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Water supply and sanitation in rural areas: the case of Thokgoaneng - Pietersburg, Northern Province, South Africa

by
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ABSTRACT

Water supply and sanitation in the rural areas have for decades been a problem that needs to be discussed. This study aims at investigating the supply of water and sanitation in the rural areas of South Africa in the Northern Province with special reference to Thokgoaneng as a case study. Much damage was made by Apartheid government when the rural areas were left being marginalised without the necessary resources such as water and electricity. Attention will then be given to water supply and sanitation in the rural areas of South Africa during the new democratic government as one of its objectives is to supply people with clean water, safe water supply of 20-30 litres per capita per day within 200 metres and adequate/safe sanitation.

The investigation has shown that although the government is trying hard to meet its objectives, much still need to be done to ensure that the services provided should be well managed by the communities. This information will assist in providing insight of how the people in the rural areas live without the basic needs i.e. water. It will also assist the rural people to take care of their natural resources because if not used sustainably for future considerations they will be depleted.

Key words
Water supply
Sanitation
Rural areas
Northern Province
CHAPTER 1

INTRODUCTION

1.1 THE ISSUE OF WATER SUPPLY

Water is regarded as one of the basic needs of humans. In fact, without it there would be no life on earth; it is therefore considered as a basic necessity of life. Can one imagine life without water? "Man can live nearly two months without food, but can live only three or four days without water." (Wright, 1977, p.1). A human requires at least three litres of water per day, which modern man takes in by drinking and eating (water, tea, coffee, cold drinks, food, etc.). The old belief that drinking eight glasses of water per day for a healthy body is not far fetched (van Rensburg, 1988). That is why there are countries which are in disputes because of water supplies. According to Miller (1996) disputes are escalating among Ethiopia, Sudan and Egypt over access to water from the Nile River basin.

Although people fight over water, a large number of them have no access to clean, safe water. More than 1,500 million people (30% of the world's population) still do not have access to safe water. The consequences of this to their health, productivity and quality of life, as well as secondary implications for economic development, and the negative influence on the emancipation of woman and poverty alleviation are believed to be enormous (Briscoe & de Ferranti, 1988).

Davies & Day (1998) indicate that by 1997, between 12 and 14 million South Africans still had no access to safe, potable water, while 23 million have no proper sanitation facilities; 90% of rural schools and 50% of rural clinics had inadequate sanitation facilities. It was noted that the South African population continues to grow at an alarming rate, by at least one million people per annum. South Africa is currently positioned among the 20 most water-poor countries in the world. Others on the list include Saudi Arabia and Egypt. The South African
National Department of Water Affairs and Forestry (DWAF) is predicting a permanent water crisis in this country after the year 2025 (Smith, 1998).

Presently between 12 and 18 million people in this country are considered to be without safe and adequate water services and between 17 and 21 million lack basic sanitation. Eighty percent of these people are found in the four mainly rural and most disadvantaged provinces - Eastern Cape, Kwazulu Natal, Mpumalanga and the Northern Province (Department of Water Affairs and Forestry:BoTT, 1999). These provinces together with Thokgoaneng as a representative study area are depicted in Figure 1.

![Map of South Africa with Thokgoaneng study area](figure1.png)

(Source: CACGIS Laboratory, UNIN, 1999)  
**Figure 1: Provinces of SA and the study area of Thokgoaneng**

The issue of water supply to the rural communities in South Africa, as explained above, brought many questions to mind when reference was made to the selected study area of Thokgoaneng, and the following research problem was identified.
1.2 IDENTIFYING THE RESEARCH PROBLEM

The issue of water supply and sanitation in the rural areas of South Africa has for decades been a problem that needs to be addressed. The legacy of the previous apartheid government left the rural population often the poorest communities in despair, as no development can take place without water. The background explanation on the issue of water supply and sanitation in the rural areas is focused in the situation that exists at Thokgoaneng as a case study in the Northern Province (see Figure 1).

According to The Reconstruction and Development Programme (RDP) (1994), one of the achievable programmes set out for the next five years since its inception in 1994 was to provide clean water and sanitation to all. The RDP will achieve this by establishing a national water and sanitation programme which aims to provide all households with clean, safe water supplies of 20 - 30 liters per capita per day (l/cap/day) within a distance of 200 metres and an adequate safe sanitation facility per site. The decisions on water resources must be transparent and justified so as to reduce conflict between users.

The promises that the present government made, urged the researcher to put forward the following questions:

1. What role has the democratic government since its inception in 1994 played to alleviate the problem of water supply and sanitation in the rural areas?

2. Do the different stakeholders carry out their responsibilities?

3. How clean or safe is the water used by the people in the rural areas?

4. Does it satisfy the demands of the people?

5. How do institutions such as schools and clinics contribute
in assisting the communities which are without clean water and sanitation?

6. Which factors contribute to the problems, if any, of water supply and sanitation at Thokgoaneng the case study area?

7. What measures did the people of Thokgoaneng take to alleviate their problems?

8. What impact does the literacy and economic profile of the people of Thokgoaneng, as a case study, have on the supply of water and sanitation?

These questions convey the ideas of the aims of this study as stipulated below.

1.3 AIMS OF THE STUDY

The aims of the study are

1. to look at the role that the government has played thus far to ensure that water and sanitation are supplied in the rural areas;

2. to determine if there is sufficient potable water and sanitation available in the rural areas of South Africa and to educate rural people in utilising potable water with special reference to Thokgoaneng as a case study;

3. to evaluate the quality of water utilised in S.A.;

4. to determine the role that different institutions play to assist or encourage the rural people to utilise potable water;

5. to look at the problems, if any, in relation to water supply and sanitation in the rural areas;

6. to determine the literacy and economic levels of the rural
people with reference to Thokgoaneng as a case study.

Different research methodologies are used in compiling this document so that the aims of this study should be realised.

1.4 RESEARCH METHODOLOGY

Literature study
Data have been collected from different South African literature books, journals, periodicals, internet and newspapers. These assist in forming the basis of this study and in gaining insight into what is taking place in terms of water supply and sanitation in the rural areas.

Fieldwork and interviews
Information will also be collected from different people to assist in the realisation of the aims of this study. Various government officials from different departments, operators, developers, the TLC, clinic, schools, community and the traditional chief in the area have been consulted.

1.5 EXPLANATION OF TERMS

Water supply
Water supply is the provision of a supply of water for domestic, industrial, and irrigation needs and the engineering installations necessary to treat and pump the water to the consumer (Huang, 1993).

Water quality
Water quality describes the physical, chemical and biological composition of water. Water is regarded as of high quality when it is safe to drink, that is when its dissolved and suspended constituents are below a level at which they are harmful (Kay, 1999).

Water contamination
Contamination is the presence in water of bacteria from the intestinal tract of warm-blooded animals, including humans. The
presence of such bacteria means that the water may carry human diseases germs (Wright, 1977).

**Water pollution**
It implies the contamination of water by foreign matter such as micro-organisms, chemicals, industrial, other waste or sewage. Such matter deteriorates the quality of water and renders it unfit for its intended uses (Huang, 1993). According to Wright, (1977) dirt, silt, organic matter, objectionable minerals, colors, odors or tastes, acidity and alkalinity are causes of pollution. Although pollution is not necessarily a health hazard, it is often accompanied by contamination which is a health hazard.

**Potable water**
Clean water which contains nothing injurious to health is called potable water (Wright, 1977 p.10)

**Ground water**
Ground water means any water from a source below the ground surface. Ground water occurs in pores or cracks of underground geological formations, referred to generally as aquifers (Southorn, 1995).

**Surface water**
Surface water is a general term describing any water body which is found flowing or standing on the surface of the earth, such as streams, rivers, ponds, lakes and reservoirs (Gray, 1994).

**Safe water**
Water free from chemical substances and micro-organisms in concentrations which could cause illness in any form (Lloyd & Helmer, 1991).

**Adequate water supplies**
Providing safe water in quantities sufficient for drinking, culinary, domestic and other household purposes including the personal hygiene of members of the household (Lloyd & Helmer, 1991).
The focus will now be on the geographical position of the study area, Thokgoaneng, which serves as a representative case study on water supply and sanitation in the rural areas.

1.6 GEOGRAPHICAL POSITION

The geographical position of Thokgoaneng is North of the Strydpoort mountains (Chuenespoort mountains). Thokgoaneng is the second village northwards from the Strydpoort mountains and on the western side of the busy R37 road from Pietersburg to Lebowakgomo. According to De Jager(2000) Thokgoaneng is located approximately 35 km south of Pietersburg on the Pietersburg-Lebowakgomo road. The area is situated in the Maraba-Mashashane-Maja TLC area of jurisdiction. Thokgoaneng is located on the farm Schoonheid 74 KS, a portion of the farm Vrederust 75 KS and a portion of the farm Vrederust 76 KS (Figure 2). The farms are situated in the Pietersburg Magisterial District. Chief Chuene is the local tribal chief here.

There are two rivers called Tudumo/Chuene and Nokanachuana that flow on the outskirts of the village. These rivers are non-perennial and during dry years they contain no flow. The Tudumo river flows into the Chuene dam and the Nokanachuana flows into the local dam which is situated on the northern side of the village. The drainage area exhibits several ponds and water channels which exacerbate water erosion in the area. The area is heavily eroded, yet the people have erected their buildings close to the dongas that pass through the village. The geographical position and the physical background of Thokgoaneng are clearly depicted in the topographical map, vertical aerial photograph and the horizontal photograph in Figures 2 and 3. The topographical map of Thokgoaneng is a portion of the topographical map 2429 AB Nuwe Witsdorp. It covers the area on the south eastern side.

To understand the sequence of what is to be discussed in relation to the information compiled from different sources, the layout of this study is explained below.
Figure 2: Topographical map of Thokgoaneng
Figure 3: Vertical Aerial photograph and horizontal photograph of Thokgoaneng
1.7 LAYOUT OF THE STUDY

This study is divided into six chapters (Table 1).

Table 1: Layout of the study

<table>
<thead>
<tr>
<th>CHAPTER</th>
<th>STUDY PROGRESSION</th>
<th>EXPLICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chapter 1</td>
<td>Issue of water supply</td>
<td>Water is an important commodity, therefore</td>
</tr>
<tr>
<td>Chapter 2</td>
<td>Water availability sources and uses</td>
<td>it should be available and accessible as it is used for different purposes, hence</td>
</tr>
<tr>
<td>Chapter 3</td>
<td>Water quality and health</td>
<td>its quality can impact on lives due to water-borne diseases, and</td>
</tr>
<tr>
<td>Chapter 4</td>
<td>Water providers and problems in rural areas</td>
<td>several stakeholders can assist in the provision of adequate safe water, then</td>
</tr>
<tr>
<td>Chapter 5</td>
<td>Thokgoaneng as a case study</td>
<td>a perspective of water supply and sanitation for Thokgoaneng is given, and lastly</td>
</tr>
<tr>
<td>Chapter 6</td>
<td>Recommendations and conclusion</td>
<td>emphasis is on alleviating water supply and sanitation problems and the sustainable use of water.</td>
</tr>
</tbody>
</table>

After being given the background of what is to be discussed in this study, the issue of water availability and its uses in South Africa will be discussed.
CHAPTER 2

WATER AVAILABILITY AND USES

2.1 WATER AVAILABILITY

Water is the most fundamental substance making life possible on our planet. While most other resources have substitutes, water, which plays a complex and multifunctional role, has no substitute. It is a unique natural resource because it cannot be created or replaced ... (Datar, 1998).

According to Miller (1996), only a tiny fraction of the world's water supply is fresh water that is available for human use. About 97% is found in the oceans and is too salty for drinking, irrigation or industry (except as a coolant), 3% is fresh water, about 2,997% is in the form of ice caps or glaciers or is buried so deep that it costs too much to extract. Only 0.003% is in the form of soil moisture, exploitable ground water, water vapor, lakes and streams (see Figure 4) (Miller, 1996 p.454). Thus, humans and organisms other than oceanic species must compete for the small percentage of fresh water that is available. Water is therefore a scarce resource (Bishop & Prosser, 1995). This can be summed up by stating what Smith (1998) highlighted, i.e. that water is not scarce, but fresh water is scarce.

The available fresh water amounts to a generous supply that is continuously collected, purified and distributed in the hydrological cycle. This natural recycling and purification process provides plenty of fresh water so long as we don't either overload it with slowly degradable and non-degradable wastes, or withdraw it from underground supplies faster than it is replenished. Unfortunately, humans are doing both (Miller, 1996).

Fuggle & Rabie (1996) state that Southern Africa is generally an arid to semi-arid region, with an average rainfall of a little
Figure 4: The planet’s water budget

under 500 mm per annum. The distribution of rainfall is very uneven, and some of the areas of highest demand, such as Pretoria, Witwatersrand and Vereeniging receive little rainfall. Because of high evaporation rates, the run-off to rainfall ratio is amongst the lowest for any of the populated regions of the world. The result is that water is a very scarce resource in most of Southern Africa and this scarcity is often a limiting factor for development. Large scale engineering techniques have been employed to store water (behind dam walls) and to distribute water from catchments with abundant supplies and low demand to those where demand is high but supplies are scarce. According to van Rensburg (1988), South Africa must share the substantial available water with other countries. Sharing of water is done according to international custom, law and agreements. The Lesotho Highlands Project is a good example of international co-operation.

The greater part of the country lies within a semi-arid zone, and
whatever water there is, does not match with the geographic areas of greatest demand. Surface run-off is the main source, augmented by some ground-water. The demands made on these sources are in many cases already equal to the supply (Mirrilees & Forster, 1993). Schutte & Pretorius (1997) further state that the current situation, as far as water supply is concerned, is that a large fraction of the population does not have an adequate water supply and/or sanitation facilities of an acceptable level. It should be noted that the water that is used is in the form of a cycle: If it is not sustainably used, the supplies can run dry.

All the rivers run into the sea, yet the sea is not full; unto the place from which the rivers come, there they return again (Clarke, 1991).

All our water comes from the water cycle and it is this process which controls our water resources. 'The earth's water cycle, called the hydrological cycle, is the continuous circulation of water between the earth and the atmosphere.' (Martin, 1997).

Within the hydrological cycle, water is constantly moving, driven by solar energy. The sun causes evaporation from the oceans, which forms clouds and precipitation (rainfall). Evaporation also occurs from lakes, rivers and the soil, with evapotranspiration contributing significant amounts of water. Although about 80% of precipitation falls back into the oceans, the remainder falls onto the land. It is this water that replenishes the soil and ground water, feeds the streams and lakes and provides all the water needed by plants, animals and humans. The cycle is continuous thus water can be considered a renewable resource. The more it rains the greater the flow into the rivers and the higher the water table rises as the underground storage areas (i.e. the aquifers) fill with water as it percolates down into the sea. Water supplies depend on the rainfall; when rain decreases the volume of water available for supply will decrease and in cases of severe drought it will fall to nothing (Gray, 1994). The hydrological cycle is explained in Figure 5.
2.2 WATER USES

Water could be used directly or indirectly. Davies & Day (1998) indicate that some of water we use personally and directly (by turning on the tap, flushing a toilet cistern and so on), while some we use indirectly when we purchase a motor car, personal computer, a newspaper, or a kilogram of tomatoes, the production of which consumes varying quantities of water.

Industrial use

Industry comes a distant second in the water-consumption stakes, using about 12% of the total amount consumed in South Africa (mines use about 11% of this). Industries use water as a solvent, a coolant, a dust settler, a cleanser and even as a means of transport (coal transport by pipeline). Some industrial processes are high users of water. About 200 m$^3$ are used in the production of a single ton of steel. Very little of the water used in most industrial processes is actually consumed. Most is polluted and then returned to water sources (Davies & Day, 1998).
Agricultural use

Agriculture is by far the major consumer, using most of the country's precious water resources to irrigate just 0.7% of South Africa's total surface area. Of all this water, less than one third contributes directly to the growth of crops (Yeld, 1997).

It was estimated in 1983 that about 73% of the total amount of water used in the entire country went to irrigation and stock-watering, although this figure decreased to about 69% in 1997. Consumption of even 69% is still too high, especially when we consider that the agricultural sector actually contributes only about 5% to the economy of South Africa (Davies & Day, 1998).

Domestic use

A little more than half of the remaining 15% of water consumed in South Africa is used domestically for washing, cooking, watering gardens, cleaning cars, filling swimming pools, flushing toilets, etc. Table 2 shows that the amount of water used in the home depends on availability and on standard of living.

Table 2: The relationship between domestic water consumption, water availability and standard of living

<table>
<thead>
<tr>
<th>Water consumption</th>
<th>Litres per person per day</th>
<th>Litres per household per day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absolute minimum consonant with health (drinking, cooking, washing hands; nearest source 15 km away, no transport)</td>
<td>3</td>
<td>12</td>
</tr>
<tr>
<td>Nearest source 1km away, with no transport (any washing done at water source)</td>
<td>5</td>
<td>20</td>
</tr>
<tr>
<td>Water in village or water-tank near house</td>
<td>10</td>
<td>40</td>
</tr>
<tr>
<td>House with tap and shower only</td>
<td>50</td>
<td>200</td>
</tr>
<tr>
<td>Full sanitation (bath and toilet); no garden</td>
<td>175</td>
<td>700</td>
</tr>
<tr>
<td>Full 'mod. cons.', including dishwasher, washing machine; no garden</td>
<td>175</td>
<td>700</td>
</tr>
<tr>
<td>Full 'mod. cons.', including garden and swimming pool</td>
<td>1550</td>
<td>1550</td>
</tr>
</tbody>
</table>

(Davies & Day, 1998)

Water losses

Lost and wasted water is the water which is unaccounted for in the sense that it is not assigned to a specific user. Water
unaccounted for is attributable to errors in meter readings, unauthorised connections and leaks in the distribution system (McGhee, 1991). Water losses account for most of the rest of the water consumed in South Africa. Stored water may be lost in a number of ways.

In a dry climate water is lost through evaporation from the surface of reservoirs. Equally problematic is the fact that water mains and pipelines are often old (in older cities like Cape Town, some are even unmapped) and leaks can be considerable. For instance, in 1982 known leakages and unaccounted for losses in the Cape Town municipal area amounted to 14%. This figure was probably the highest in South Africa and is due to the fact that Cape Town has the oldest and most failure prone water mains. In 1994 the figure for unaccounted water (leaks, unmetered consumption and theft) was about 22.6% of the total amount of water supplied to the city. The enquiries made around South Africa lead to the conclusion that about 25% of all water supplied to consumers is unaccounted for. Vincent Bath, Director of Rand Water, considers the figure to be more or less correct for Johannesburg and other regions supplied by the utility (Davies & Day, 1998).

Public use

Water furnished to public buildings and used for public services include water for city buildings, schools (rural areas), flushing streets and fire protection, for which the municipal supplier usually is not paid (McGhee, 1991).

Apart from water availability and uses, it is imperative that the water consumed by humans should be of good quality as this will alleviate a number of water-borne diseases that may be a health hazard. South Africa’s water quality and water-borne diseases are discussed in the next chapter.
CHAPTER 3

WATER QUALITY AND HEALTH PROBLEMS

Given that there is often limited availability of water, careful management of resources is important. This management includes maintaining a high quality of such available resources, and this requires careful monitoring (Kay, 1999).

3.1 WATER QUALITY

Water is regarded as of high quality when its dissolved, and suspended constituents are below a level at which they are harmful (Kay, 1999). DWAF is responsible for protecting the quality of the country’s water resources. The Department controls water from point sources by requiring that effluents comply with uniform standards which were set at technological and economically attainable levels. The relaxation of these standards is negotiated in certain individual cases on the basis of technological, economic and socio-political considerations. These standards serve a useful purpose by limiting the rate of deterioration in water quality, focusing attention on pollution and promoting improvements in waste water treatment technology and management. Despite these efforts to control pollution, the deterioration of the quality of water resources is continuing.

Clarke (1991) indicated that standards are a vexed subject but in so many categories regarding water quality South Africa emerges as unduly permissive. For example the European Council (EC) allows no more than 25 mg/l of faecal matter. The World Health Organisation, mindful of the realities of the Third World situations, and not wanting to set impossible targets, says 200mg/l is safe enough while South Africa allows 600mg/l. Cadmium and mercury, heavy metals which can build up in the body causing anaemia, brittle bones, liver diseases, paralysis and other serious effects, and which enhance the toxic effects of copper and zinc, are very strictly controlled in most countries. The EC limit is 0,005 mg/l for cadmium and 0,001 mg/l for mercury. The
South African Bureau of Standards has recommended four times more cadmium and ten times more mercury as still being safe.

The quality of surface water in South Africa is characterised by salinity, eutrophication, micropollutants, microbiological pollutants and erosion and sedimentation (DWAF, 1991). South Africa’s topography has a useful built: its rivers run fast and are thus quite well oxygenated. Because of this they have good self-cleansing properties as far as organic pollution is concerned. But dissolved solids cannot be reduced in this way. Many urban streams are now becoming overwhelmed by industrial contamination (Clarke, 1991).

The changes in those areas where water quality has deteriorated significantly are mostly due to human activities. According to Molefe (1999) most of the rivers in Gauteng, the country’s economic heartland and most crowded province, are very polluted. The Crocodile, Jukskei and little Jukskei rivers, Modderfontein and Sandspruit have high levels of bacteria and raw sewage. All these rivers and streams, including Jukskei (which is reported to the most polluted river in South Africa), flow through densely populated urban areas, including upmarket suburbs and squatter camps, posing a serious health risk to residents.

Because of the lack of systematic monitoring, known cases of ground water contamination in South Africa are limited. However, this should not give a false sense of security. Within the past decade ground water contamination has become recognised throughout the world as a major environmental hazard incurring enormous annual expenditure on clean-up and control measures. It is not surprising that some of the strictest environmental control measures have been introduced for ground water protection (DWAF, 1991). Szollosi-Nagy et. al. (1998) highlight that pollution not only contaminates water on or beneath the ground, but also changes the chemical composition of water in the atmosphere.

The 1989 annual report of the Water Research Commission stated that in the long term the deteriorating water quality and the resulting decline in its usefulness can become a bigger problem.
than the availability of water in South Africa. It saw salination and eutrophication as the worst problems (Clarke, 1991).

3.2 HEALTH PROBLEMS

The importance of water as a vehicle for the spread of diseases has long been recognised (Lloyd & Helmer, 1991). New reservoirs create new environments for disease-transmitting organisms and also alter the rivers below them, sometimes creating new and more favourable conditions for the spread of certain human diseases. Such environmental changes are particularly problematic throughout Africa.

The potential for the further spread of bilharzia and malaria in rural populations is very high throughout the entire continent of Africa except for the south western tip. Many of the rural populations are ill-equipped to combat such diseases because of poor sanitation and minimal medical care resulting from geographical isolation, lack of funds or ignorance on the part of the people themselves. Without clean water, waterborne diseases ravage poor communities.

3.2.1 Diseases

*Till taught by pain, men really know not what good water’s worth* (van Rensburg, 1988).

Water is a carrier of different types of diseases. According to McGhee (1991), communicable diseases which may be transmitted by water include bacterial, viral and protozoal infections. The bacterial infections include typhoid, paratyphoid, salmonellosis and asiatic cholera. Viral diseases include hepatitis, poliomyelitis and gastroenteritis. Protozoans such as Giardia and Cryptosporidium can produce gastroenteritis and are very resistant to disinfectants.

The Water Research Commission (WRC) (1997) indicated that in the population group 0-6 years intestinal infectious diseases accounted for 16.91% of deaths, while in the 1-5 year old group
the proportion is 19.51% and the leading cause of death in this age group.

Davies & Day (1998), show some of the waterborne diseases in Africa as indicated below.

**Malaria**

Malaria is prevalent throughout the tropics. In areas where the intense transmission of the disease occurs, it causes many deaths among infants. The most dangerous form of malaria infection is found in Africa. The Sahel region of Africa suffers from this disease more than any other part of the world (Jobin, 1999). Malaria currently infects over 300 million people per year, of whom between one and three million will die, mostly African children. In South Africa the control of malaria is regarded as more important than the control of any other parasitic disease. The disease is caused by several species of the protistan (or protozoan) parasite Plasmodium, which is transmitted by female mosquitoes. Johnston (2000) emphasised that deadly malaria is carried, but not caused by mosquitoes. Only certain areas in South Africa are malaria areas. These are eastern Mpumalanga and northern KwaZulu Natal (Versluis, 2000).

Malaria is not the only disease transmitted by mosquitoes to humans. Filarial disease occurs when humans are infected with filarial worms which often occurs in childhood, but often does not produce symptoms until puberty. The larvae of the worms which have developed in the mosquito escape when it bites humans. People can suffer from swollen lower limbs and the enlargement of genitals that causes incontinence and impotence. This destroys marriages and produces social ostracism. Cases have been reported of African men needing wheelbarrows to support their scrotum. Few people understand how comparatively common the disease is and the social and economic difficulties which arise from it (The Star, 2000).

**Bilharzia (schistosomiasis)**

In South Africa, the geographic distribution of schistosomiasis is confined mainly to the north-eastern part of the country (Fuggle & Rabie, 1996). Bilharzia currently afflicts
approximately two million people in South Africa alone, although possibly only 10% translates into 200,000 sufferers. Even those who do not show full symptoms of bilharzia are apparently predisposed to a wide variety of other chronic diseases. Yet many Africans treat bilharzia with disdain. In some cultures the disease has become an integral part of custom and ritual. In parts of Africa the ability to pass black or discoloured urine—a symptom of urinary bilharzia—is considered an essential part of initiation and the transition from childhood to the mysteries of adulthood. Poor sanitation, aids the spread of the disease.

Winblad & Kilama (1985) state that human beings pollute water with infected urine or faeces containing schistosome eggs. People get the infection while bathing, swimming, washing, fishing, cultivating or collecting plants in the polluted waters as schistosome larvae in the water penetrate the skin (Figure 6).

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**Figure 6: How schistosome worms are spread**

It is difficult to control schistosomiasis and the disease is
increasing in many parts of the developing world. Effective drugs are expensive, while less expensive drugs have bad side effects. Most people cannot avoid becoming reinfected soon after the treatment. The chemicals used to control the snail vector are also expensive, pollute the water and give only temporary control (Winblad & Kilama, 1985).

**Cholera**

Cholera is a waterborne bacterial disease also common in southern Africa. There is a relationship between cholera and inadequate water supply. Cholera is caused by the enteric bacterium Vibrio cholera. Fuggle & Rabie (1996), state that reported cholera outbreak cases were in excess of 20 000 in South Africa in 1987. Even in the presence of a good water supply, outbreaks of cholera can be expected due to the poor state of sanitation.

**Dysentery diarrhoea**

Diarrhoea is usually defined as three or more watery stools passed in 24 hours. Children under five years of age are the most susceptible to the ravages of diarrhoea. Benjamin (1999) states that at present about 650 people die from diarrhoea each day in South Africa - mostly as a result of drinking contaminated water. The annual cost of hospitalising and treating patients with diarrhoea is estimated at R15 billion. According to Pegram et al. (1998) dysentery is the frequent passing of bloody stools.

**Typhoid**

Typhoid which is commonly contracted through the ingestion of food or milk contaminated with the bacterium Salmonella typhi, it can also be waterborne if sewage enters water supplies (Davies & Day, 1998).

**Helminth disease**

It is caused by the nematode roundworm Dracunculus medinensis. The disease is waterborne and it is contracted by humans when they drink untreated water containing living copepods (minute shrimp-like crustaceans) (Davies & Day, 1998).

**Arboviral disease**

It is transmitted by blood-sucking arthropods. The most common
Africa they do not transmit any human diseases, but they are of economic impact as the disease cause enormous stock losses. The feeding of a large swarm of blackflies can be painful enough, and it causes sufficient loss of blood to result in spontaneous abortions in cattle and sheep or to kill relatively large stock.

Table 3: Common diseases transmitted to humans through contaminated drinking water

<table>
<thead>
<tr>
<th>Type of Organism</th>
<th>Disease</th>
<th>Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bacteria</td>
<td>Typhoid fever</td>
<td>Diarrhea, severe vomiting, enlarged spleen, inflamed intestine; often fatal if untreated</td>
</tr>
<tr>
<td></td>
<td>Cholera</td>
<td>Diarrhea, severe vomiting, dehydration; often fatal if untreated</td>
</tr>
<tr>
<td></td>
<td>Bacterial dysentery</td>
<td>Diarrhea; rarely fatal except in infants without proper treatment</td>
</tr>
<tr>
<td></td>
<td>Enteritis</td>
<td>Severe stomach pain, nausea, vomiting; rarely fatal</td>
</tr>
<tr>
<td>Viruses</td>
<td>Infectious hepatitis</td>
<td>Fever, severe headache, loss of appetite, abdominal pain, jaundice, enlarged liver; rarely fatal but may cause permanent liver damage</td>
</tr>
<tr>
<td>Parasitic protozoa</td>
<td>Amoebic dysentery</td>
<td>Severe diarrhea, headache, abdominal pain, chills, fever; if not treated can cause liver abscess, bowel perforation, and death</td>
</tr>
<tr>
<td></td>
<td>Giardiasis</td>
<td>Diarrhea, abdominal cramps, flatulence, belching, fatigue</td>
</tr>
<tr>
<td>Parasitic worms</td>
<td>Schistosomiasis</td>
<td>Abdominal pain, skin rash, anemia, chronic fatigue, and chronic general ill health</td>
</tr>
</tbody>
</table>

(Source: Miller, 1996)

Although it is quite obvious that pathogen-contaminated drinking water is a prime source of infection, it is equally true that insufficient availability of water hampers people's efforts to practise good personal and domestic hygiene (Lloyd & Helmer, 1991). No individual can possibly benefit from the hygienic practices associated with water unless water is available, close by and in reasonable quantities. Improved health can never directly result from the introduction of improved water supplies alone. It must be accompanied by the hygienic use of water to have any effect on the health of the individual (Morgan, 1990).

3.1.2 Hygienic conditions

Many health problems are due to poor hygiene. Health-related water programmes should consider the changes in hygiene practices needed to complement improved water and sanitation facilities. There are different aspects of hygiene that must be considered.
1. Personal hygiene

Many water related diseases are transmitted through inadequate body and hand washing. Washing can reduce the chances of contracting skin and eye diseases. Washing hands after defaecation reduces the transmission of micro-organisms which cause diarrhoea (Figure 7).

Figure 7: Promoting hand washing in rural areas

Morgan (1990) further highlighted that the hands are the most mobile parts of the body. They touch the ground, doors, taps,
towels and other peoples bodies and they are used to clean the body they belong to. Of all the parts of the body they are most susceptible to contamination. It seems logical that the hands may be responsible for carrying pathogenic bacteria - from contaminated places directly to the mouth, especially in young children, who usually suffer most from enteric diseases.

3.1.2.2 Household hygiene

If the full benefit is to be derived from any improved water source in the rural areas it is essential that the water is collected in a clean bucket and stored correctly in a vessel with a covered lid (Morgan, 1990). The containers used for water storage at home must be kept clean as they might be the transmitters of diseases.

3.1.2.3 Community hygiene

Communal water points need to be kept in a sanitary condition and used hygienically if health benefits are to follow from a safe water supplied. Water from an improved supply may be safe but can become contaminated during collection.

3.1.3 Sanitation

Where there is no pit toilet, flush or chemical sanitation, many people practice what has been called open field defaecation. Custom may dictate location and the areas which men and women use. Children may defaecate in or near the household yard. Some of these traditional sanitation practices are uncontrolled and can pose serious health risks (Davis et. al., 1993).

Several stakeholders are responsible for the provision of sufficient and potable water to the communities as stated below.
CHAPTER 4

WATER PROVIDERS AND PROBLEMS IN RURAL AREAS

4.1 WATER PROVIDERS

4.1.1 The government

An aim of every government is to achieve a reliable water supply which is sufficient in both volume and quality (Bishop & Prosser, 1995).

Scandinavian Communication SC AB (1999) indicates that because of the unfair policies of apartheid over 12 million people were left without access to potable water and up to 24 million did not have sanitation. Since 1994 the Office of Water Affairs and Forestry has begun a number of water management campaigns. These campaigns were designed and implemented to address a number of water-related and socio-economic issues.

The role that the government plays cannot be overlooked. According to the Sunday Times (1998), during the official opening of Sinthumule-Kutama Presidential Lead Water Project, at HaSinthumule, near Louis Trichardt in the Northern Province, a pensioner once said:

"We have suffered a lot. When I was a little girl it was worse but it improved when people started digging boreholes in their yards. I have always asked myself why my children and grandchildren should suffer as I did. I thought this government would not do anything for us, but now I am very happy."

The Department of Water Affairs and Forestry (DWAF) is the instrument of government which regulates the uses made of water and attempts to reconcile conflicting interests. It strives to maintain a climate of understanding in which each user group can
be persuaded to accommodate the needs of others. Demands for water range from those made to support life and health to those that support humans' material needs through agricultural and industrial production and to those that provide psychological or spiritual fulfilment by conserving and beautifying the environment and supporting recreation. The DWAF is developing allocation criteria to serve what is termed 'the best interests of the population' (Fuggle & Rabie, 1996). It is therefore important to consider the legislation that the government will pursue for water supply and sanitation and pollution.

The South African Water Act, No. 54 of 1956, water supply and sanitation services means the provision, operation and maintenance of any facility-

1. permitting access to water of a quality suitable for use for domestic purposes and in sufficient quantities to satisfy basic human needs; and

2. relating to the removal of night-soil or sewage of domestic origin from a domestic environment and its disposal and includes measures intended to promote the effective use of such facility.

The Department of Water Affairs and Forestry (1998) indicates that the purpose of the National Water Bill (Act 36 of 1998) is to ensure that the nation's water resources are protected, used, developed, conserved, managed and controlled in ways which take into account, amongst other factors:

1. meeting the basic human needs of present and future generations;
2. promoting equitable access to water;
3. redressing the results of past racial and gender discrimination;
4. promoting the efficient, sustainable and beneficial use of water in the public interest;
5. facilitating social and economic development;
6. providing for growing demand for water use;
7. protecting aquatic and associated ecosystems and their biological diversity;
8. reducing and preventing pollution and degradation of water
resources;
9. meeting international obligations;
10. promoting dam safety;
11. managing floods and droughts,
and for achieving this purpose, to establish suitable
institutions and to ensure that they have appropriate
community, racial and gender representation.

To achieve these purposes, the government has established the
Reconstruction and Development Programme (RDP). According to the
African National Congress (ANC) (1994), the fundamental principle
of the water resource policy is the right to access clean water -
water security for all. The RDP recognises the economic value of
water and the environment, and advocates an economically,
environmentally and politically sustainable approach to the
management of our water resources and the collection, treatment
and disposal of waste. The long term environmental costs of
sourcing water from neighbouring countries and between provinces
must be given greater consideration. South Africa is also a
drought-prone country, and a national drought management system
and water reserves are a priority.

Decisions on water resources must be transparent and justified
to reduce conflict between competing users. The use of water must
be balanced with a realisation of the dangers of overuse and
inappropriate disposal. Community organisations must also receive
training in water management and must ensure such management is
integrated into overall planning.

The RDP's short-term aim is to provide every person with adequate
facilities for health. The RDP will achieve this by establishing
a national water and sanitation programme which aims to provide
all households with a clean, safe water supply of 20-30 litres
per capita per day (l/c/d) within 200 metres, an adequate/safe
sanitation facility per site, and a refuse removal system for all
urban households.

In the medium term, the RDP aims to provide an on-site supply of
50-60 l/c/d of clean water, improved on-site sanitation, and an
appropriate household refuse collection system. Water supply to
nearly 100% of rural households should be achieved over the medium term, and adequate sanitation facilities should be provided to at least 75% of rural households. Community/household preferences and environmental sustainability will be taken into account.

The RDP's long-term goal is to provide every South African with accessible water and sanitation. It is committed to providing operation and maintenance systems which ensure minimum disruptions in service within two years. Particularly in rural areas, the RDP must develop appropriate institutions, including village water committees. Consultation with communicaties is essential in the provision of water.

Standards used for determining water quality
Standards are defined as values of water quality parameters (e.g. dissolved oxygen concentration, temperature, turbidity) which must be met in a stream or lake to maintain a specified environment (Schroeder, 1977). Much could be achieved in terms of improved health and reduced infant mortality if water supply services were up to standard (Lloyd & Helmer, 1991).

Many standards have been laid down for the quality of drinking water for rural areas, and these vary from one source to another. Similarly much stricter standards have been laid down for urban water supplies, where one central source may serve millions of persons. In such a case the standards must be adhered to. In rural areas water is derived from many different sources and almost all of these are untreated with disinfectants (Morgan, 1990).

4.1.2 Non Governmental Organisations (NGOs)

Non Governmental Organisations are not for profit entities that operate at national and international levels (Cutter & Renwick, 1999). Davis et. al. (1993), further state that NGOs can be international or national.

Increasingly, NGOs are becoming a considerable force in
environmental areas, their primary purpose is to improve the human condition and manage resources in a sustainable way (Cutter & Renwick, 1999). Australian Aid has committed over R10 million to a three year Mvula Trust Programme looking at the sustainability of water supply and sanitation projects in the rural areas in South Africa (Woza Internet, 1998).

The agency and community work together to develop a supply. This might, for example, be an NGO programme in which community participation is encouraged. Operation and maintenance may be shared between the NGO and the community for as long as the NGO is able to continue its support (Davis et al., 1993).

4.1.3 Community leaders

Traditional leaders, chiefs, spiritual leaders, local political leaders and others often have the authority which the majority of people are expected to obey. Sometimes this authority means that leaders do not have to explain why their instructions should be carried out. If the reasons are not explained, however, there will be less understanding of, for example, how an improved water supply could improve the people's quality of life. It is important to identify at an early stage the relationship between community and the community leaders (Davis et al., 1993).

4.1.4 Community

Governments often have problems in managing water supplies, especially in rural areas, because they lack resources. Unless there is reliable long term external support, it is necessary to develop water supplies which communities can largely manage themselves. If communities can take a greater share of the responsibility for managing water supplies, they will be less dependent on external support (Davis et al., 1993). Where communities are not fully involved or committed to the process of development the results seldom meet the expectations (Nel & Hill 1996, 273).

Water pumps in various villages of the Northern Province have
recently become the target of thieves, and fears of water shortage have risen. The regional office, with the assistance of the communication officer embarked on a Community Awareness Campaign after 40 pumps were reported missing. The campaign has resulted in villagers volunteering to guard their pumps. Some have resorted to removing the pumps daily after the reservoirs have filled up. One such village is Nkhumushe, situated at Ga-Matlala west of Pietersburg. In that village men guard the pumps from six in the evening till six the following morning (Seloba, 1998).

It is vital that all parties involved in efforts to improve community water supply - government agencies, donors, advisors, community leaders and residents - recognise and adhere to the principle that it is the local people themselves, not those trying to help them, who have the most important role to play. The community itself must be the primary decision-maker, the primary investor, the primary maintainer, the primary organiser and the primary overseer (Briscoe & de Ferranti, 1988). The purpose of the community involvement should not be ignored.

4.1.4.1 Purpose of community involvement

Mirghani & Savenije (1995) give an explanation of the purposes of the people's participation as indicated below.

The community is the one that must come up with the ideas to improve their own situation and to transfer the ideas into practical actions.

People's participation plays an important role in anchoring a project within the local structure. The community is the tool which leads to the identification of urgent needs and consequently suitable project interventions. Many design issues, such as type, location and size of structures may totally negate the intended output of a project if the local situation is ignored.

A project has little chance of success if it ignores the traditions, values and social organisation of the intended beneficiaries, or if its objectives are too abstract to be
understood or too remote from the people’s everyday concerns.

Considering local people’s views on design largely mitigates adverse effects. In order to attain project sustainability, people’s participation must be considered from the very inception of the project. Successful rural development needs to be controlled and owned by the community itself if such ventures are to succeed and become self-sustaining and self-perpetuating (Nel & Hill, 1996).

4.1.5 Women and the young

In rural areas children perform labour intensive work which should be performed by the adults, especially women. According to Robson (1996) the work that children do should be conceptualised as work, rather than merely as socialisation and training.

It is little wonder then that when women are asked about their development needs, improved water supply frequently tops the list. Rural women, who are often simultaneously farmers, food processors, cooks and mothers, work extraordinary long and hard days. In many settings, life is made even more difficult because a substantial amount of time is spent fetching water. For example, in the lowlands of Lesotho, 30% of families spend more than two and a half hours a day collecting water while in East Nigeria, water collection can take up to five hours a day (Briscoe & de Ferranti, 1988). Kwapa (2000) states that for the community of Ga-Dikgale in the Mankweng area in the Northern Province, getting water means queuing for several hours every day to fill buckets with water. They make sure that they wake up early so that they can get water before others.

The desire to maximise health benefits from improved water supplies also implies a key role for women. The effect of rural water supply projects is substantially greater when hygiene education and sanitation activities are part of the water project. Because of women’s central role in household hygiene, food preparation and child care, such programmes are a necessity.
to women, and because woman to woman communication in such matters is more effective than man to woman communication, the programmes should usually be conducted by women (Briscoe & de Ferranti, 1988).

Women are seen as an important category of stakeholders in the schemes and their participation in management adds an extra edge to the sustainability of these schemes. It is expected that greater contribution by women would mean a more efficient use of resources and improve development process (Datar, 1998).

4.1.5.1 Health problems of women related to water collection

Women can suffer deformities, headaches and exhaustion due to the range of heavy carrying work they are required to do. For many low income women, the working day is excessively long. In Sub-Saharan Africa, the collection and carrying of water and fuel-wood over considerable distances can result in women having only a few hours of sleep a night in the dry season. It has been proven in the highlands of Ethiopia, for example, that carrying heavy water pots on the back can cause spinal damage (Davis et al., 1993). Also see 5.5.2.2.

4.2 WATER SUPPLY PROBLEMS

4.2.1 Population increase

South Africa’s estimated population of 40,1 million in mid-1994, the third highest in Africa after Nigeria and Ethiopia, is growing at the rate of about 2.6% per year, making it set to double in 26 years. Clearly such a rapidly increasing population is not compatible with a national goal of sustainable living. More people consume more resources and cause more pollution (Yeld, 1997).

Rapid population growth has made the large task of water supply difficult to be solved. Widespread failures of new water supply systems, mainly from inadequate maintenance, have undercut the gains (Briscoe & de Ferranti, 1988).
4.2.2 Poverty

Poverty is one of the reasons for environmental destruction in South Africa. In many parts of the country, impoverished and overcrowded communities are battling to survive (Yeld, 1997).

4.2.3 Willingness to pay for water

Despite its importance, most of us give little more thought to our water supply beyond turning on the tap and start grumbling about the water rates. So long as the water which comes out of the tap can be drunk safely and there is enough for us to use we give no further thought to it (Brassington, 1983).

Willingness to pay depends on many other factors besides income. Family characteristics and the convenience, reliability and perceived quality of existing and proposed water supplies are dominant factors. Willingness to pay varies by area, there is a need for rapid, inexpensive, yet valid method for assessing willingness to pay (Briscoe & de Ferranti, 1988).

Many residents of rural areas expect more from the water schemes provided to them in terms of the government’s water provision programme. This is the key reason why many residents are refusing to pay for their services. Although it is widely claimed that the people do not pay because they cannot afford to, it appears that this is not always the real reason for non-payment. It was found that in many instances where non-payment occurs, there are alternative water sources albeit that the water is not as clean as that supplied by the water schemes. The residents therefore do not see the need to pay for new services, as they do not think it is really necessary. People in these communities usually had much higher expectations of the services provided, like taps in their homes. When the schemes do not meet these expectations, they withhold payment (Farmer’s Weekly News, 1998).
4.2.4 Lack of co-operation with the government

In some of the rural areas where the government has supplied the communities with water, other members of the community do not appreciate the government's efforts. Their behaviour becomes detrimental to the whole community because they interfere with the water system. Maleke (1999) indicates that the water committees complained about illegal connections, which result in water wastage and the lack of co-operation in water conservation users. Some of the community members steal the pipes and this results in water shortage as stated in 4.1.4.

4.2.5 The government

Although the government is trying to implement legislation and strategies which can overcome the problems related to water, some deficiencies still exist. Pearson & Idema (1999) realised through their research that manpower and training deficiencies often play major roles in the failure of rural disinfection systems. Especially in Kwazulu-Natal, it is alarming to see how many of the small communities and community establishments (hospitals, schools, clinics, etc.) do not adequately disinfect their water treatment facilities. The reason for failure and unreliability of disinfection include lack of chlorine chemicals, lack of operator attention, no provision made for chlorine addition, lack of funds for purchasing chlorine and no monitoring of chlorine residuals to detect chlorine levels.

The conditions that exist in other rural areas in South Africa concerning the supply of water as discussed above will be delimited by taking Thokgoaneng as a case study.
CHAPTER 5

THOKGOANENG AS A STUDY AREA

The data were collected by issuing 80 questionnaires to the villagers (Appendix 1). The questionnaires were completed by the researcher during interviews. The interviews were randomly conducted in order to acquire information from the different sections of the area. Different stakeholders who could assist with the information were consulted such as the induna of the area, local schools, clinic, the Chuene Holiday Resort, TLC members and the water committee. The respondents were eager to give as much information as they could as they are looking forward to get assistance.

Their replies to the questions were then tabulated in order to facilitate data analysis.

5.1 PERSONAL DATA

5.1.1 Age structure

The highest percentage constituting 31% of 80 respondents (Figure 8) over the age of sixty years. The age groups between 40 to 49 and 50 to 59 share the same percentage of 21% each, then followed by 18% between the age group 30 to 39. The smallest group is 9% which is within the age group 20 to 29.

The factor that contributes to the high level of the age group 40 to 60 is that they live in extended families i.e. parents live with their children and grand-children in the same household, relying on the pensioners' money as they are unemployed. This is where the old citizens of Thokgoaneng live. The other contributory factors are that the younger generation has moved from the old village to live in the RDP houses (Chuene Park) and others have moved to cities in search of work.
Figure 8: Age distribution of the respondents

5.1.2 Economic profile

According to the data obtained from the respondents (n = 80) the majority of the villagers (Figure 9(a)), constituting 39 %, are unemployed, another 30 % rely on pensioners' payouts, 10 % are labourers who earn less than R1000 per month, 11 % are labourers who earn between R1001 - R2000 and 10 % earn more than R2000 per month. It is imperative to say the area is occupied by poor people.

5.1.3 Literacy level

According to the data obtained from the 80 respondents 54 % have never attended any school (Figure 9(b)); 20 % of respondents dropped out of the school between standards 1 - 5, 14 % completed standards 6 - 8 and 13 % have managed to pass standard 10. This information shows that illiteracy level at Thokgoaneng is high.
Figure 9: Income per month (a) and literacy level (b) of the respondents
5.1.4 Number of dependents

This researcher has realised that certain large families at Thokgoaneng are due to extended families. The number of dependents was calculated in terms of the number of both children and unemployed adults who depend on one family member for survival. In most cases they depend on the pension payout of the elderly parents. Nineteen percent of the respondents have one to two dependents, and 33% have three to four dependents, while 49% have more than five dependents (Figure 10).

![Image of bar chart showing number of dependents per household]

**Figure 10: Number of dependents per household**

The people of Thokgoaneng rely on several sources of water to satisfy their needs.
5.2 WATER SOURCES

The different sources that exist at the village are used for different purposes. Some sources of water are preferred for drinking, while others are used to cater for other activities such as washing clothes and building activities.

5.2.1 Roof water

The interviewees indicated that they do not get water from the rivers or dams during rainy days. They use drums to collect run-off water from the gutters of the roof. This water they use confidently as potable water.

5.2.2 Ground water

The village was initially supplied with water from two boreholes until 1998, when a bulk supply scheme was commissioned with a new 750 kl service reservoir as pointed out by the TLC. The villagers interviewed indicated that the water problems they used to encounter when using boreholes, were minimal compared to the ones they are now encountering when they use the water supplied by the government (See 5.5 below). It was also indicated that the problem they used to have was that when the water-pipe broke, it used to take up to two weeks before it was fixed. The democratic government in 1998 decided to provide them with tap water from Olifants/Sand and Transfer Scheme and relinquished their supply from the boreholes.

5.2.3 Tap water

According to Metsi Water and Sanitation (1999) the Chuene dam was constructed in 1971 to supply Lebowakgomo with water. After the Olifantspoort Water Scheme was commissioned in 1991 to supply Lebowakgomo with water, the demand from Chuene dam was gradually phased out. Since 1991 purified water is supplied to the three villages under chief Chuene, respectively called Maratapelo, Chuene Moshate and Marulaneng from the Chuene dam. The supply is
operated by DWAF except for the village of Thokgoaneng which initially used the water from the two boreholes and later, in 1998, it was supplied by Olifants/Sand Transfer Scheme (OSTS) which is controlled by Lepelle Water Board.

The OSTS was commissioned in 1997 to supply water from the Olifants river system to Pietersburg. The transfer pipeline route follows the main road R37 between Pietersburg and Lebowakgomo through the Chuenespoort area. Two draw-off points were provided at Thokgoaneng and Chuenespoort dam. Thokgoaneng therefore gets its water from Olifantspoort Water Treatment Works which is located in the Olifants river and the water is controlled by the Arabie dam located further upstream in the river. The treatment works is operated by Lepelle Northern Water Board on behalf of the DWAF (Metsi Water and Sanitation, 1999).

5.2.4 Surface water

According to the information that this researcher has acquired from the interviewees, it was mentioned that, since OSTS has connected the water pipes at the village to the transfer pipeline, they started to have some serious water shortage problems. The villagers then started to use the unpurified water from the rivers and dams.

Although the Government has tried to supply the village with water, this action has not solved the problems of water shortage at Thokgoaneng. Consideration will now be given to whether the community was consulted before the water pipes were connected.

5.3 COMMUNITY INVOLVEMENT IN DECISION-MAKING

According to the information supplied by the officer in the Department of Water Affairs and Forestry, Village Water Committee and tribal authority (induna) meetings were held with the community to inform them about how the water supply system would be operated. Contrary to this, 12.5% of the 80 respondents complained that they had not heard about the meetings. Another group which constitutes also 12.5% indicated that they had heard
about the meetings, but did not attend. The rest of the respondents constituting 75% said they did attend the meetings and then agreed upon the conditions stipulated to them on how the water services would be operated and payments managed (Figure 11).

![Attendance of respondents to meetings](image)

Figure 11: Attendance of the respondents to meetings

5.3.1 Financial management

All water payments in the area are collected by using the local VWC. The VWC at the village has divided the community into ten sections. Each section has a representative which controls the payment of that particular section. The representative collects the money from the individual households and issues each paying household with a receipt. The VWC treasurer keeps a register of all money collected, as well as the households' payment status.

The attitude that some of the respondents had for not responding positively towards attending the meetings, points to the fact that those members will not pay at all for the services provided.

42
5.4 WILLINGNESS TO PAY

An overwhelming number of the respondents (71%) are willing to pay for the water services as they are dissatisfied with the alternative water sources that they are using. Some of the respondents (29%) indicated that they are not willing to pay for water.

They complained that the taps are situated far from them i.e. more than 200 meters away from their households, but that they are expected to pay the same amount as those with taps close to them. They said that they are neglected when it comes to the development of the area as they had not been told about the meetings, and that they are presently not supplied with water pipes and are also not supplied with electricity poles. They also mentioned that the members of the TLC or Village Water Committee installed the water pipes in such a way that water moves straight from the reservoir (which is situated on the upper slopes) to the lower slopes, because that is where council members and the majority of the younger generation stay. This presents a problem, because the water is not under sufficient pressure to reach the taps which are installed on the higher slopes, therefore they are forever without piped water.

5.5 PROBLEMS RELATED TO WATER SUPPLY

The interviewees raised several problems in relation to the supply of water to the village. These problems are divided into two categories depending on how they have emanated.

5.5.1 Shortage of potable water

* the water is available for only a short time each day i.e. from 8:00 to 14:00 hours. This inconveniences others as they frequently have to leave the water-points without water. This is also a disadvantage to the workers and school children, since they leave home before 8:00 and come back in the afternoon after 14:00 - thus they never have a chance of getting clean piped water.
other community members are not willing to pay for the water, but they want to enjoy similar services as those provided to those who have paid.

they were initially promised that they would have to pay ten rands per months, but they were compelled to pay that amount each and every time when the VWC is supposed to open piped water for them.

When they paid for the fourth time, since 1998, the water was kept in the reservoir as the VWC decline to give them a good reason for that.

other members bring many or large containers and this compels the others to queue long hours for their turn; they may even return home without water, because the water supply might be turned off before they could get their water.

Their general feeling is that each household must be supplied with a water meter to regulate individual water consumption.

These problems led the villagers to resort to alternative sources of water.

### 5.5.1.1 Other water sources

Since the provision of potable water by the government is not functional in this area, the people of Thokgoaneng decided to get water directly from the nearby rivers and dams to satisfy their needs.

**Rivers**

The people of Thokgoaneng have not been supplied with potable piped water since 1998. They get drinking water from the nearby rivers, the Tudumo and the Nokanachuana, which are non-perennial rivers. During low or no flow periods, they dig shallow holes in the sand of the river bed and then wait until filtered clear water percolates to the hole (Figure 12).
Twenty percent of the 80 respondents indicated that they sometimes boil or use bleach to purify the water, but the majority use nothing at all for purification. On enquiring why they do not try to apply measures of purification, they said they feel reluctant because it is a time-consuming exercise, and that they have been using the water with no serious side-effects.

2. Dam

During the dry seasons when the rivers are dry, they get their drinking water from Chuene dam. Chuene dam is situated near Chuene Holiday Resort. The researcher was informed by the officer at the resort that the resort gets its water from boreholes. It was indicated that the resort could not allow the people from Thokgoaneng to use their water, because it would seem they are against the government and, as the government has supplied the villagers with water but the community is not willing to pay for the services, government must sort out their problems with the
community itself and not depend on the resort to supply the villagers with water.

The respondents highlighted that they also use the water from the local dam which is fed by the Nokanachuana. They regard this water to be dirty and unfit for drinking, but still use it for other activities.

5.5.2 Consumption of unpurified water

Numerous rivers running through poverty-stricken communities in underdeveloped countries are frequently nothing more than foul polluted drains. This tightens the poverty-stricken cycle by contributing to general ill-health and the spread of diseases such as cholera and diarrhoea. In this context, we could cite countries such as Rwanda, Somalia, Sudan, Liberia and Ethiopia as African horror stories, but South Africa has nothing to boast about in this respect. The legacy of land dispossession and poor housing and education has left many communities unaware that polluted rivers are health hazards. As a result of this, some 30 South African children die every day of diarrhoeal infections caused by exposure to insanitary conditions (Davies & Day, 1998).

All the respondents showed dissatisfaction about using water directly from the dams and rivers as they encounter some problems. They said there is nothing that they can do since it is their only alternative source of water.

5.5.2.1 Water pollution

The respondents indicated that they frequently observe foreign matter in the water, which makes the water unsuitable for human consumption.

* animals die in the river,

* people are murdered and thrown into the dams, and others commit suicide by drowning themselves in the dams;

* they find both human and animal faeces in the water;
people wash themselves and their clothes in the rivers;
* when they cook the water, it foams from bath and washing soaps;
* it smells of urine.

Figure 13 shows some women washing some clothes upstream while others are busy collecting water downstream. Figure 12 depicts a girl collecting water, while a little boy washes his hands. This shows that there is no form of control at all in keeping the water source clean. This can result in people getting diseases.

5.5.2.2 Illnesses
The illnesses that the respondents said they suffer from are divided into two groups.
Illnesses related to carrying heavy loads

The women interviewed complained of different illnesses which are related to carrying or pushing heavy loads. They carry 20 - 25 liters of water on their heads or push wheelbarrows with two to three 25 litres water containers. This results in health problems like:

* backache
* headache
* painful legs
* chest pains and
* tonsilitis.

These illnesses attack mostly women and children as they are the ones responsible for family chores; 75% of the 80 respondents are women and children who supply their families with water; 23,75% of men transport water and only 1,25% buy the water from people who use donkey carts to carry the water. These percentages show that the men in the rural areas play a less important role in engaging themselves in family chores.

Water-related diseases

The information that the researcher has gathered from the Chuene Clinic concur with that of the Department of Water Affairs and Forestry (1999) as it states that the water-related diseases at the village include

* diarrhoea
* cholera
* typhoid fever
* dysentry
* bilharzia and
* malaria.

5.5.3 Car Accidents

The respondents indicated that some of their community members who live on the eastern side of the village, near the R37 main road from Pietersburg and Lebowakgomo, are sometimes injured or killed by cars. This happens when they cross the busy tarred road
to get water from the Chuene river. The interviewees who live near the road said that they consulted the TLC on several occasions to request the Traffic Department to assist them by installing some pedestrian crossing signs to alert the motorists, but nothing has been done about this to date.

5.5.4 Administration of funds

The respondents indicated that there should be a better way of administering the funds paid for water. They do not feel happy about the way the funds are administered.

It is vital to also discuss the sanitation of Thokgoaneng to see how this contributes to water pollution of the dams and the rivers of this area.

5.6 SANITATION

It has been realised that of the 80 respondents only 58.75% have erected some toilets in their yards. On enquiring what they use when nature wants to take its course, they mentioned that they go behind the bushes and in the dongas. Figure 3 depicts some dongas and bushes found in the area, and also shows that the area is heavily eroded.

On rainy days the excrement is washed into the rivers and dams, and this poses a health hazard to them when they use the water from those sources. To the people of Thokgoaneng, washing hands after going to the toilet, is just a dream that will not come true, because that will be a waste of the little water that they have, hence their main focus is on getting potable water.

The type of toilets that some of them use is similar to the one depicted in figure 14. On enquiring why they don’t build themselves toilets, some indicated a lack of money, but others don’t see the need as they can do without one. When this researcher moved around the village, it was realised that some of the dumping areas near the yards smell of human faeces. These are the alarming conditions in which some of the rural
the alarming conditions in which some of the rural communities live.

Figure 14: Toilets that some of the community members use

Another horrifying fact is that many of the toilets of the RDP houses (Chuene Park) are already dilapidated and not working properly, except for those who erected their own. They complain that when the toilets of other households are filled to capacity, the dirt spills into neighbouring yards.

5.7 THOKGOANENG WATER PROVIDERS

5.7.1 Lepelle Northern Water Board

Lepelle Northern Water Board is the bulk water service provider for Thokgoaneng. The area is supplied by the Olifants Water Transfer Scheme which is operated by the Lepelle Northern Water Board. The water treatment works are operated by Lepelle Northern Water Board on behalf of the Department of Water Affairs and
5.7.2 Transitional Local Council

Metsi Water and Sanitation (1999) indicates that although they provide local water services to the villages, the Maraba Mashashane and the Mankweng Transitional Local Councils are the Constitutional Water Service Authorities within Thokgoaneng. The water reticulation at Thokgoaneng is performed by the Village Water Committee.

5.7.3 Village Water Committee (VWC)

Metsi Water and Sanitation (1999) states that the reticulation service provision can be performed by the local VWC. For the VWC to be recognised as water service providers the following should be implemented:

* the election of the existing VWC should be finalised and formalised.
* the Minister should inaugurate members of the VWC.
* members of the VWC should be trained and capacitated through the implementation of the identified training needs.

Although these stakeholders are regarded as the water providers, they will not operate in a vacuum. Their relationship with the induna and the community is important as this determines whether the services provided will be functional or not.

According to the statements given by the villagers, and members of the TLC and the VWC, there exists an internal conflict between parties in the village. This conflict, unfortunately, affects the progress of the provision of the services in the area because this caused the other section of the village to go completely without services such as electricity and water supply.
The community complains about the TLC and the VWC: they indicated that the pipes were connected in a way that it satisfies the needs of the younger generation (TLC and VWC) at the expense of the other older members of the community. This information conforms with the information supplied by the engineers who installed the first water reticulation network in the area. It has been mentioned that the initial reticulation network has been altered. This reiterated the problem of lack of water availability on the higher slopes, because the water in the system is not under sufficient pressure to move from down-slope to up-slope.

On the other hand, the TLC and the Village Water Committee complained about the other part of the community that lives near the induna and forms the majority of the elders in the community. They indicated that the majority of the residents in that section does not support them because these services (water and electricity) are not supplied by the chief, but by themselves. This conflict led to some of the problems indicated in paragraph 5.4.

According to the VWC the existing reservoir was constructed to meet the demand of the number of the community members who put down their signatures when the survey of the people who should be serviced was undertaken. A part of the community did not put down their signatures. Thus the statistics that were used when the reservoir was constructed, is not a true reflection of the population figure of Thokgoaneng. This is one of the reasons that leads to water shortages.

Educational institutions are expected to bring about some changes within the community. The schools in the area were consulted to establish their conditions in relation to water supply and sanitation, and to determine what measures they have taken themselves to ensure that such services are provided.

5.7.4 Educational institutions

There are two schools at Thokgoaneng, a primary school and a
The third school that the researcher visited is Siloe school for the Blind, as it was thought that this one also falls under Thokgoaneng. On visiting Siloe the researcher was informed that it does not form part of Thokgoaneng, but it is situated close to the boundary that separates Pietersburg and Thokgoaneng. The school is provided with necessary services, such as water from boreholes, flush and pit toilets, and electricity. This is contrary to what is experienced at the schools that fall under Thokgoaneng i.e. Thokgoaneng Primary School and Thogoa Secondary School.

According to the information supplied by the head of Thokgoaneng Primary School, which is situated at the centre of the village the school was built in 1981 and for the year 2000, 650 pupils were enrolled. The school is not supplied with water and does not have toilets for either teachers or pupils. On enquiring what action is taken if one needs to go the toilet, it was said that the pupils just go to the little bushes near the school. For the teachers have conditioned their biological rhythms not to need a toilet when they are at work. It was mentioned that if this rhythm is disturbed, they can ask to use a toilet at the nearby homes.

They complained that the children suffer from stomach ache and they appear to be malnourished. They tried to overcome these problems by asking the community to raise funds, but this was in vain. The pupils pay a school fund of only R25 per annum. According to them the money is insufficient to cater for the school facilities such as toilets.

Thogoa Secondary School is situated on the eastern side of the village near the R37 that runs from Pietersburg to Lebowakgomo. It had an enrolment of 224 for the year 2000, and each pupil pays a R50 school fund per annum. The conditions that prevail at Thogoa do not differ from those experienced at the Primary School. There are also no toilets or water. The pupils also use the bushes as their toilets and the teachers (when they are desperately in need of a toilet) drive to the Chuene Holiday Resort which is about two kilometres away from the school.
Posing the question on what the schools do to ensure that there is water and sanitation available at the school, it was said that there is nothing that they can do if the community is not prepared to uplift itself.

Now, having highlighted a better perspective of the provisions of water and sanitation in the rural areas with regard to Thokgoaneng as a case study, some recommendations will be made and a conclusion will be reached, based on what has been discovered.
CHAPTER 6

RECOMMENDATIONS AND CONCLUSION

According to the information acquired from different sources, it is realised that the problem of water supply and sanitation in rural areas has long been existing in S.A. and other parts of the world for a long time as is explained in chapter 1.

Chapter 2 indicates that only a small fraction of water supply is fresh water that is available for human consumption. Water is one of the resources that are becoming scarce in South Africa. It is therefore the responsibility of the communities to ensure that water is used sustainably for future generations.

Chapter 3 addresses the problem of water quality and sanitation in the rural areas. It is important that the government pass laws which will compel each family of the rural communities to build a toilet. People in the rural areas should be fined for open defaecation and littering as these are some of the problems which degrade the quality of water. This results in people being infected with water-related diseases. These laws are applied in the urban areas, whereas the rural areas are neglected.

Chapter 4 shows that although the South African government is trying hard to ensure that piped water and sanitation are supplied in the rural areas, much still need to be done. The TLCs and VWC should be well-trained and monitored to ensure that services provided to the communities should not be personalised to suit their individual needs at the expense of the community. All the sections of the community must be represented.

The problems of water supply and sanitation in the study area of Thokgoaneng, as explained in chapter 5, do not differ much from those that exist in the rural areas of South Africa. Marrilees & Forster (1993) state that much environmental damage results from poverty, and many societies are very poor indeed. It is also significant that the poor suffer most from a degraded
environment. In order to curb poverty in rural areas, the people should be educated towards having smaller families and encouraged to be literate as this will ensure better jobs and better life.

Institutions, such as schools, can play a major role if the government can introduce environmental education in Out-Comes Based Education (OBE) so that it should be taught at the foundation phase in schools. The communities must be encouraged to erect toilets and to manage the services provided. This knowledge will assist the pupils to implement what they have learned at school at their respective homes.

The success of every project depends on involving the community it serves. In terms of Thokgoaneng the different sections must be represented. Although the services might not cover the whole area, a good explanation is needed to highlight those affected so that they should not cause a dispute.

In conclusion, if environmental management is taught at schools the information is indirectly transferred to the parents. This will help the communities to understand that if water is not used sustainably, it could be depleted. The communities will gain knowledge of the impact that their actions might have on the environment e.g. littering, open defaecation and discarding waste products in an open veld. Activities such as these have an impact on the quality and availability of water.
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Dear sir/madam,

A research project on water supply and sanitation at Thokgoaneng is being conducted by Ms R.R. Modiba, a Masters student in the Department of Geography and Environmental Management at the University of Rand Afrikaans University.

The purpose is to look at the feature of water supply and sanitation of the area. This information will be of value to any person interested in managing the environment by encouraging the sustainable use of natural resources such as water.

It would be highly appreciated if you could assist me in the investigation.

All information will be kept anonymous.

Thank you for contributing to this research project.

Yours sincerely

R.R. Modiba
APPENDIX 1

QUESTIONNAIRE: COMMUNITY - MALE/FEMALE PARENT

PROJECT: WATER SUPPLY IN RURAL AREAS: THE CASE OF THOKGOANENG-CHUENE, NORTHERN PROVINCE, SOUTH AFRICA

Please make a cross (x) where applicable.

For office use only.

<table>
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<th>Date</th>
<th>Questionnaire no.</th>
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1. Standard passed_____

2. Profession_____

3. Occupation_________

4. Income per month in rands

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5. Age_____

6. No. of children younger than 18 years______ and/or number of dependence______.

7. Do you have a toilet at home?

[ ] Yes  [ ] No

8. If no, what then is used?_____

9. If yes, what type of a toilet is used?

[ ] Pit latrine  [ ] Flush

9.1 If flush toilet, is it connected to sewage works?

[ ] Yes  [ ] No
10. Where do you fetch the water?

| bore hole | tap inside the house | tap in the yard | tap in the street | river |

10.1 Why do you prefer to use that source?

10.2 How far is the source from home?

10.3 Who fetches/fetch the water from the river/street?

| mother | mother and children | father | others |

10.4 If from the river, what is used to purify the water?

10.5 If from the tap, were you consulted before the water system was installed to discuss matters related to water supply in your area?

10.6 Did the community agree on what was discussed?

| Yes | No |

10.6.1 If no, what would you have liked to be discussed?

10.6.2 Are you satisfied with the manner in which the water is supplied? Explicate.

10.7 How are the problems of water leakages from the pipes or taps handled?

10.7.1 How long does it take before the taps or pipes are fixed?

10.8 Were you informed to pay for the usage of tap water?

10.8.1 How much are you expected to pay for the water per month?
10.8.2 Are you willing to pay for tap water? Reason.

Yes  No

10.8.3 Are the taps situated in the streets not further than 200 metres from the households?

11. Where is the water stored at home?_____________

12. What problems do you encounter, if any, in terms of water supply in the area? Make a cross to the appropriate answer or answers.

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<tr>
<th>distance</th>
<th>Queue</th>
<th>shortage</th>
<th>Expensive</th>
<th>Others: specify</th>
</tr>
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13. If you need a good bath, where do you wash yourself?

river basin at home others: specify

14. Where do you wash your clothes?

river basins at home others: specify

15. How much water is needed for washing clothes?

15.1 What is used for collecting that quantity of water?

16. What illnesses do you suffer from when you carry the water?

17. What do you do as the community to alleviate the problem of water supply?______________________________

Thank you for your co-operation.

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R.R. Modiba