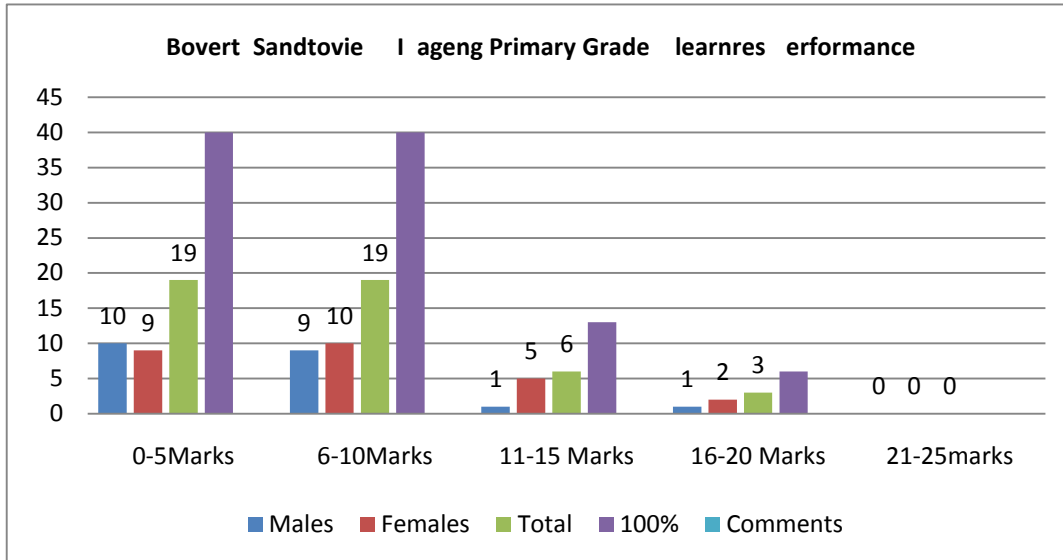


Figure 44: Activity 8. Primary schools performance stats bar graph

- ii. Results from the high schools:
Sandtonview, Eastbank, and Kwabekilanga
Chart that indicates the outcomes:

Marks	Males	Females	Total	100%
0-5marks	7	6	13	25%
6-10marks	9	4	13	25%
11-15marks	5	9	14	26%
16-20marks	3	7	10	19%
21-25marks	1	2	3	5%
26-30marks	0	0	0	0%
Number of learners	26	28	53	100%

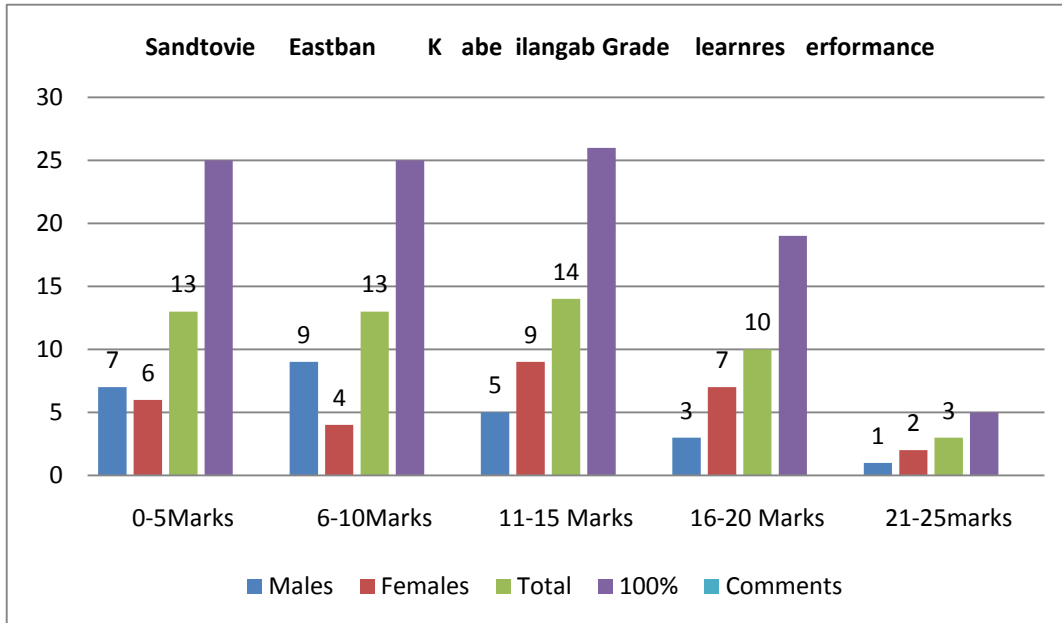


Figure 45: Activity 8. High schools performance stats bar graph

iii. Analysis of the primary schools' and high schools' results.

The outcomes of activity 8 show that the knowledge of learners at the primary and high schools does not vary so much. Although primary school learners more often suffer a lack of knowledge than high school learners, the general outcome indicates that learners do not possess the relevant knowledge with regard to the location of informal settlements and its hazards to school children. The majority of learners, both at primary and at high school scored less than 10 out of 30 marks. Thus, there is a need for the RNCS to improve on the adequacy of relevant knowledge, based on awareness, the location of informal settlements, water pollution hazards, and water pollution-related diseases.

4.5. Conducted Observation

The researcher conducted a field observation at Stjwetla informal settlement with the purpose of identifying evidence that support lack of awareness on water pollution related diseases. According to Strauss and Myburgh (2003:47) “the observation process therefore entails that the researcher or observer has a list of certain specifics that she /he will observe, often called an observation schedule...when observing qualitatively, observation is much more open when compared to observation as a quantitative technique”. The researcher will observe the following observation schedule: Human activities that contribute to water pollution in the Jukskei river; Organisms/aquatic animals that are found in the Jukskei river; and how polluted the Jukskei river is? The researcher used two checklists, one on Human activities that are contributing to water pollution in the Jukskei river; and the other on Organisms/aquatic animals found in the Jukskei river. Each checklist is accompanied by an assessment rubric that evaluates the outcomes of the observation; refer to table 7-10.

4.5.1 Human activities that contribute to water pollution in the Jukskei river.

Allers (1997:205) quoted Camp & Donahue (1994:359) as follows “...human activities affect local and even the planetary ecosystems in both direct and indirect ways” furthermore, Allers (1997:208) quoted the report of the world summit at Rio de Janeiro in 1992 as follows “everyone produces one kilogram of waste per day world wide, this creates some 428 million tons annually”. The researcher’s observation agrees with the statement quoted above, since most the human activities are contributing to water pollution in the Jukskei river. Stjwetla settlement has human activities such as washing clothes in the river.



Figure 46: Showing a car wash adjacent to Jukskei river above Stjwetla informal Settlement in Alexandra Township.

Moreover, just above Stjwetlas' bridge there is car wash; polluted water runs into the river. One of the disturbing observed issue is people relieve themselves into the river, since their area has no sewage system. It was shocking to observe a huge amount of waste material dumped inside the river. The researcher observed developed furrows between the shacks to pore polluted water that has been used for domestic purposes such as bathing, but disturbingly the wasted water runs into the river. These are some of the human activities that are making Stjwetla informal settlement unhygienic on a day to day basis.

According to <http://www.waterpollution.htm> page 2 of 11 under the heading point and nonpoint sources "...pollution is defined as: to make foul or unclean, dirty. Water pollution occurs when a body of water is adversely affected due to the addition of large amounts of materials to the water; when it is unfit for its intended use, water is considered polluted". In this case the observer finds

that water in the Jukskei river is not fit to be used since human activities are making water unfit for its intended use.

4.5.2 Organisms/aquatic animals that are found in the Jukskei river.

The researcher also paid attention in observing different kinds of animals/aquatic that are found in the river. Allers (1997:175) indicated four categories of water and different kinds of aquatic animals found in that specific group of water. He distinguish them as follows " **clean water**: has the presence of trout, insect larvae, tadpoles, water snails, water scorpions, water beetles, dragonfly, caddish fly, stonefly, mayfly nymphs, water algae, sludge worms, and flatworms; **Water slightly polluted**: has most water life still present with mayfly nymphs, and stonefly nymphs; **Moderate polluted**: has the absence of stonefly nymphs, mayfly nymphs, as well as caddish fly larva; **High polluted**: has only water algae, sludge worms and rat-tailed maggot; **Serious polluted**: has no water life". The researcher finds that the settlement has lot of huge rate-tailed maggot along side the river. The water is highly contaminated by water algae, and sludge worms which is a clear indication of water that is highly polluted. The researcher did not observe any fish in the water, a clear indication of highly contaminated water. At Stjwetla informal settlement it is impossible to see a tadpole or water snails, since pollution has reached a very high level.

4.5.3 How polluted is the Jukskei river?

The researcher observed the degree of seriousness as far as how the Jukskei river is polluted. According to the website http://www.alexandra.co.za/2003updates/media_031015_thestar_01.htm page 1of 1 under the title Death of a river it states that" the star has learned that E.coli counts-showing the presence of human faeces taken in the river had reached 21-million/ 100ml of

water. Shocking considering that internationally 200 E.coli/ 100ml are considered unsafe. The levels of E.coli in the water are much higher than they were in January 2001, when three people died after a cholera outbreak in Alexandra. The Cholera bacteria were found in the water downstream of the township". Furthermore, According to Thakadu (2003, 4) 'Jukskei a dumping ground' Geography learners and their teacher Mr. Solomon Mawela of the Chinese Kuo Ting school conducted an investigation of pollution at the Jukskei river and their findings indicated that "...the river is full of litter and...some members of the community do not have proper sanitation, they use the river to relieve themselves, which causes a bad smell. Some people have set up scrap yards and fix cars next to the river"

Downstream of Alexandra Township is Stjwetla informal settlement. Just towards the end of Alexandra Township, there is a huge sewage system that is discharging waste into the river, refer to figure 7. One of the human activities is people relieve themselves into the river and this accelerate the rate of pollution in the Jukskei river. The researcher collected a sample of water at Stjwetla informal settlement for testing at JHB water laboratory (see attached copy of the results) that indicates that water is highly contaminated and is imposing danger to human life. The testing of water indicate the nitrate that is 2.4mg/l and according to Quality of domestic water supply volume 1 (1996: 86) "Nitrate has the potential to cause tiredness and failure to thrive". The testing of chloride indicates 64mg/l; Quality of domestic water supply volume 1 (1996:72) states that "in fresh water, chloride concentrations are typically less than 10mg/l...health effects such as nausea and vomiting may occur at chloride concentrations in excess of 1200mg/l..." moreover in page: 60, "...the pH of most unpolluted water sources lies in the range 6, 5 - 8, 5. Below 6,5 may be found wherever acidification processes occur...the direct effects are the consequence of the irritation or burning of mucous membrane..." the recorded pH of Jukskei river is 6,4 and it poses danger to the community. The recorded

E.coli is 200mg/l which is a clear indication of presence of bacteria, viruses or parasites.

Checklist used to observe the human activities that are contributing to water pollution in the Jukskei river; and Organisms/aquatic animals that are found in the Jukskei river.

Table 7: Checklist used during observation of organisms found in the Jukskei river.

4.5.3.1 Checklist used during observation of organisms found in the Jukskei river.

Organisms/aquatic animals	Many in the river	Rarely seen in the river	Never seen in the river
Whirligig beetle			✓
Water snail			✓
Trout			✓
Rat-tailed maggot	✓		
Sludge worm	✓		
Water algae	✓		
Mayfly nymph		✓	
Stonefly nymph			✓
Caddish fly larva			✓
Flatworm		✓	
Dragonfly nymph			✓
Fish			✓
Frogs /tadpoles		✓	
Water scorpions			✓
Water beetles			✓

Table. 8: Rubric to assess the checklist of organisms/ aquatic animals found in the Jukskei river.

4.5.3.2 Rubric to assess the checklist of organisms/aquatic animals found in the Jukskei river.

Items covered	Poor	Average	Excellent
Degree of pollution	<p>✓</p> <p>The river water is highly polluted and has the following organisms/aquatic animals: Sludgeworms; water algae Rat-tailed maggot</p>	<p>The river water is slightly polluted and has the following organisms: mayfly nymphs; and caddish fly larva.</p>	<p>The river water is totally clean and free of pollutant. The river has the following organisms: trout; tadpoles/frogs; water beetle and water scorpions.</p>

Table, 9: Checklist used to observe human activities

4.5.3.3 Checklist used to observe human activities that are contributing to water pollution in the Jukskei river.

Activities	Often practiced	Rarely practiced	Never seen in practice
Throwing waste materials in the river	✓		
Washing clothes in the river	✓		
Washing cars near the river	✓		
Fixing cars near the river		✓	
Human relieving themselves in the river	✓		
Putting waste in dustbins			✓
Boiling water before is used for domestic purposes			✓
Digging pit toilets			✓
Awareness sign posts on pollution			✓
Cleaning of Jukskei river by Stjwetla residents			✓

Table. 10: Rubric to assess checklist of human activities

4.5.3.4 Rubric to assess the checklist of human activities that are contributing to water pollution in the Jukskei river.

Items covered	Excellent	Average	Poor
Pollution Awareness	The community is excellently aware of the concept pollution. The area is clean and tidy	The community seems to know about pollution, but the area does not look clean and tidy.	✓ The community is totally not aware of pollution problems. The area looks unhygienic, filthy and highly polluted.
Attitude and Behavior of people	Community has positive attitude and behavior towards the environment.	The community cares, but less about the environment.	✓ The attitude and behavior of the community is totally not environmentally friendly.
Degree of pollution	The environment is cared for excellently. No pollution of any kind is visible in the area.	The environment is partially cared for. There are few polluted areas.	✓ The environment is a dumping area of the community. The area is highly polluted.
Pollutants	No visible pollutants in the area	Few pollutants such as papers are visible in the area.	✓ The area is highly polluted by things such as papers, plastics, tins, human waste, rubbles, and oil from cars.

4.5.4 Observation Analysis

Allers (1997:106) stated that “all animals -including people, pets, and wildlife- need food, water, shelter, and space in which to live. These must be in quality...” it is therefore clear that Stjwetla informal settlement is a dangerous site for human settlement. Water at the Jukskei river is highly polluted to be used for any domestic purposes. The testing of water shows that E.coli is too high; therefore it imposes threats to health and human life in general. Children’s health is in danger of sickness and diseases from polluted water.

The dumping of waste material inside the river shows a huge problem of lack of knowledge and awareness of water pollution and its related diseases among the residents of Stjwetla informal settlement. Residents relieve themselves inside the river and use the same water for domestic purpose such as washing clothes and bathing; this shows that they are not aware of the outcomes thereafter of polluting water. Washing cars near the river decreases the amount of oxygen available in water and this imposes danger to aquatic animals. The researcher’s findings and observations clearly indicate that it is time for RNCS curriculum to start delivering adequate and relevant knowledge of water pollution and related diseases from primary level to higher institutions.

4.6. INTERPRETATION OF THE INTERVIEWS

The researcher interview people who have responded in different ways based on their specializations. The interviews were recorded by a tape recorder, and data was edited before transferred into writing. The editing was conducted as a way of phrasing sentences into correct grammar, but never changed the actual meaning of what the interviewee had to say.

4.6.1 Delta Environmental Centre for Education, and Rand Water (Environmental Education Specialist)

It is clear that the interviewees have adequate knowledge of the Revised National Curriculum Statement and environmental issues such as water pollution-related diseases. An environmental specialist indicated that the RNCS covers most environmental issues in all the learning areas. The problem as stated, was linked to educators' lack of knowledge of how to teach as indicated by the following quotation from an Environmental Education Specialist, According to the interviewee of Delta Environmental Centre for Education specialist "The curriculum is not short-sighted or it does not have gaps and it is totally inclusive; and by putting environmental education as a separate learning area we will be taking away its cross-cutting and its interrelatedness approach. Environmental education should remain integrated to other learning areas. A solution is to train teachers to see that interdependence and the role of the environment in almost every learning area and all aspects of our lives".

A Rand Water Environmental Specialist indicated that they teach children about water pollution; the only challenge they picked up from different schools is that most children know little about water pollution-related diseases. For the sake of awareness, this is what the Rand Water Environmental Specialist said, "We give children tools/ knowledge based on how they can use water, such as, washing hands before they eat or from relieving themselves from toilets and not using the river as a place to relieve themselves. We also teach six meanings of being water wise (Rand water brochure: water wise 2008)

Both the Environmental Education Specialists from Rand Water and Delta agree that water pollution hampers learners' attendance and learning progress at school.

4.6.2 Gauteng Department of Education, District 9 (Geography Subject Facilitator)

The interviewee indicated that the RNCS has certain flaws, especially when it comes to the number of environmental issues that has to be covered in all the learning areas. She indicated that very little is covered in learning areas such as Geography and the Social Sciences. She mentioned that the integration of Environmental Education in all learning areas is insufficient. She indicated the poor awareness on water pollution related diseases is seen when learners are often absent from school due to different diseases. "Children often complain about headache; stomach pains/runny stomach; dizziness; influenza; eye-ailments; and bilharzia". Lastly, she also indicated that it will be justice if Environmental Education can be introduced as a learning area.

4.6.3 An Educator (H.O.D)

(Geography; Social Sciences; Life Orientation; English and Tourism H.O.D at Santonview).

An educator who teaches most of the learning areas, including social sciences, geography, Travel and tourism, Life orientation, and English stated that Environmental Education is supposed to be a learning area on its own, since most of the learning areas give very little coverage to environmental issues.

The educator indicated that there is no in-depth coverage of environmental issues in other learning areas. He said that there is a high rate of absenteeism under the influence of truancy. Although, most learners were absent from school due sicknesses that are water-pollution related. Many learners

complained about headaches, stomach complaints, diarrhoea, and bilharzia. The educator emphasized that there is a lack of awareness of water pollution-related diseases at school level, and he expressed the wish that learners could be taught water pollution and other environmental issues from a very early age. The perception of the educator with regard to awareness was, "There exists a small degree of awareness, there are learners who are aware of diseases like cholera, bilharzia, and malaria; but some are not aware of these diseases at all. Those who know about these diseases do not know that they may contract these diseases when they are exposed to contaminated water or polluted water" (Interviewee. Santonview H.O.D).

4.6.4 An Educator Boverit Primary school (Social Sciences and English educator)

Boverit Primary educator indicated that the revised national curriculum system it is a good tool in integrating all learning areas. The educator stated that there is a need to look at environmental issues that are found in all learning areas, since they are not adequate. Furthermore, he stated that learners' awareness on water pollution is very minimal, since some of the learners are still playing in the Jukskei river. Moreover, he feels that there is a need to introduce environmental education as a learning area.

4.6.5 Johannesburg Water Laboratory (Quality of water testing, Sampling, Analysis)

The Johannesburg Water Specialist who assisted in testing the water from the Jukskei River responded more accurately on water pollution-related diseases. She indicated that water pollution from sewage systems is one of the biggest sources of diseases that children suffer from. The interviewee indicated that diseases hamper learners' performance at school. Diseases such as headaches,

diarrhoea, and bilharzia were mentioned as some of the common diseases that trouble children who play in contaminated water.

It has been elaborated in the interview that all chemicals found in contaminated water are dangerous to the health of a learner and should not be neglected since they are equally crucial to consider when testing the quality of water. The interviewee indicated, after testing the water of the Jukskei river, that the water is dangerous and may not be used for human consumption at all. The outcomes of water testing are as follows: Chloride is 64mg/l; E.coli is 200mg/l; pH is 6,4 ; phosphate is 0.25mg/l; Nitrate is 2,4mg/l; Ammonia is 1,4mg/l and COD of 120 mg/l. Based on the outcomes of water testing results, the residents together with learners' health are at risk.

4.7 CONCLUSION

This chapter dealt with the analysis and interpretation of the methods laid down in chapter one. The results of the questionnaires by grades 7 and 9 learners from a number of schools were analyzed and interpreted. The results indicate that most of learners have insufficient knowledge on water pollution-related diseases. There is greater need on awareness on water pollution-related diseases in learners. The interviews conducted to various stakeholders such as Delta environmental centre for education, Rand water, Department of education, and the Educator from Santonview shows a greater concern on inadequate awareness of water pollution-related diseases in learners.

Chapter 5 will give details of the conclusions and recommendations, based on the findings and outcomes of this research.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

5.1 INTRODUCTION

In this chapter the outcomes of the analyzed questionnaire, interviews, and the observations made during the research will be summarized. Conclusions based on the outcomes of the research will also be made followed by recommendations for further study.

5.2 SUMMARY

In trying to ascertain how children in informal settlements are affected by water pollution-related diseases as far as their attendance and performance at school is concerned, the following key points were considered:

A literature study was conducted on water pollution, sustainable development, the RNCS, relevant environmental and water pollution regulatory laws, the testing of the quality of water, and the development of an informal settlement.

The triangulation method was used, making use of questionnaires, interviews and observation. The RNCS learning areas were consulted in drafting the questionnaire. The focus was on the social sciences as a learning area. Pre-questionnaires and post-questionnaires were linked to detect the learners' knowledge and awareness with regard to water pollution-related diseases in the informal settlement. Schools were selected within the targeted research area. The following aspects were outlined: how interviews with different stakeholders were to be conducted, and how learners were

to answer the questionnaire. Interviews were recorded by a tape recorder and then transcribed. The outcomes of the questionnaires were explained by means of graphs.

In chapter four the analysis of the questionnaires was done. The focus of the questionnaires was knowledge of environmental issues linked to water pollution-related diseases. The results of each activity were interpreted and analyzed. An interview was conducted with a resident of the Stjwetla informal settlement, and the outcomes were analyzed.

Formal interviews were conducted with specialists from the Delta Environmental Centre for Education and Rand Water, the Gauteng Department of Education, and Johannesburg Water, and were analysed. The Delta Environmental Centre, Rand Water, Johannesburg Water and the Gauteng Department of Education have a common focus, namely, that water pollution-related diseases hamper the performance and attendance of learners at school.

5.3. RECOMMENDATIONS

The questionnaires that the learners completed, the input from the interviews conducted with a representative from the Delta Environmental Centre, with the Gauteng Department of Education, with Johannesburg Water, with Rand Water, and with residents from the Stjwetla informal settlement and the literature study necessitates an intervention by the Department of Education to:

- review the integration of Environmental Education in the RNCS learning areas;
- review the contents of Environmental Education covered in the RNCS learning areas; and
- introduce Environmental Education as a learning area.

5.3.1. The learners

- Learners have to be made aware of water pollution in rivers, and littering in the informal settlement; and water pollution-related diseases; and
- they should form part of a Non-Governmental Organisation (NGO) in their communities to assist in water pollution-awareness campaigns.

5.3.2. The community and other structures should

- work with existing water supply institutions such as Johannesburg Water or Rand Water, to learn how they can be water-wise, prevent water pollution, and become alert to water pollution-related diseases; and
- work closely with the municipality to find ways of creating common dumping grounds other than rivers.

5.3.3. Schools around Stjwetla informal settlement in Alexandra Township

- Schools should initiate water pollution-related projects that deal with awareness in their communities.
- They should work closely with community-based organisations (NGO's) to facilitate the awareness of water pollution in informal settlements.
- It is important for schools to associate themselves with organisations such as the Delta Environmental Centre for Education, Johannesburg Water, and Rand Water, either by visiting these institutions or by inviting them to offer educational programmes on water pollution-related diseases and other environmental issues.

5.4. RECOMMENDATIONS FOR FURTHER STUDIES

5.4.1. Recommendations emanating from this research

- There is a great need for the integration of Environmental Education in the RNCS learning areas. For the betterment of the lack of inadequate information with regard to environmental issues that are to be covered holistically in all learning areas, the Department of Education needs to create a structure of Environmental Education specialists who will co-ordinate efficiently the integration of Environmental Education in all the RNCS learning areas.

5.4.2. Areas to be researched

- The outcomes of this research are for a specific area (Stjwetla informal settlement) and cannot be generalized. It is therefore recommended that this research be applied to other rural and urban informal settlements where there are primary and high schools. The outcomes can be compared. An argument may be forwarded to introduce Environmental Education in schools to increase the awareness and knowledge of learners of environmental issues.
- How important is the supply of basic needs in the informal settlement, such as water, sewage, dustbins, and electricity?
- The relevancy of basic education to the residents of the informal settlement.
- How essential and active are community based structures with regard to the alleviation of environmental issues and problems?

5.5. Conclusion

This chapter gave a summary of all chapters in this thesis. The recommendations of the research were outlined with regard to learners; the community and other structures; and the schools around Stjwetla informal settlement in Alexandra Township. Furthermore, the research laid down the recommendations for further studies and also areas that need to be researched.

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APPENDIX 1

Interview

Delta Environmental Centre for education and Rand Water Educational Specialists.

Education is considered to be a key to success for all persons. There are various challenges to children that may lead to their underachieving or not achieving at all. Children from the informal settlements experience unique challenges, some of which are beyond their control.

This interview is concerned with water pollution-related diseases that lead to challenges that hamper learners' performance at school.

This interview is confidential; your name will not be disclosed. We would like your personal opinion regarding these issues.

Date: 8 April 2008

KEYS: S: Researcher (interviewer)

Delta: Environmental Education Specialist, Di Beeton

Rand: Rand Water (Water Specialists), Samantha

S: Good day! Would you please share with me the work of the Delta Environmental Centre at schools in the Gauteng Province?

Rand: Ok! Mm, there is quite a need for an Environmental Centre in urban areas because we do not have many open spaces any more due to over-development. Because of urbanization, children are less aware of the environment and how essential everything is to us to survive. I am referring to natural resources, air, clean water, and enough food. The

existence of an Environmental Centre is essential so that schools can contact us, and we can aid learners with understanding environmental issues and how they can become more environmentally aware.

Delta: I think the teachers find it very difficult to cover some of the topics in their schools, so to come to a Centre where the facilities and activities are presented in a different way is a stimulating experience for young learners.

S: Which grades have you been paying most attention to and why?

Rand: Mm! We focus on all grades, but we do get more bookings and requests from the intermediate phase, which is grades 4-6.

Delta: It is the same applies; we do get the same programme.

S: What are some of the topics that you cover when teaching children?

Rand: Well! What we do at Rand water is we focus mainly on water pollution, purification, management, ecology, and the testing of the quality of water.

Delta: The Delta programme covers a wide range of environmental topics, from animal adaptation, to ecology, bio-diversity, population dynamics, climate change and waste management. It also depends on what the teachers request and what is relevant to the curriculum requirements; and then, as far as water is concerned there are many topics.

The water programmes are handled by Rand Water.

S: When schools visit your Centre, do you consider where they are coming from, so that you can specifically address issues that concern them most? If yes, how do you do that?

Delta: When the school books, the teacher does the booking. We try to get as much information as possible from the teacher around the topic he/she has requested and what the needs linked to the curriculum are, so that the outing is not just a visit, but it actually has a very strong educational accent. Obviously we take into account the area where the children come from, and the language they speak, and try to assess what they have already done, what they hope the visit would add to their learning

and what they are going to do with the information when they get back to school. So there is a pre-visit and a post-visit purpose to the whole planning.

S: Have you ever addressed children from informal settlement schools on water pollution-related diseases? If so, which type of diseases do you often pay most attention to?

Rand: We pay the most attention to diseases that are most common, and that children might know, such as typhoid, cholera, and diarrhoea. We focus on how one contracts these diseases and how to prevent being infected.

S: Generally speaking, do you find that most of the children are familiar with the diseases that are water pollution-related?

Rand: They are familiar with the fact that if they swim in water or drink river water they may get sick, but they cannot name the diseases.

S: As an Environmental Education Specialist, do you think children lack knowledge because our RNCS (learning areas) are not offering sufficient or relevant knowledge on water pollution-related diseases?

Delta: I think the RNCS gives teachers many opportunities in many learning areas and subjects to cover those issues. So, I don't think there is a flaw with the RNCS. There may be a lack of knowledge on the part of teachers, or on the immediate environment, and how that impacts on the children's health. But the RNCS is not the limiting factor.

S: Would you say that educators also lack knowledge to a point where they need training?

Delta: I would say, yes! Teachers must be trained to look at the physical Signs, the children's behavior, and try to respond to that, because in some schools the toilets are so dirty, and the speed of diseases spreading is encouraged due to the physical condition of the school environment. It is therefore the responsibility of the teachers, the management of the school, and the SGB to monitor the surrounding environment where the children live.

S: The Department of Education has released a White Paper that indicates a high rate of absenteeism at schools. Would you say that water pollution-related diseases are some of the illnesses causing children to often be absent from school?

Delta: Yes! I think so, although I would not say it is the core or the only reason. There are many other factors that contribute to absenteeism that may relate to poor nutrition, HIV and AIDS, and bad eating habits because of poverty-related issues. Children are also exposed to contamination and the inadequate provision of clean water and this impacts harshly on their ability to combat diseases.

S: As an education Specialist, do you think that absenteeism can affect learners' performance?

Delta: There is no doubt about that, it is a fact. Children who are not at school can't learn. A school is a place of teaching and learning; if children are continuously absent, they fall further and further behind to a point where they can not catch up. We have a situation in South Africa where, in comparison with the rest of Africa, nearly all our children attend school. In many other countries in Africa, children, specially girls, do not attend school; we have to keep our children in school.

S: How do you ensure sustainability to children whom you have taught on concepts such as water pollution, when they are at schools or elsewhere?

Rand: What we are doing in our workshop is to offer learners ways of being safe with water. We give them the tools or knowledge of how to use water, such as washing hands before they eat, or after going to the toilet, and not using the river as a toilet. We use 'Water wise Education brochure. 2008. Conserve Water, Conserve the environment. Rand Water. Johannesburg' when we teach them six ways of being water-wise, namely, 1. Respect water, respect life. We emphasize that without water nothing on this planet can survive. 2. Do not waste water. We

teach children on how they can use water sparingly, e.g. by taking shorter showers and smaller baths, and not letting the tap run when brushing teeth. 3. Do not pollute water, that is, by throwing dirty matter into the water, washing clothes in rivers, and using the river as a toilet. 4. Pay for your water. Most children think that their parents pay for water and not the cleaning of water. learners must be taught that water is for free, but we should pay for purifying it. 5. Take action: save water, conserve water; and deposit rubbish in a dustbin. 6. The sixth one encompasses all of the above. Once we taught them that, we teach them a little song and dance to make sure that they understand all the six meanings of saving water. We also say a pledge with them on how to be water wise, and sign it before they go home.

S: Would you share with me your experience of visiting a community in an Informal settlement. If you haven't been to such a community, what are your plans on visiting such a community with the purpose of bringing awareness of the concept of water pollution to them, especially to the children?

Delta: Well, we visited schools and many informal settlements. The overriding picture is one where the school is not a healthy environment. To learn in an environment that is not a positive learning environment. One has to have a positive learning environment; and if you don't have clean and adequate water, but a filthy, dirty environment, you cannot learn properly.

S: Environmental issues are major debatable matters in the world today. Do you think it is necessary for the Department of Education to introduce Environmental Education as a learning area in our schools with the purpose of inculcating relevant and sufficient knowledge of environmental issues to our children?

Delta: No, because the underlying principle of RNCS is (i) human rights, ii) social justice, iii) a healthy environment, iv) inclusivity. And these are the underlying principles and it is written into all the learning areas. If

you look at issues like the provision of clean water to schools, it is a human rights issue, because every person has a right to a clean and healthy environment. It is a social justice issue that in this country, in 2008, there should be children who don't have access to clean water, clean drinking water, and have clean toilets in their schools. A healthy environment is everybody's right. The curriculum is not shortsighted nor does it have gaps, and it is totally inclusive. By placing the environment into as a separate learning area we will be taking away its interrelatedness approach. A solution is to train teachers to see that interdependence and the role of the environment in almost every learning area, and in all aspects of our lives.

S: Would the Delta Environmental Centre offer training to educators if the Department offers them the opportunity to do so?

Delta: Yes! We are ready for them.

S: I am thankful for your effort, contribution, and time.

Interview

Department of Education, District 9, Geography Facilitator

This interview concerns the effectiveness of the Revised National Curriculum Statement in addressing water pollution problems as an environmental issue in the classroom.

This interview was conducted with a departmental official from district 9 in Sandton on 13 December 2007.

This interview is confidential: your name will not be disclosed. You are requested to give your personal opinion on the issues.

Keys: S = Researcher (Interviewer)

T= Interviewee

S: Would you please be so kind as to indicate your position the Department of Education.

T: I work as a Geography subject specialist. I facilitate Geography in district 9. I monitor and evaluate the effectiveness of teaching and learning in schools.

S: Do you have a proper understanding of the Revised National Curriculum System?

T: In a way, yes, since I was trained to train educators.

S: Do you find that the RNCS caters for integration in all learning areas?

T: Yes, it does. Subjects are not taught in isolation; they are integrated with one another. Different concepts are covered in all learning areas.

S: In this integration, how are environmental issues addressed in each learning area?

T: To some extent they are, but not adequately. If Environmental Education can be a subject on its own, environmental issues will be

addressed in a way that will allow learners to act responsibly in relation to the environment.

S: Does the assessment and evaluation in each learning area address children's health issues as a way of understanding the poor performance of such children? If it does, how is it benefiting or improving the children's performance?

T: No, when a learner has failed a test, educators often do revision, or offer extra lessons. There is no criterion on assessment and evaluation that states that educators should look at the health status of children. Children are offered a chance to complete tasks that have been done in their absence.

S: Has the Department of Education ever developed a means of improving the methods of assessment and evaluation in such a way that you may include environmental issues that may affect the performance of learners in a classroom?

T: No! I wish the Department would develop assessment methods that address the health status of learners in school.

S: As a former educator, what are some of the diseases that you think are contributing to a poor performance of learners in class?

T: Children often complain about headache, stomach pains/ runny Stomach, dizziness, influenza eye infections, and bilharzia.

S: Does the Depart of Education influence the schools to do follow-ups on where the child comes from (settlement) as a way of ascertaining the relationship between the performance of a child and where the child stays?

T: It is the responsibility of each school to know where the child comes from, but I do not know of any act or regulation that states that educators have the responsibility of knowing the relationship between the performance of a child and his/her place of residence.

S: Do you think it will be wise to include environmental issues that hinder the performance of children in class in the educational guidelines.

T: I think the child should be looked at holistically. Yes! It can be a good idea to look at all environmental aspects that we have been deliberating upon.

S: I would like to thank you for your contribution and your time.

Interview

Sandtonview Educator

Education is seen as a key to success for all persons. There are various challenges that children encounter that may lead to under-achievement or to not achieving at all. Children from the informal settlements have their unique challenges, some of them beyond their control.

This interview concerns the integration of the RNCS (Revised National Curriculum Statement) with Environmental Education in all learning areas. Take note that this interview is confidential. Your name will not be disclosed. You are requested to give your personal opinion on these issues.

Keys: S: Researcher

T: Interviewee (Educator)

S: Good day, Sir!

T: Good day to you!

S: For how long have you been teaching?

T: I have been teaching for eleven years.

S: Did you attend courses on the Revised National Curriculum Statement?

T: yes I attended the training.

S: Do you find RNCS a good tool in teaching at our schools, and why do you say so?

T: The RNCS is the best thing that ever happened in our education system,

because it brings about creativity in learners, and teachers go out of their way to plan their lessons. There is interaction between teachers and learners. The teacher's role becomes that of a facilitator; and learners become more independent and responsible for their own learning.

S: Which learning areas have you taught since the beginning of career?

T: I taught English, Social Science, Geography, Tourism, and Economic Management Sciences and Life Orientation.

S: Would you say that Environmental Education issues have been well integrated in all the learning areas that you have taught?

T: Mm! They have been covered, although not in great detail. For example, in English there may be a comprehension test that covers an aspect of the environment that learners will have to read and answer. But environmental issues are not covered sufficiently across all the learning areas. Obviously, subjects like Geography and Tourism will cover aspects like global warming, water pollution and sustainable development, and other aspects that have to do with environment; but not in detail.

S: From your personal teaching experience, do you find learners adequately aware of water pollution-related diseases?

T: There is less of an awareness. There are some learners who are aware of diseases like cholera, bilharzia, and malaria, but not all of them. Those who know about these diseases, do not know that you contract these diseases after you have been exposed to contaminated or polluted water.

S: How is the attendance of learners in your school; would you rate it as excellent, average, or poor?

T: It is average.

S: What would you say is the general reason for absenteeism in your school?

T: I would say it is truancy. Mm! Because when learners are absent, they are supposed to produce a letter from their parents or a doctor's or

medical certificate. So, if there isn't a letter from the parents or a note from the doctor we assume that it was truancy.

S: Does your school invite health care inspectors to advise children on environmental issues such as water pollution-related diseases?

T: Unfortunately not. I have been teaching at this school for five years and I have never seen a health inspector at the school to advise learners about environmental issues such as water pollution-related diseases.

S: Does the school have programmes that they run based on environmental issues; if yes, can you mention them?

T: Yes! The school does have environmental programmes. There are environmental clubs; the high school has an environmental club. They collect cans, in a way it is recycling, and they sell them. The primary school learners feed birds, and also make shelters for the birds, and they plant trees on Arbor day.

S: Do you think there is a need for Environmental Education to be Introduced as a learning area in our schools?

T: Yes, I do. I feel that we need a greater awareness of environmental issues. So, if it is introduced in the primary schools, we will surely not have many of the environmental problems that we have today. Learners waste water, pollute water, and drink dirty water. They do not know whether they have to boil water or not. Today the world is grappling with big environmental problems such as global warming. This says to me that we do not know much about the conservation of the environment. Hence I feel that if this subject was to be introduced in schools especially in the primary school we will be able to eliminate some of these problems.

S: Can you mention some of the areas where your learners come from?

T: Most of our learners come from areas such as Alexandra, Soweto, Bramley, Sandton, and Lombardy East and West.

S: Thank you for your time and input.

Interview

Bovert primary school

Education is seen as a key to success for all persons. There are various challenges that children encounter that may lead to under-achievement or to not achieving at all. Children from the informal settlements have their unique challenges, some of them beyond their control.

This interview concerns the integration of the RNCS (Revised National Curriculum Statement) with Environmental Education in all learning areas. Take note that this interview is confidential. Your name will not be disclosed. You are requested to give your personal opinion on these issues.

Keys: S: Researcher

T: Interviewee (Educator)

S: Good day, Sir!

T: Good day to you!

S: For how long have you been teaching?

T: I have been teaching for 10 years.

S: Did you attend courses on the Revised National Curriculum Statement?

T: Yes I did attend the RNCS training and did a full course at Rau

S: Do you find RNCS a good tool in teaching at our schools, and why do you say so?

T: RNCS is an effective tool across the curricula. The teacher's role becomes that of a facilitator; and learners become more independent and responsible for their own learning. RNCS assist me in integrating learning areas that I teach with other learning areas.

S: Which learning areas have you taught since the beginning of your career?

- T: All learning areas. As a primary educator we have been trained to teach all learning areas.
- S: Would you say that Environmental Education issues have been well integrated in all the learning areas that you have taught?
- T: it is difficult to say yes, since there are many environmental issues that are not found in other learning areas. I admit that certain issues have been covered, but there is a need to add more issues related to environment.
- S: From your personal teaching experience, do you find learners adequately aware of water pollution-related diseases?
- T: partially, yes! Here in Alexandra there are many learners who play in the Jukskei river, which is a health risk.
- S: How is the attendance of learners in your school; would you rate it as excellent, average, or poor?
- T: It is average.
- S: What would you say is the general reason for absenteeism in your school?
- T: poverty is a serious problem in this settlement. Most learners do not come to school due to various reasons. Just to mention a few; sickness, hunger, and abuse from elderly members of the community.
- S: Does your school invite health care inspectors to advise children on environmental issues such as water pollution-related diseases?
- T: Not that I know.
- S: Does the school have programmes that they run based on environmental issues; if yes, can you mention them?
- T: No!
- S: Do you think there is a need for Environmental Education to be Introduced as a learning area in our schools?
- T: Yes, I do. I feel that we need a greater awareness of environmental issues. So, if it is introduced in the primary schools, we will surely not have many of the environmental problems that we have today. Learners waste water, pollute water, and drink dirty water.

- S: Can you mention some of the areas where your learners come from?
T: All our learners are coming from the community of Alexandra.
S: Thank you for your time and input.

Interview

Johannesburg Water Testing Lab (assistant Lab Technician)

Please take note that this questionnaire was designed giving you the freedom to respond as accurately as possible, the aim being to assess your knowledge of water pollution in the informal settlements, the negative outcomes for school children of drinking polluted water. The information you give, and your name, will remain confidential.

This interview was conducted after testing the water from the Jukskei River at Stjwetla informal settlement. Refer to the attached copy of the results of the water tested at the end of the interview.

Keys: S = Researcher (interviewer)

M= Interviewee

S: Good day, Sister. Please tell me, what is your role in this department?

M: I am responsible for testing the quality of water.

S: How reliable is this laboratory with regard to the testing of the quality of the water?

M: Mm! Sir. This laboratory tests the quality of the water for the city of Johannesburg. I am certain that there is no one who would like to take any chances and risk the lives of millions of people in this city. This laboratory is the most reliable water testing station and it produces 100% results.

- S: The National Water Summit of 2006 that gave an overview of the sewage treatment industry in South Africa, indicated that "...the estimated volume of sewage treated is between 5800 to 7600 million liters per day". How would you respond to the fact that some of the sewage systems are discharging waste into the Jukskei River?
- M: Mm! That is a terrible thing. Pollution from sewage systems is one of the major sources of diseases in water. The poor treatment of sewage pipes leads to the leaking and bursting of pipes that transport waste to where it is supposed to be treated.
- S: From your experience, what could the negative outcome of polluted water in children's health be?
- M: Children are so vulnerable to polluted water, since they like to play in water. They can easily pick up germs and bacteria that can make them sick. Certain bacteria contribute to bilharzia, a runny stomach, headaches and other related diseases.
- S: Can the above-mentioned diseases harm the children's educational performance? If yes, could you please substantiate your answer.
- M: Diseases always hamper learners' performance at school. Children are often absent from school because they are sick either with headaches, stomach pains, or bilharzia. When children are not in class they miss out on schoolwork and they can't do the homework. It is therefore crucial to make children aware of the dangers of playing in or drinking polluted water.
- S: Talking about awareness, how is this laboratory making school children aware of the concept of water pollution?
- M: Johannesburg Water is playing an important role in bringing awareness to school children. Schools are visited to educate children on how to use water wisely at home and to stay away from polluted water, and also on how to use polluted water, for example, one must boil water before it can be used for domestic purposes.
- S: If you were to write an environmental awareness article on health

hazards caused by polluted water as part of Environmental Education project, what are the chemical water qualities that you would pay the most attention to?

M: Mm! There is no chemical water quality that is less important than the other. I think it is of vital importance to children to be aware of all chemical water qualities and their effect on the body. According to the Department of water Affairs and Forestry, Quality of Domestic water Supplies Volume 1: Assessment guide (1999:60-94) there are 15 chemical water qualities. "...Sulphate can cause health hazards such as diarrhoea, particularly in users not accustomed to drink water with high sulphate concentrations...Zinc can cause nausea and vomiting in sensitive individuals if it is at concentrations above 20mg/l; ...the excessive intake of sodium salts in babies can place a strain on the kidneys and the heart, and lead to serious disturbances of the salt balance in the body, with water retention; ... excessive concentrations of potassium can seriously disrupt the heart and muscular function, irritate the mucous membranes and cause nausea and vomiting;... Nitrate in water is caused by decaying plants, animals, and human waste.... Nitrate causes tiredness and failure to thrive. In extreme cases cyanosis and difficulty to breathe in bottle-fed infants under the age of one year may occur. A high concentration of magnesium may cause diarrhoea,... The excessive Total hardness implies whether water is soft or hard and if there is too much Soap In water it may also affect the taste of the water...Fluoride can cause damage to the skeleton, causing the hardening of the bones and making them brittle...Acute poisoning by high doses of fluoride are characterized by vomiting, abdominal pain, nausea, diarrhoea and convulsions... A high concentration of copper may cause nausea and vomiting and can cause acute damage to the liver and kidneys...If there is excessive chloride in the water it may cause nausea and vomiting... Calcium often causes scaling... Nausea, vomiting and diarrhea can be caused by Cadmium... Excessive Arsenic causes acute poisoning with

sensory loss in the peripheral nerves as well as gastro-intestinal symptoms. As I said, most of the diseases that are troubling children at school are caused by contaminated water.

S: You have just tested the water from the Jukskei River. What is your judgment on the quality of this water?

M: As you can see from the remarks on the document, this water appears to be unsuitable for human consumption due to the presence of E.Coli. This water can only be used for washing and irrigation. It is highly polluted. If humans use this water, they will definitely be affected by various diseases that could even lead to death.

S: Thanks for your time and contribution.



Sampled Date : 15-08-2007
Date of Analysis : 15-08-2007

Goudkoppies Laboratory

Analysis		COD	Ammonia	Nitrate	Phosphate	pH	<i>E.Coli</i>	Chloride
Units		mg/L O	mg/L N	mg/L N	mg/L P		/100ml	mg/l
Sample	Method Ref No.							
Jukskei River		120	1.4	2.5	0.25	6.4	200	68

Remarks: From the results, Jukskei river water appears to be unsuitable for human consumption due to the presence of *E.Coli*. The water is nevertheless suitable for washing and irrigation.

Mr Thomas Mahlaola
LABORATORY MANAGER : GOUDKOPPIES

Telephone No. 938-1675

Arc Ref : 12/77/1/1

- 1) These results only apply to the sample analysed.
- 2) Unless written approval is obtained, this report may only be reproduced in full.
- 3) This report supersedes results reported by telephone or fax.
- 4) Only methods having a Method Ref. Number have been accredited by SANAS.

Interview

Resident of Stjwetla Informal Settlement in Alexandra

This interview is based on research on the impact of water pollution-related diseases on the academic performance of children who stays in the informal settlement of Alexandra (Stjwetla).

I am a student at UNISA who is studying for my Masters Degree. I would like to ask you a few questions about your residential area. Please take note that your name will not be mentioned. Feel free to express your feelings and ideas of your experience and understanding of Stjwetla Informal Settlement.

Interviewer: S

Interviewee: J

S: Good day, Sir!

J: Good day to you, Sir!

S: Sir, since when have you been staying in this informal settlement?

J: Mm! I moved in here in 2003.

S: What influenced you to choose this area as your residential area?

J: What can I say? There was no other place to go. As you can see, we do not pay rent, electricity, water, and sewage. We are poor people. We are suffering, without jobs.

S: There are so many challenges in this area, would you like to mention two environmental problems that are challenging this informal settlement.

J: Mm! Most of us do not have jobs. We do not have proper sanitation, water, sewage, or dustbins.

S: Sir, what influenced you to build your "house" near the river?

J: We do not have water supply in this area. So, if you stay near the river you

have water to wash clothes and to cook.

S: Would you please mention some of the domestic activities that people do on a day to day basis, that leads to water pollution.

J: As I have said, we wash clothes in the river; some people relieve themselves in the river. You can see for yourself that people also throw rubbish into the river.

S: Sir! How polluted is the Jukskei River, who is polluting it, what are some of the pollutant materials or substances?

J: This river is polluted by plastic, papers, tins, and etcetera.

S: Have you seen some of the children playing in this polluted water?

J: Yes, almost every day. They play in this dirty water or bath in the river.

S: Children suffer from various diseases. What are some of the diseases that Children from this area often suffer from?

J: Our children often suffer from headaches, runny stomachs or bilharzia.

S: From your general perspective, how often do children in this area fail to go to school due to sicknesses; is it once, twice, thrice, four times in a week?

J: I am not sure about that. You often see children around here during school hours.

S: Would you say that water related diseases is hampering children's performances at school?

J: Definitely, yes!

S: If you were to advise the children of your community, what would you say to them about water pollution?

J: Mm! I would say that children should stop playing in dirty water because it affects their health.

S: I would like to thank you for your time and your contribution.

APPENDIX 2

QUESTIONNAIRE (PRE- AND POST-TEST)

It is important to read the following section before you start completing the questionnaires.

These questionnaires have been designed to give you freedom to respond as accurately as possible with the view of ascertaining your knowledge of water pollution in the informal settlements and sustainable development. No one will be penalized for giving unacceptable answers, since this is our way to find your way of thinking, even if it is different from others. This is not a test for marks. I am not expecting you to be influenced by my/your teachers' instruction in class or by any other educator's perceptions.

Each learner is expected to supply the following details before completing the questionnaires.

Please make use of a black pen to complete the questionnaire.

School's name	
Surname	
Names	
Grade	
Age	
Gender	
Have you completed a questionnaire on water pollution?	Tick the relevant answer: YES..... NO.....

Questionnaire.

Actualization of pre-knowledge: awareness of water pollution.

Activity 1

Each child is expected to supply the following details before completing the questionnaire.

Please make use of a black pen to complete the questionnaire.

School name	
Surname	
Names	
Grade	
Age	
Gender	
Have you completed a questionnaire on water pollution?	Tick the relevant answer: YES..... NO.....

	Learning Area	Learning outcome	Assessment Standard
Main focus learning area	Social Science	LO:3	AS: 1
Links with other learning areas	Natural Science	LO:3	AS: 2

Adapted from Van Heerden (2006:14) Building Capacity for Sustainable Living



Fig 11: Jukskei river used for washing clothes and dumping waste
Study this picture and answer the questions below.

Keys.

The following keys have been used for this questionnaire:

T= True
F= False
N= Not Aware

Make a cross to indicate your answer.

The above picture displays an informal settlement	T	F	N
This settlement is located near a river	T	F	N
There are tarred streets between the buildings	T	F	N
People have problems with water supply in this area	T	F	N
Houses in this settlement are known as shacks	T	F	N
The area looks very clean	T	F	N
People living in this area have descent jobs	T	F	N
Buildings have been constructed with boxes, plastic and zinc	T	F	N
People in this settlement own plots of land	T	F	N
Most of the people in this settlement are foreigners	T	F	N
Total mark		/20	
Educator's signature			

Activity 2

Each child is expected to supply the following details before completing the questionnaire.

Please make use of a black pen to complete the questionnaire.

School's name			
Surname			
Names			
Grade			
Age			
Gender			
Have you completed a questionnaire on water pollution?		Tick the relevant answer: YES..... NO.....	
	Learning Area	Learning outcome	Assessment Standard
Main focus learning area	Social Science	LO:3	AS: 2
Links with other learning areas	Natural Science	LO:3	AS: 2
Links with other learning areas	English	LO: 2	AS: 3

Adapted from Van Heerden (2006:14): Building Capacity for Sustainable Living



Fig.

Figure 27: Dumping waste In Jukskei river

Each statement has been supplied with two possible answers.

Choose the correct answer. Make a cross opposite your answer.

Water in the river is polluted by.....	plastic and papers	chemicals from the industries	
Polluted water.....	smells very bad	smells in an acceptable way	
Diseases caused by polluted water include.....	cholera and diarrhoea	Aids and malnutrition	
Polluted water can be used for.....	irrigating crops	drinking	
Fresh water comes from.....	rivers and dams	sea and acid rain	
Aquatic animals are found in.....	fresh water	polluted water	
What is the purpose of water treatment?	To make it suitable for domestic use	To benefit the company that is treating the water	
Some of the uses of domestic water are:	for drinking; food preparation; bathing; laundry	watering the garden; washing cars	

Total mark	/16
Educator's Signature	

Activity 3

Each child is expected to supply the following details before completing the questionnaire.

Please make use of a black pen to complete the questionnaire.

School's name			
Surname			
Names			
Grade			
Age			
Gender			
Have you completed a questionnaire on water pollution?		Tick the relevant answer: YES..... NO.....	
	Learning Area	Learning outcome	Assessment Standard
Main focus learning area	Social Science	LO:3	AS: 3
Links with other learning areas	Natural Science	LO:3	AS: 2
Links with other learning areas	English	LO: 5	AS: 3

Adapted from Van Heerden (2006:14) Building Capacity for Sustainable Living

Read the extracts below and answer the questions that follow.

Extract 1 (Adapted from: Building Capacity for Sustainable Living)

"Water covers three-quarters of our planet. More than 97% of all the water is salt. The remaining 3 % is fresh water. ... Only 3% of the total available fresh water is found in rivers and lakes. Water is a remarkable resource on which most forms of life are dependent."

Questions:

1. What percentage of water is salty? 2
.....
2. What percentage of water is classified as pure water? 2
.....

3. Mention two areas where we find fresh water. 4

.....
.....

4. Can people, animals and plants survive without water?
Support your answer 2

.....
.....

Extract 2 (Adapted from: Quality of Domestic Water Supplies, Volume 1):

“According to Water Safe for Use: Water in blue and green classes is safe for lifetime use. Water in yellow classes may be safe for use under certain conditions, but should be used with caution: it is important to sample and assess the quality of water in the yellow class regularly. Expert advice should be called upon to determine the real threat to sensitive users. Sensitive groups should also be informed when water falls into the yellow class. Water falling into the red class should be considered unsafe for use and should be treated. Water in the red class may be used for short-term emergency supplies, but only where no alternative supplies are available. Water falling into the purple class should be considered unsafe for use and should be treated. Water in the purple class is unsafe even for short-term emergency use.”

Questions:

1. Which two water classes is safe to drink without conditions?
a)..... 2

b).....

2. Which water class can be used when there is no alternative for a short time? 2

3. If you were to advise people on safe water to drink, which class of water would you advise people not to drink at all? 2

a).....

5. Which group of people would you pay most attention to when supplying yellow class water to the community? 4

a)..... (b).....

[20x1=20]

Activity 4

Each child is expected to supply the following details before completing the questionnaire.

Please make use of a black pen to complete the questionnaire.

School's name	
Surname	
Names	
Grade	
Age	
Gender	
Have you completed a questionnaire on water pollution?	Tick the relevant answer: YES.... NO.....

	Learning Area	Learning outcome	Assessment Standard
Main focus learning area	Social Science	LO: 2;3	AS: 2
Links with other learning areas	Natural Science	LO:2;3	AS: 2
Links with other learning areas	English	LO: 5	AS: 3



Figure 32: learners crossing the river.

Study this picture and answer the questions that follow.

Choose the correct answer and write it on the space provided.

1. Which danger are these children exposed to? (diseases; car accidents)
..... 2
2. Which group of people is crossing the river? (students; swimmers)
..... 2
3. From which residential area do these children come? (Suburbs; informal settlements). 2
4. These children have a problem when going to school. (during floods; when crocodiles are hungry). 2
5. Do you think these children are crossing the river?(with shoes on; bare-footed)..... 2

[10x2=20]

Activity 5

Each child is expected to supply the following details before completing the questionnaire.

Please make use of a black pen to complete the questionnaire.

School's name	
Surname	
Names	
Grade	
Age	
Gender	
Have you completed a questionnaire on water pollution?	Tick the relevant answer: YES..... NO.....

	Learning area	Learning outcome	Assessment standard
Main focus learning area	Social Science	LO:3	AS: 2
Links with other learning areas	Natural Science	LO:3	AS: 2
Links with other learning areas	English	LO:5	AS:3

Adapted from Van Heerden (2006:14) Building Capacity for Sustainable Living

Read the extract (From City Vision, dated 8-14 August 2007), and answer the questions that follow:

“ Three people died and 200 were left homeless on Sunday morning after 75 shacks caught fire when people were still asleep...the fire was caused by a man who came home drunk at around 2am...seventy-three shacks were destroyed in the incident. What made the fire even worse was the kind of material people used to build their shacks. There were many shacks built from cardboard material and it is very difficult to contain fires in those situations...”

Fill in the correct answer on the dotted lines:

1. Mention one thing that can disrupt the normal studying of children in an informal settlement? 2

2. What are the dangers that you, as a learner, are exposed to when the incident mentioned in the extract takes place?
.....;..... 2

3. What caused the incident mentioned in the extract? 2

4. How did the materials mentioned in the extract fail the fire-extinguishers to control the fire? 2

5. How many people died in this incident?2

[10x2=20]

ACTIVITY 6

Each child is expected to supply the following details before completing the questionnaire.

Please make use of a black pen to complete the questionnaire.

School's name			
Surname			
Names			
Grade			
Age			
Gender			
Have you completed a questionnaire on water pollution?		Tick the relevant answer: YES..... NO.....	
	Learning area	Learning outcome	Assessment standard
Main focus learning area	Social Science	LO: 1;2;3	AS: 2
Links with other learning areas	Natural Science	LO: 2;3	AS: 2
Links with other learning areas	English	LO:5	AS: 3

Adapted from Van Heerden (2006:14) Building Capacity for Sustainable Living

Read the extract adapted from Environmental Science, 9th Edition by Tyler & Miller (2003: 364) on "How can we reduce water pollution, an integrated approach", and answer the questions that follow.

"According to environmentalists, a more sustainable approach to dealing with water pollution requires that we shift our emphasis from pollution cleaning up to pollution prevention by (1) reducing the toxicity or volume of pollutants (for example, replacing organic solvent-based inks and paints with water based materials), (2) re-using waste-water instead of discharging it (for example, re-using treated waste water for irrigation), and (3) recycling pollutants (for

example, cleaning up and recycling contaminated solvents for re-use) instead of discharging them.”

Open-ended questions:

1. List two reasons why water is so important to us
.....
..... (2)
 2. What are the two major things that you think are contributing to the shortage of fresh water in our country?
..... (2)
Mention some of the effective ways that can be used to increase the supply of fresh water in our country..... (6)
 3. How will you define the concept ‘water pollution’?
.....
..... (2)
 4. Most of the streams are polluted by (list two).....; (2)
 5. Indicate some of the effects of water pollution on human health
.....
..... (2)
 6. Indicate two methods to reduce water pollution in the informal settlements.
.....
..... (4)
- [20]

THE POST- TEST

The activities below are based on the teaching and learning that will take place in class. Educators will present a lesson on water quality and water pollution.

The researcher will hand out lessons to the Social Sciences educators of grades 7 and grade 9 to present to the learners.

After the lessons learners will do the activities based on the lessons presented to them in class. The social science lessons will be integrated to the following learning areas, namely, LLC 1, LO [Life orientation], and NS [Natural Sciences]. Each activity will be specifically linked to the lesson presented.

Lessons

Open-ended lesson plan

Name of school	
Subject	Social sciences
Grade	
Educator	
Section	
Topic	Water pollution
Duration	Three periods [90 minutes]

Learning areas integrated to Social Sciences	Critical outcomes [CO]	Learning outcome [LO]	Assessment standards [AS]	Suggested resources LTSM	Method of teaching
SS Social Sciences	Work effectively with others as members of a team, group, organization, and community.	LO: 3	AS: 2	Photos; work sheets; diagrams	Group-work
LLC1 [English]		LO: 1	AS: 2	Work sheets	Group-work
NS [Natural Science]		LO: 2	AS: 3	Work sheets	Group-work
LO Life Orientation		LO: 2	AS: 2	Work sheets	Group-work

Actualization of pre-knowledge

The educator has ascertained the learners' pre-knowledge by means of questions. The following questions will be asked on of water pollution. Learners' responses are not to be recorded or judged on whether the answer is correct or not.

- i. How will you explain the concept 'water pollution'?
- ii. What are the common materials that pollute water in rivers?
- iii. What are some of the dangers of using polluted water for domestic purposes?

This activity has been adapted from 'Environmental Management in School' by RAATH, STONE & VAN HEERDEN (2006: 50)

Learners are to fill in the correct term in column B that suits the description or phrase in column A.

Activity 7

Individual task

Column A	Column B
I supply water to people in towns and cities	
I drink water which comes from taps	
I transport human waste and dirty water to a storage tank	
Water from the sky falls into me	
This system works with water and human waste	
I store a lot of water for human and animal consumption	

Total=12

Lesson presentation

The educator has to group learners into groups. Each group has to consist of 6 to 12 learners. The educator must supply each group with paper to draw on. The educator should lay down rules regarding the activity, that is, one person is the writer, listen when one member of the group is talking, do not ignore members' input, assist one another in a respectful manner.

The first period

The educator gives group A the following task:

- i. Design a poster of an informal settlement.
- ii. Indicate the materials to be used to construct the house/shack.
- iii. Indicate a river passing close to the settlement.
- iv. Indicate where this settlement dumps its rubbish into the river.
- v. Indicate the sewage system/pipe near this settlement that discharges human waste into the river.

The educator gives group B the following task:

- i. Design a poster of a clinic.
- ii. Indicate children in school uniform visiting the clinic.
- iii. Mention some of the diseases that these children often suffer from while in class.

The educator gives group C the following task:

- i. Design a poster that indicates a school.
- ii. Indicate a river that passes near the school.
- iii. Indicate a dumping area inside the river.
- iv. Indicate young children playing in the river.
- v. Indicate children in school uniform crossing the river going home.

The educator should monitor these groups consistently. Where there is a need, the educator should assist the group. The educator should remind the groups about the time remaining to complete the task.

The second period

The educator instructs the learners to present their posters. Two children in a group have to present their poster. The educator should ask learners to draw/write a link that indicates the relationship between the three posters. The learners are asked to discuss the following topic:

Is it possible to have a good education when you are staying in the environment displayed by the three posters? Substantiate your answer.

Learners should be given 10 minutes to prepare this task. One member of the group should give the overall view of the group. Each learner is to give a presentation. The educator must summarize the findings.

The educator has to make the learners aware of the fact that the activity is based on water pollution, a topic that they are to write on individually in the third period.

Activity 8

Period three

Below is the activity that the learners are to write on during period number three.

Each child is expected to supply the following details before completing the questionnaire.

Please make use of a black pen to complete the questionnaire.

School's name			
Surname			
Names			
Grade			
Age			
Gender			
Have you completed a questionnaire on water pollution?		Tick the relevant answer: YES.... NO.....	
	Learning area	Learning outcome	Assessment standard
Main focus learning area	Social Science	LO:3	AS: 3
Links with other learning areas	Natural Science	LO: 2;3	AS: 1;2
Links with other learning areas	English	LO: 5	AS: 3

Adapted from Van Heerden (2006:14) Building Capacity for Sustainable Living

Answer the questions below by supplying a correct answer in the provided spaces.



Figure 41: Baby nappies washed by water from polluted Jukskei river. Study the picture above before you answer these questions.

<p>Would you say that the above picture portrays an informal or a suburb settlement?</p>	<p>(2)</p>
<p>Mention one reason why this settlement is located near a river.</p>	<p>(2)</p>
<p>Identify a woman washing clothes near the river and indicate one environmental problem that this activity may cause.</p>	<p>(2)</p>
<p>Besides the above-mentioned problem, what is the other common environmental-related problem that is visible on the picture?</p>	<p>(2)</p>
<p>Identify two building materials of shacks in this informal settlement.</p>	<p>(4)</p>



Figure 42: Jukskei river, a dumping ground and children's play ground.

Study the picture above and answer the questions in the stipulated spaces.

Identify children in the picture; what are the two most possible health hazards that the children are exposed to?	(4)
Do you think that these children are safe from diseases? If not, what are the two types of diseases that could possibly affect the health of these children?	(4)
If these children are infected by the above-mentioned diseases, would that affect their performance in class? If yes, indicate how?	(4)
How would you advise these children so that they may not be contaminated by water pollution-related diseases?	(4)
Which project can you start at your school to make children aware of water pollution-related diseases?	(2)

Total= 30

Appendices 3 The results of Pre- and Post- activities from the Five Schools

Name of school	Age	Has the child answered Questionnaire on water pollution before?	Gender	Grade	Pre-Activity one Total 20	Pre-Activity two Total=16	Pre-Activity three Total=20	Pre-activity four Total=10	Pre-activity five Total=10	Open-ended six Total=20	Post-activity one Total 0	Post-activity two Total 0	Total marks	Childs Place of residence
East bank	14	No	M	9	12	12	9	8	6	8	0	16	71	Alexandra
East bank	14	No	F	9	12	8	18	6	6	4	2	8	64	Alexandra
East bank	14	No	F	9	12	10	11	10	8	8	2	20	81	Eastbank
East bank	14	No	M	9	16	10	5	10	4	0	6	6	57	Alexandra
East bank	14	No	F	9	18	0	9	2	2	0	2	0	33	Alexandra
East bank	15	No	F	9	16	10	14	10	8	5	4	14	81	Alexandra
East bank	15	No	F	9	12	8	14	10	6	1	4	19	74	Alexandra
East bank	15	No	F	9	12	16	13	10	2	4	6	11	74	Alexandra
East bank	15	No	M	9	12	10	8	0	2	4	0	8	44	Alexandra
East bank	15	No	M	9	8	6	10	0	2	0	0	4	30	Alexandra
East bank	15	No	M	9	14	0	12	10	2	1	2	8	49	Alexandra
East bank	15	No	F	9	16	14	15	8	6	6	6	19	90	Alexandra
East bank	15	No	F	9	12	12	9	8	2	3	4	15	65	Alexandra
East bank	15	No	F	9	16	16	13	10	6	4	6	18	89	Alexandra
East bank	15	No	F	9	12	10	7	6	2	4	4	7	52	Alexandra
East bank	15	No	F	9	6	0	4	0	0	0	0	0	10	Alexandra
East bank	15	No	M	9	16	14	16	8	2	10	8	16	90	Alexandra
East bank	15	No	M	9	20	12	16	8	6	12	4	22	100	Alexandra
East bank	15	No	M	9	18	4	3	10	11	2	4	11	63	Alexandra
East bank	16	No	F	9	12	6	2	6	4	2	0	4	36	Alexandra
East bank	17	No	M	9	12	8	0	0	0	0	0	0	20	Alexandra

Appendices 3 The results of Pre- and Post- activities from the Five Schools

	=5; 14; 1; 17=1		M F	Total 2										
Santonview	14	No	F	9	16	12	10	10	10	6	6	12	82	Alexandra
Santonview	14	No	M	9	18	12	15	10	10	5	6	6	82	Alexandra
Santonview	14	No	M	9	14	14	12	10	6	5	4	8	73	Alexandra
Santonview	15	No	F	9	18	16	13	10	3	11	0	22	93	Alexandra
Santonview	15	No	F	9	14	12	16	10	10	9	8	22	101	Alexandra
Santonview	15	No	F	9	8	12	11	8	1	4	2	15	61	Alexandra
Santonview	15	No	F	9	12	10	10	10	8	4	4	18	76	Alexandra
Santonview	15	No	F	9	8	8	11	10	3	1	4	2	47	Alexandra
Santonview	15	No	F	9	14	12	14	10	4	2	2	15	73	Alexandra
Santonview	15	No	F	9	12	10	13	10	2	6	2	10	65	Alexandra
Santonview	15	No	F	9	6	12	14	8	4	5	0	12	61	Midrand
Santonview	15	No	F	9	12	12	14	10	8	8	0	14	78	Alexandra
Santonview	15	No	M	9	14	8	8	8	0	2	0	8	48	Alexandra
Santonview	15	No	M	9	16	14	11	10	8	0	0	10	69	Alexandra
Santonview	15	No	M	9	16	12	12	10	6	2	6	12	76	Alexandra
Santonview	15	No	M	9	16	12	12	10	4	3	4	14	75	Alexandra
Santonview	15	No	M	9	12	10	6	4	0	1	4	8	45	Alexandra
Santonview	16	No	F	9	16	16	13	10	8	11	4	17	95	Alexandra
Santonview	16	No	M	9	14	14	8	8	0	2	0	0	46	Alexandra
Santonview	16	No	M	9	14	12	11	10	8	5	4	14	78	Alexandra
Santonview	16	No	M	9	12	10	12	8	6	2	4	16	70	Alexandra
Santonvie	16	No	M	9	16	12	6	4	3	2	2	5	50	Alexandra

Appendices 3 The results of Pre- and Post- activities from the Five Schools

	=3; 14;		M F	Total 22										
Kwabekilanga	15	No	F	9	8	12	18	10	6	12	0	10		Alexandra
Kwabekilanga	14	No	M	9	8	12	10	10	4	0	0	2	46	Alexandra
Kwabekilanga	15	No	M	9	16	14	12	10	6	5	0	0	63	Alexandra
Kwabekilanga	15	No	M	9	8	12	11	14	0	2	4	0	51	Alexandra
Kwabekilanga	15	No	F	9	14	12	16	10	0	7	0	2	61	Alexandra
Kwabekilanga	15	No	F	9	18	12	14	8	7	14	0	17	90	Alexandra
Kwabekilanga	15	No	F	9	6	8	7	1	0	2	1	2	27	Alexandra
Kwabekilanga	15	No	F	9	16	10	6	8	6	9	0	15	70	Alexandra
Kwabekilanga	16	No	M	9	12	14	12	8	8	4	2	11	71	Alexandra
Kwabekilanga	17	No	M	9	16	14	13	8	4	4	0	9	68	Alexandra
	=1; 15=7; 1;		M F	Total 0										
Ikage Primary	13	No	M	7	16	8	12	6	2	4	0	2	0	Tsutsumani
Ikage Primary	13	No	F	7	6	10	10	10	4	0	0	12	52	Eastbank
Ikage Primary	13	No	M	7	14	10	11	6	2	1	4	2	50	Alexandra
Ikage Primary	13	No	M	7	16	8	12	6	2	4	0	2	50	Alexandra
Ikage Primary	14	No	F	7	14	12	15	8	6	11	8	16	0	Alexandra
Ikage Primary	14	No	F	7	14	10	11	10	0	2	0	11	58	Alexandra
Ikage Primary	15	No	M	7	14	8	10	8	2	1	4	5		Alexandra
													2	

Appendices 3 The results of Pre- and Post- activities from the Five Schools

	=4; =2; =1		M F	Total										
Santonview Primary	12	No	M	7	14	8	11	8	2	0	0	4	47	Alexandra
Santonview Primary	12	No	M	7	12	14	10	8	0	3	2	8		Alexandra
Santonview Primary	12	No	M	7	14	12	8	8	0	1	4	5	52	Alexandra
Santonview Primary	12	No	F	7	16	10	11	8	12	4	0	7	68	Alexandra
Santonview Primary	12	No	F	7	18	10	14	10	4	4	0	7	67	Alexandra
Santonview Primary	12	No	F	7	4	10	7	6	4	5	0	14	50	Alexandra
Santonview Primary	12	No	F	7	6	14	13	10	6	1	0	14	64	Alexandra
Santonview Primary	13	No	M	7	8	14	7	8	6	0	4	10	57	Alexandra
Santonview Primary	13	No	M	7	12	14	5	10	2	4	2	12	61	Alexandra
Santonview Primary	13	No	M	7	18	16	10	8	4	3	0	10	69	Alexandra
Santonview Primary	13	No	M	7	14	14	8	10	6	1	2	16	71	Alexandra
Santonview Primary	13	No	M	7	4	12	7	8	4	2	0	2	39	Alexandra

Appendices 3 The results of Pre- and Post- activities from the Five Schools

Santonview Primary	13	No	M	7	16	12	9	8	4	1	0	9	59	Alexandra
Santonview Primary	13	No	M	7	10	10	2	10	0	0	0	3	35	Alexandra
Santonview Primary	13	No	F	7	10	10	12	10	8	1	0	9	60	Alexandra
Santonview Primary	13	No	F	7	14	16	9	4	8	1	0	10	62	Alexandra
Santonview Primary	13	No	F	7	6	8	6	8	2	2	0	6	38	
Santonview Primary	14	No	F	7	6	8	18	5	4	0	2	12	55	Alexandra
Santonview Primary	14	No	F	7	14	12	10	10	12	0	0	6	64	Alexandra
	2=7 ; =10; =2		M 0 F	Total										
Bovert Primary	12	No	F	7	16	12	12	10	6	6	6	17	85	Alexandra
Bovert Primary	12	No	F	7	16	12	14	10	8	3	4	6		Alexandra
Bovert Primary	12	No	M	7	12	12	16	10	8	11	6	6	81	Stjwetla
Bovert Primary	12	No	F	7	14	10	16	10	6	2	8	6	72	Tsutsumani
Bovert Primary	13	No	F	7	14	10	10	10	4	2	0	1	51	Eastbank
Bovert Primary	13	No	F	7	20	10	12	10	6	2	2	6	68	Marlboro
Bovert Primary	13	No	F	7	10	8	13	6	6	2	2	6	53	Alexandra
Bovert Primary	13	No	F	7	10	14	11	10	6	4	6	4	65	Eastbank
Bovert Primary	13	No	F	7	18	14	16	10	2	6	0	2	68	Alexandra
Bovert Primary	13	No	M	7	6	18	8	4	3	4	2	6	51	Alexandra
Bovert Primary	13	No	F	7	8	6	14	6	4	0	2	4	44	Alexandra

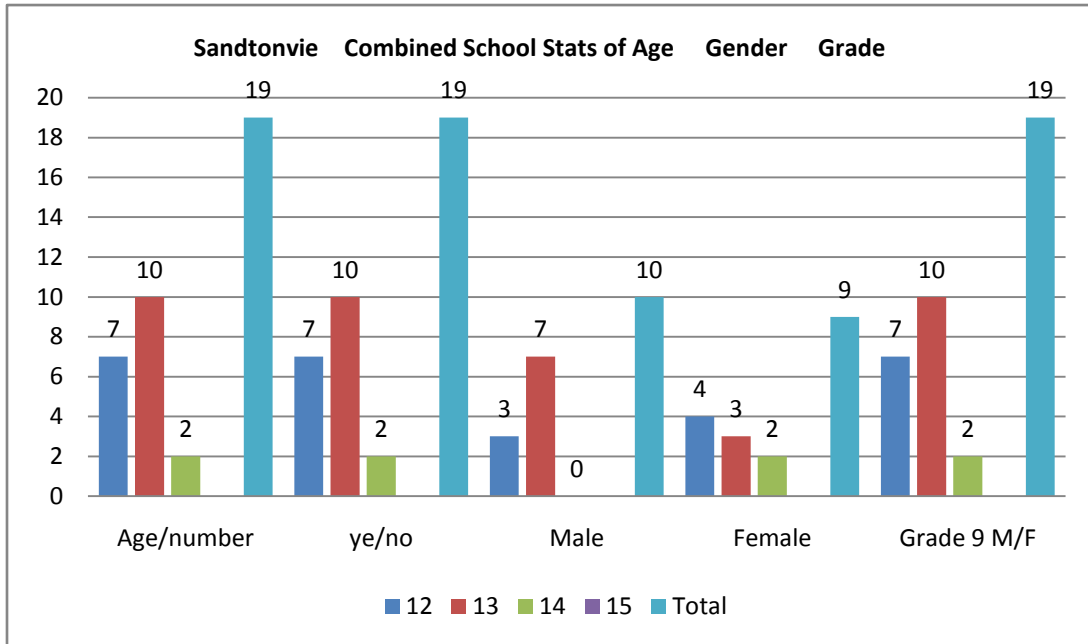
Appendices 3 The results of Pre- and Post- activities from the Five Schools

Bovert Primary	13	No	F	7	12	10	10	8	6	1	2	4	53	Alexandra
Bovert Primary	13	No	F	7	14	10	11	8	8	0	0	4	55	Eastbank
Bovert Primary	13	No	F	7	16	14	10	10	2	4	2	7	65	Alexandra
Bovert Primary	13	No	M	7	12	10	11	10	4	1	0	6	54	Alexandra
Bovert Primary	13	No	M	7	16	12	10	10	4	3	0	6	61	Alexandra
Bovert Primary	13	No	M	7	14	8	14	10	6	5	4	1	62	Alexandra
Bovert Primary	13	No	M	7	16	8	5	10	6	3	2	4	54	Eastbank
Bovert Primary	13	No	F	7	12	8	12	10	4	2	0	5	53	Alexandra
Bovert Primary	14	No	F	7	8	12	11	10	4	1	2	4	52	Alexandra
Bovert Primary	14	No	M	7	14	14	11	4	4	2	2	0	51	Alexandra
	2=3 ; =16; =2		M F	Total 2										

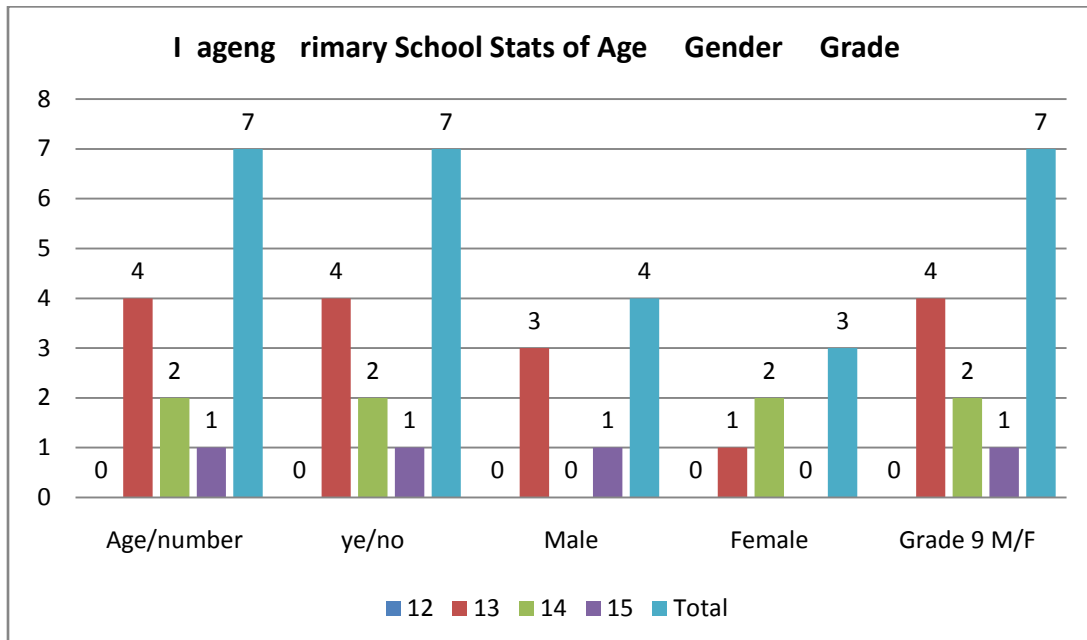
APPENDIX

STATISTICS OF LEANERS WHO PARTICIPATED IN THE RESEARCH

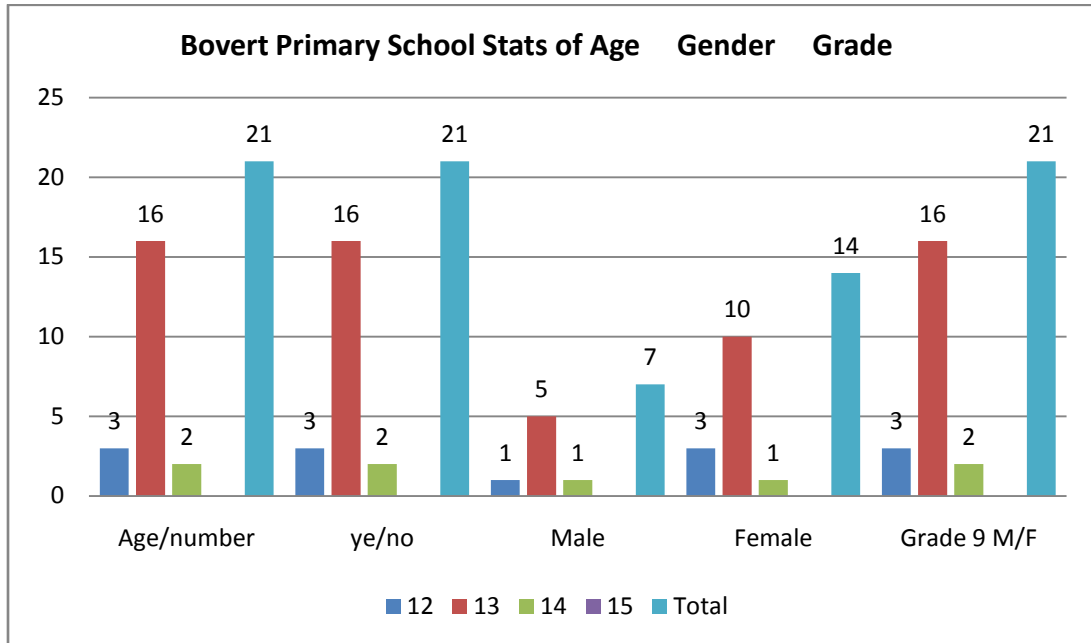
Grade Age and gender analysis er school grades and



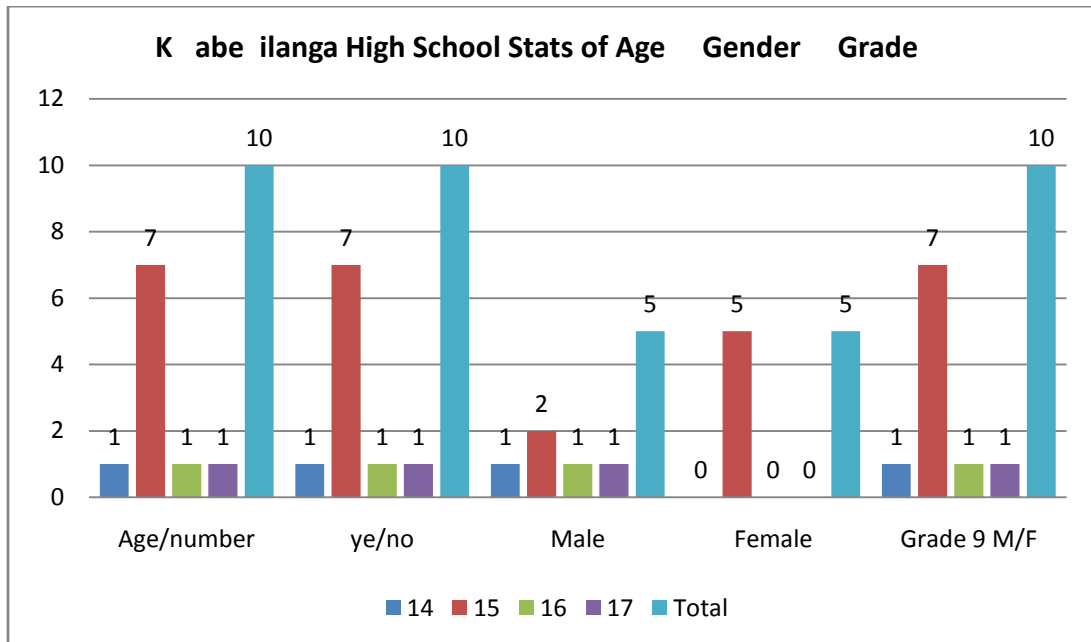
Most of the learners from Sandtonview Primary School are 13 years old and a few 12 years old, with a small number of 14 years age. There are more boys than girls. These learners never answered a questionnaire on water pollution before.



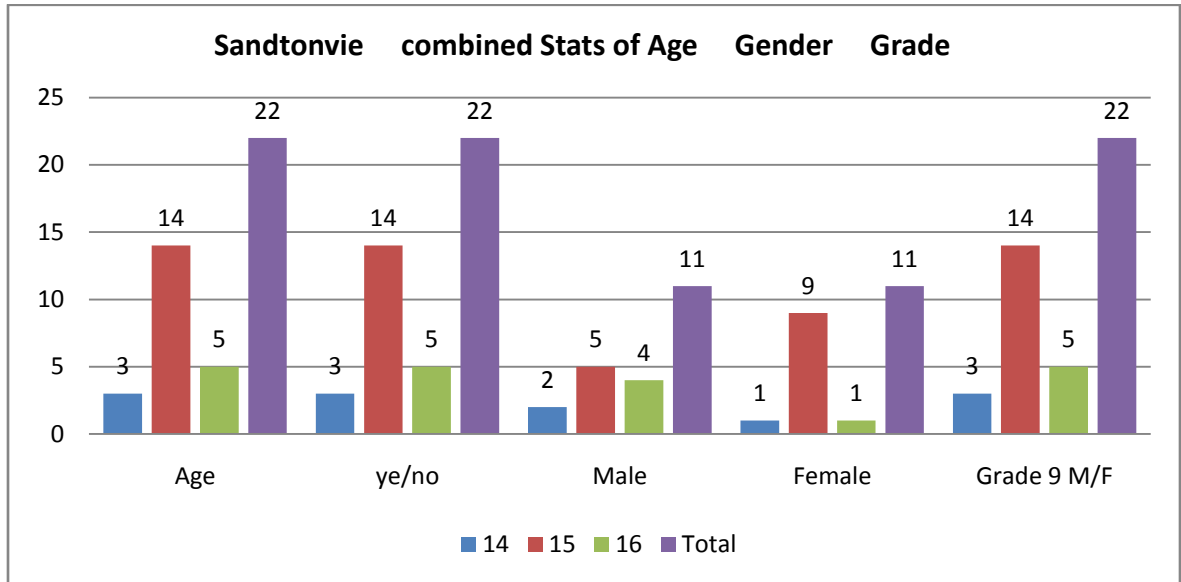
Most of the learners from Ikageng Primary School are 13 years old and a few are 14 and 15 years with more or less the same number of boys and girls. These learners have never answered a questionnaire on water pollution before.



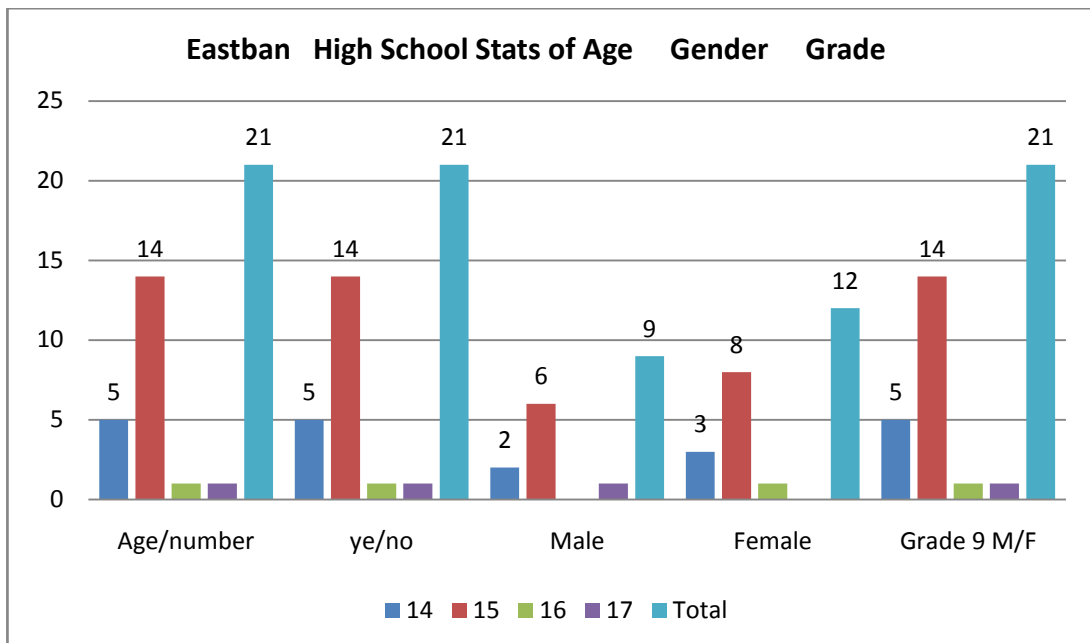
Most of the learners at Bovert Primary School are 13 years old, with a few 12 and 14 years old. There are more girls than boys. Learners haven't answered a questionnaire on water pollution before.



Most of the learners from Kwabekilanga high school in grade 9 are 15 years old and a few are between 14 – 16 years. There are more or less the same number of boys and girls. Learners never answered questionnaire on water pollution before.



Most of the learners from Sandtonview combined school were 15 years old and the minority 14 years, while a few are 16 years old, with more boys than girls. Learners never answered a questionnaire on water pollution before.



Most of the learners from Eastbank high school are 15 years old, and the minority are 14, while a few are 16, with more girls than boys. Learners never answered a questionnaire on water pollution before.

APPENDIX 5

MEMORANDUM OF QUESTIONNAIRE

1.True
2.True
3.False
4.True
5.True
6.False
7.False
8.True
9.False
10.True

Activity 2

Plastics and papers
Smells very bad
Cholera and diarrhea
Irrigating crops
Rivers and dams
Fresh water
To make it suitable for domestic use
Drinking, food preparation, bathing and laundry

Activity 3

Extract: 1

1. More than 97%
2. 3%
3. Rivers and lakes
4. No- water is a remarkable resource on which most form of life is dependent.

Extract: 2

1. a) Blue
b) Green
2. Red
3. Purple class
4. Children and old age people; sensitive group of people.

Activity 4

1. Diseases
2. Students
3. Informal settlement
4. During floods
5. Barefooted

Activity 5

1. Fire and drunk people; Noise pollution
2. Left with no books and school uniform
3. A man who came home drunk caused the fire
4. Shacks were made out of cardboard
5. Three

Activity 6

1. (A) Crucial for domestic use (B) irrigational uses (C) animals drink water (D) generating hydro-electricity (E) Can be used as a cooling mechanism in mining industries.

2. (A) Water pollution in rivers, dams, lakes. (B) Disturbing the normal function of wetlands.
3. A. protecting wetlands, B. stop water pollution in rivers, dams, lakes; recycling of water; re-using treated waste water based materials; and cleaning up pollutants in our rivers, lakes and dams.
4. Is a process whereby human activities such as throwing away of papers and rubbish; pouring dirty water; spilling of oil or chemicals; insecticides, chemicals from agricultural sectors flow into the river, lakes, dams and limit the amount of fresh water available.
5. Papers or plastic; tins; rubble; oil; chemicals from industries.
6. Diseases such as cholera; diarrhoea.
7. Awareness programme on water pollution; supplying dustbins; cleaning up pollutants in rivers

Post- tests

Activity 7

1. Rand Water; Johannesburg Water
2. People
3. Sewage system
4. Rivers; Lakes; Dams; Wetlands
5. Toilet
6. Rivers; Dams; Lakes

Activity 8

1. Informal settlement
2. Availability of water
3. Water pollution

4. Dumping of waste products(rubbish) in the river
5. Cardboard boxes; zinc; wood and plastic
6. Can contaminate with polluted water and suffer from diseases such as cholera, and diarrhoea; they are playing in a dumping area where pieces of bottles can cut them.
7. No: Cholera; and diarrhoea.
8. Yes: They will get sick and be absent from school, they will miss classes, and that will affect their performance.
9. Play away from the river. Boil water from the river before they can use it for domestic purposes.
10. Water day project; and awareness of a water pollution project.

APPENDIX

Letters to request permission to conduct interviews completing questionnaire to the following institutions

Namely:

1. Sandtonville combined Bovert primary Isageng primary Eastban high and Kabe ilanga high schools
2. Learners who are participating in the research
3. Delta Environmental Education centre Rand Water Gauteng Department of Education District and Johannesburg Water

Letter Addressed to the schools Principals

I Mr. Maseela A. Solomon from the University of South Africa Masters Student in Environmental Education in the Faculty of Education hereby by as permission to conduct research at your school.

The research will involve one educator who teaches social sciences and his/her class. I will provide all the necessary requirements for the educator and learners during the research.

My contact details are as follows: 022 811 2288 at any time.

I will appreciate the opportunity to use your school.

Yours Sincerely

Mr. Maseela A.S

Letter Addressed to Learners

I Mr. Maela A.S have asked for a permission to conduct research at your school from the School principal. You the selected learners to participate in this research are being requested to participate by means of completing the questionnaire that shall be provided to you.

You are also informed that you have the right to decline or to pull out if you do not feel comfortable to participate in the research.

Your name shall not be disclosed.

I appreciate your time and effort in participating in this research.

Yours Sincerely

Mr. Maela A.S

Request to conduct interview

I Mr. Maseela A. Solomon from the University of South Africa Masters Student in Environmental Education in the Faculty of Education hereby request permission to conduct interview at your institution.

The interviewee shall be familiarised with all questions that the researcher will ask during the interview. A tape recorder will be used to record the whole interview. The interviewee has the right not to participate if he/she is uncomfortable.

I appreciate your time and your professional input.

Yours Sincerely

Mr. Maseela A.S