CHAPTER FIVE

EMPIRICAL CASE STUDIES ON THE GOVERNANCE OF POTABLE WATER SUPPLY IN HARARE, MASVINGO, MUSINA AND TSHWANE MUNICIPAL AREAS

5.0 INTRODUCTION

This chapter presents an overview of the study areas; the methodological and multifaceted systems conceptual frameworks as adopted for this study; as well as challenges encountered in the study process. The chapter is divided into five main parts. The first part is a description of the local areas chosen for this study in both Zimbabwe and South Africa. This description focuses on the location of the local areas/municipalities, the physical environment and the geo-hydrological context of the study areas, as well as the local governance (including potable water supply) systems in each of the case studies. Part two looks at how data was gathered for the purpose of analysis and interpretation of findings. Specifically this section discusses the research design; research strategy; research methodology; subjects (population and sample); research instruments; data collection procedures; and data presentation and analysis. Part three looks at moral and ethical considerations on the conduct of this study. Lastly, the chapter touches upon the challenges and difficulties encountered in conducting this study and how the researcher negotiated and manoeuvred his way through. This last part of the chapter ends by pointing to the limitations of the study before summarising the chapter.

5.1 DESCRIPTION OF THE STUDY AREA

Information in this part of the chapter is both empirical and theoretical. It is empirical in the sense that it is based on both informal and formal talks with municipal employees and residents during the study period and prior to the study, when the researcher developed an interest in studying potable water supply governance in the two countries, especially in Zimbabwe. The information is ‘semi-theoretical’ in that it is largely based on legislative and policy frameworks

documented in the municipal information systems and what the high ranking employees and interviewees had to say in interviews.

The study was conducted in urban and rural communities of Zimbabwe and South Africa. Harare in the Harare Metropolitan Province is the capital of Zimbabwe, while Pretoria, in the Tshwane Metropolitan Municipality, is the administrative capital of South Africa (the legislative capital is Cape Town, and the judicial capital is Bloemfontein. Masvingo and Vhembe (for Musina) are largely rural local governance entities in Zimbabwe and South Africa respectively. The selection was made in an effort to draw comparisons between metropolitan urban IWRM structures and those in rural municipalities which may have considerably different demands for effective potable water governance structures.

5.1.1 The Republic of Zimbabwe

Figure 5.1 shows that Zimbabwe is centrally located in southern Africa with a surface area of 390 760km^2. It lies within the tropics between 15º 30' S and 22º 30' S and 25º E and 33ºE (Mubaya, 2010: 73). Its climate shows variations due to its geographical features and is tropical in type. Zimbabwe's physiography ranges from the low-lying bushveld along the Limpopo River valley to the largely flat central plateau and the highlands of the eastern Chimanimani area. Similar to other southern African countries, rainfall occurs in the summer months, primarily between November and April. According to Mubaya (2010: 73), the mean annual rainfall in Zimbabwe varies from below 400 mm in the extreme south of the lowveld to above 2 000 mm on isolated mountain peaks in the eastern districts. While the main soil type is sandy in nature, there are isolated areas of heavier, more fertile soils throughout the country (Mubaya, 2010: 73).

Zimbabwe has ten administrative provinces including two metropolitan cities with provincial status, Harare and Bulawayo. The administrative provinces are Bulawayo Metropolitan Municipality; Harare Metropolitan Municipality; Manicaland; Mashonaland Central, East and West; Masvingo, Matabeleland North and South; and Midlands (see Figure 5.1).

The country is also divided into agro-ecological regions numbered 1 to 5 based on rainfall, vegetation and other agro-ecological factors (Nemarundwe, 2003: 71).

Figure 5.1: Map of Zimbabwe showing provinces and the two study areas (Harare and Masvingo)

(Source: Google maps, accessed 24 March, 2010)

Since 1994 the Zimbabwe National Water Authority (ZINWA) has been the overseer of water governance issues in Zimbabwe. ZINWA has divided the country into seven catchment areas based on the major river systems, which are further divided into sub-catchments based on surface watcr basins (see Figure 5.2). These councils form the basic unit of administration in ZINWA

with catchment councils and sub-catchment councils in charge of local water use management. Stakeholder participation in water management, which owes its origin to the Rio-Dublin Principles, has been widely adopted as a policy and strategy instrument in Zimbabwe. In Zimbabwe, the functions of catchment councils are to prepare outline plans; determine applications and grant permits; regulate and supervise the exercise of water rights; and to supervise the performance of sub-catchment Councils. Sub-catchment Councils carry out the day-to-day water management (Manzungu and Mabiza, 2004: 1167)

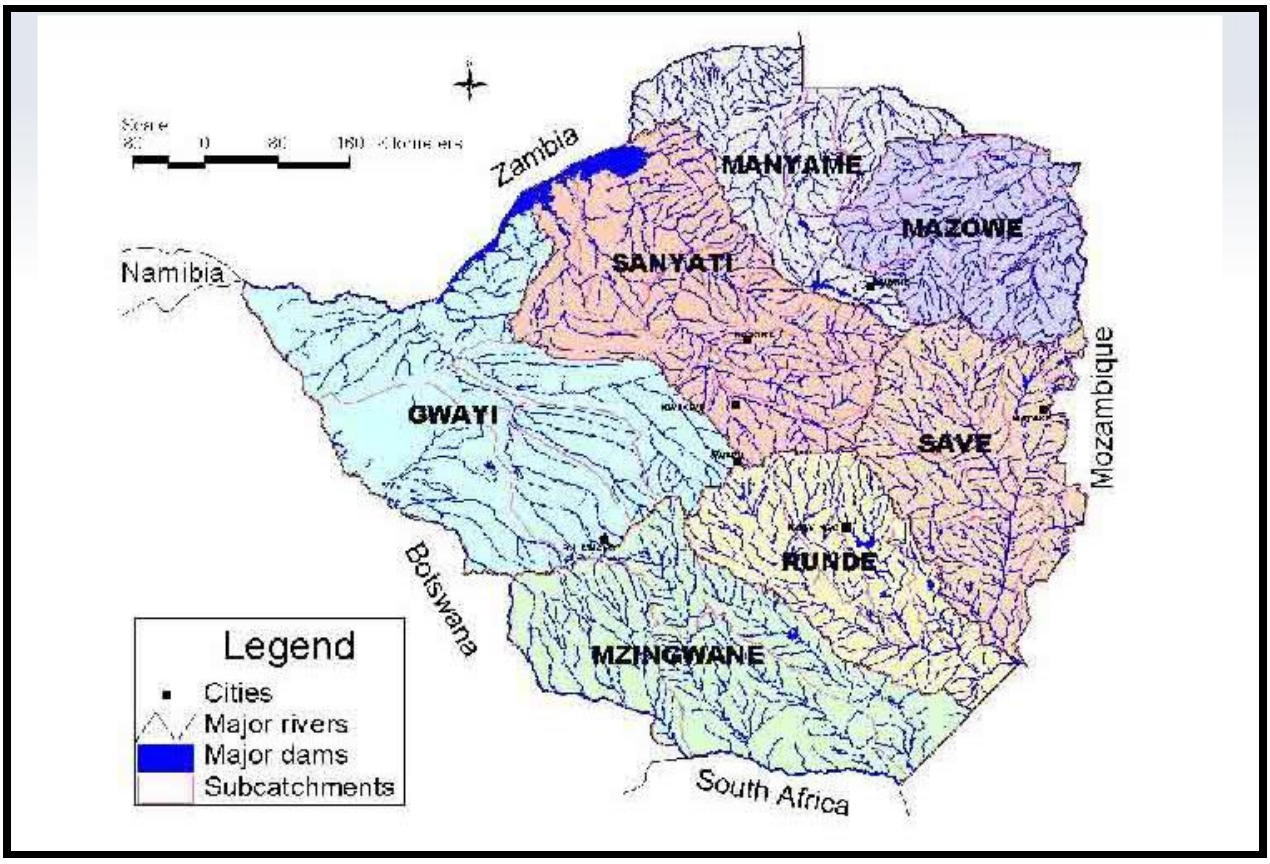

Figure 5.2: The seven Zimbabwe water management catchment areas
(Source: Hydrology Department, Zimbabwe, 2010)

According to Wurzel (1987), at the time of independence Zimbabwe was unique among African states that gained independence before 1980. It was unique in terms of a relatively far higher level of developmental infrastructure in industry, agriculture, science and engineering. The post-independence external donors and climatologists who rushed to Zimbabwe expecting rainfall records that were sparse and somewhat haphazard, were surprised to find 90 years of

countrywide rainfall data, fully computerised, tabulated, analysed and synthesized (Wurzel, 1987: 266). Wurzel (1987: 266) goes on to claim that not only was this the picture in terms of data generally, but also as far as human expertise was concerned. There were many competent engineers and scientists with 30 years of background and experience in the field of water affairs in Zimbabwe.

> It is thus fair to note that the 'state of the art' in water resource development in Zimbabwe was well advanced; over 8000 dams (110 over 2 x 106 m3), 40 000 boreholes and sophisticated research and endeavour in most aspects of hydrology and water resource engineering (Wurzel, 1987: 266).

As observed by Chakaipa (2010: 2), the major theoretical and conceptual argument for local government (in this case catchment management systems) is that, as the level closest to the people, it is able to better articulate and respond to local needs. Catchment management is also better placed to harness both local knowledge and effort in the execution of its mandates. The competencies assigned to local government (catchment management systems) are not only local in nature but have a direct bearing on the day-to-day lives of local communities. Local government/catchment management provides a means for the ordinary citizen to take part in public affairs at local level. Thus, as observed by Chakaipa (2010: 2) the *raison d'etre* for the establishment of local government by many governments is:

- provision of services at affordable cost to local communities in a more responsive and efficient manner;
- promotion of public participation in government as a means of enabling and encouraging people to exercise their rights and responsibilities as citizens; and
- regulation of the conduct of individuals and organizations in areas under their jurisdiction.

Since catchment and sub-catchment management systems are administered within the broader framework of local government and decentralisation, it is important to give an exposition of the local government framework in Zimbabwe at this juncture. In many countries, local government is enshrined in the constitution. South Africa, Ghana and Uganda among others have taken this

bold step. This however is not yet the case in Zimbabwe. Local government in Zimbabwe is established through acts of parliament. The relevant statutes establishing local government are:

- Urban Councils Act, No 24 of 1995 (Chapter 29:15);
- Rural District Councils Act, No 13 of 2002 (Chapter 29:13);
- Provincials Councils and Administration Act, No 12 of 1985 (Chapter 29:11); and
- Traditional Leaders Act, No 25 of 1998 (Chapter 29:17)

In 1980 the Zimbabwean government adopted a tri-structured local government system comprising rural, district and urban councils. However, economic and institutional challenges faced by the government led to the realignment of existing policies and legislation and a reduction of the types of local authorities to a dichotomous arrangement of urban councils and rural-district councils.

Urban councils in Zimbabwe are regulated by the Urban Councils Act, No 24 of 1995, Chapter 29:15 (Government of Zimbabwe [GoZ], 1995). They are hierarchically organised, based mainly on size and functions (see Table 5.1). At the lowest level are local boards. Town councils are at the next level followed by municipalities. Local boards have chairpersons and secretaries as heads of the policy making body and management respectively. Among the seven city councils are the two metropolitan councils of Harare and Bulawayo. Municipalities and city councils have mayors, and town clerks. Municipalities also own land within their boundaries whereas local boards and town councils do not. The land owning councils can dispose of land to prospective developers and thus generate revenue.

The Urban Councils Act (Act No 24 of 1995; Chapter 29:15) ushered in executive mayors elected by the residents of the town. The executive mayors positions called for some academic qualifications and were fulltime appointments. They worked with executive committees composed of chairpersons of standing committees to assist them carry out their functions. Town clerks were the chief executives accountable for the administration of the municipal councils. The Urban Councils Act of 1995 was however amended in 2008 removing the office of executive mayor and the executive committee. This was interpreted by observers as a ploy by

ZANU PF to weaken opposition politics, especially the MDC which had won the harmonised elections and was thus the *de jure* ruling party (Jonga and Chirisa, 2009 178; Chakaipa, 2010: 32). The executive mayor has been replaced by a part time mayor with reduced powers and functions. Thus, although many current mayors continue to operate in a near executive fashion, the law does not assign the powers they want to cling on to. The position of town clerk seems to have emerged stronger as he/she has retained all functions specified in section 136 of the Urban Councils Act (Act No 24 of 1995; Chapter 29:15). These include being responsible for:

- the proper administration of the council;
- managing the operations and property of the council; and
- supervising and controlling the activities of the employees of the council in the course of their employment.

Table 5.1: Hierarchy of urban councils in Zimbabwe

(Source: Chakaipa, 2010: 10)

Level I: Cities	**Level II: Municipalities**	**Level III: Town councils**	**Level IV: Local boards**	**Total**
• Harare • Bulawayo • Gweru • Mutare • Masvingo • Kwekwe • Kadoma	• Redcliff • Chegutu • Chitungwiza • Victoria Falls • Chinhoyi • Gwanda • Marondera • Bindura	• Chiredzi • Norton • Shurugwi • Zvishavane • Gokwe • Beitbridge • Rusape • Karoi • Chipinge	• Ruwa • Chirundu • Epworth • Hwange	
7	**9**	**10**	**4**	**30**

On the other hand, the functions of the mayor in terms of section 104 of the Urban Councils Act (Act No 24 of 1995; Chapter 29: 15) is to, 'preside over all meetings of council at which he/she is present and in the event of an equality of any votes on any matter before council, he or she shall……in addition to a deliberative vote, have a Casting Vote.' Any other functions the mayor now performs arise out of the civic office he/she occupies (Chakaipa, 2010: 32).

To better transact their business, councils have committees provided for in sections 96 and

97 of the Urban Councils Act (Act No 24 of 1995; Chapter 29:15). All urban councils in Zimbabwe will have at least the following standing committees:

- Finance Committee – responsible for regulating the financial affairs of council;
- Health and Housing Committee - responsible for health and housing matters; and
- Environmental Management Committee - responsible for environmental matters.

Most urban councils have the following departments:

- Treasury/Finance;
- Health;
- Engineering Services;
- Housing and Community Services;
- Chamber Secretariat;
- Human Resources; and
- Internal Audit (usually a section under the town clerk).

According to Chakaipa (2010: 18), councillors are elected every five years. A full council, as an institution composed of councillors and employees of an urban council, makes resolutions and by-laws key tools for managing local government affairs. Council resolutions, equivalent to policy, are the source of council vision, plans, programmes and projects (Chakaipa, 2010: 18).

It is, however, important to note that:

> In Zimbabwe centre-local relations are a phenomenological reflection of a tendency towards (re)centralisation than decentralisation. This is clearly visible in the widespread political interference by central government's Ministry of Local Government, Public Works and National Housing in the administrative affairs of urban councils. The results from a survey of a sample of fifty-two respondents on the Zimbabwean urban governance status revealed that issues of political interference revolved around the firing of legitimate councils and mayors, control of all council reforms including generation of funds, politicking in the chambers, unlawful appointments, and the use of commissions. Constitutional amendment

> has been cited as a big step towards political interference in urban governance of the country (Jonga and Chirisa, 2009: 166).

This means urban local governance and decentralisation in Zimbabwe is more about deconcentration than devolution (see chapter 2). Ministerial directives are a major tool used by central government to meddle in local governance issues. These machinations traded good governance for political advantage, thereby thwarting any remaining elements of freedom, good governance, commitment and initiative among councillors and council employees. For example:

- The Minister of Local Government, Public Works, Rural and Urban Planning gave statements to reverse Harare City Council's decision to reinstate city council employees (the directors of both housing and, engineering; and the city treasurer) who had been illegally fired during the management of a commission.
- The national department of Local Government, Public Works, Rural and Urban Planning is the chief determinant of surcharges and rates. Urban councils cannot increase surcharges or rates without permission from the ministry.
- The firing of councillors is done by the minister.
- The national department abolished the office of the executive mayor.
- The national department introduced district administrators and metropolitan governors (specifically for Harare and Bulawayo) in urban areas (Jonga and Chirisa, 2009: 174)

All these are central government prerogatives that make urban local government less effective.

The Rural District Councils Act (Act No 13 of 2002; Chapter 29:13) and the Traditional Leaders Act (Act No 25 of 1998; Chapter 29:17) regulate local government in rural and communal areas. The Rural District Councils Act of 2002 provides for elected and appointed councillors whereas the Traditional Leaders Act of 1998 deals with traditional leaders whose office is through customs, tradition and is inherited. The two pieces of legislation have structures up to village level. There are village development committees formed in terms of section 159 and ward development committees established in terms of section 58 of the Rural District Councils Act (Act No 13 of 2002; Chapter 29:13). Village assemblies are established in terms of section 14 and ward assemblies in terms of section 18 of the Traditional Leaders Act (Act No 25 of 1998;

Chapter 29:17). Given the challenges emanating from role conflict at grassroots level (particularly over the allocation of communal land), the Traditional Leaders Act of 1998 has attempted to harmonise work of these two village bodies. The village head now chairs both the village development committee and the village assembly. The headman chairs the ward assembly. The elected councillor is a member of the ward assembly. Chiefs are *ex-officio* members of the rural district council and are also represented in the provincial council. Issues on land allocation require participation of traditional leaders and council guided by the Communal Lands Act (Act No 20 of 1982; Chapter 20:04).

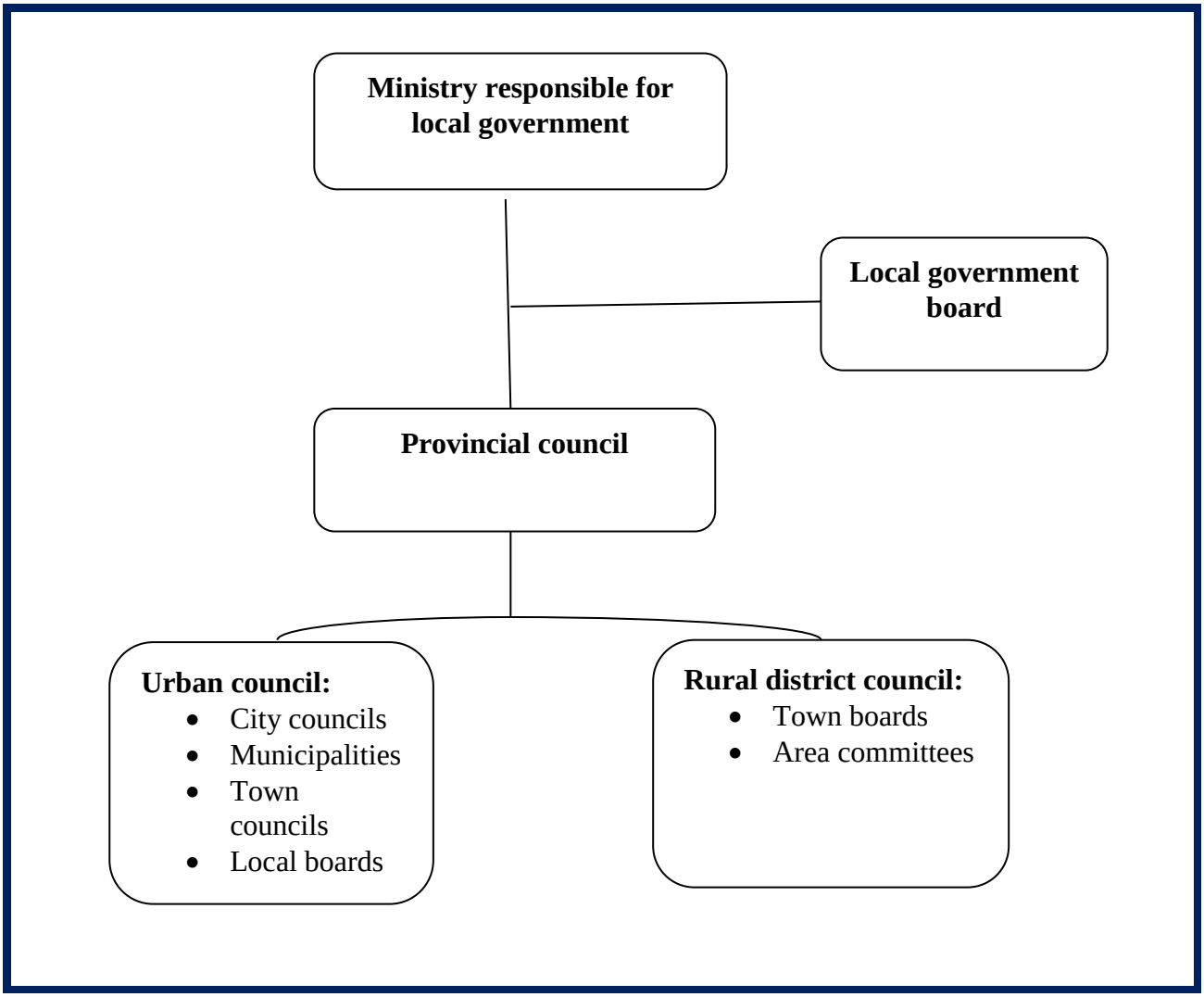

Figure 5.3: Local government institutional arrangements in Zimbabwe

(Adapted from Chakaipa, 2010: 3)

Had it not been for unprofessional central government interference into local governance issues for political reasons, the local government framework discussed above would have been more supportive and effective. The argument in this thesis is that unless there is adherence to its dictates, having a framework is as good as nothing.

The majority of the population (more than 55%) lives in rural areas (Chigonda, 2011: 296). Agriculture, mining and tourism are main components of the economy.

Groundwater is the major source of potable water supply for rural areas and many growth areas (townships). The major cities (Bulawayo and Harare) are supplied by surface water, although a backup groundwater supply has been developed for Bulawayo due to the unreliability of the surface source during severe drought. The bulk of groundwater usage is by the agricultural sector, followed by rural water supply and (to a small degree) by the mining sector (Groundwater Consulting Bee Pee, 2010: 6).

Groundwater Consulting Bee Pee (2010: 7) reports that groundwater quality in Zimbabwe is good, with minor areas of quality unacceptable for human consumption related primarily to salinity and fluoride. In most of the areas underlain by the basement complex, water quality is good due to the shallow nature of aquifers with active recharge, although they are more vulnerable to pollution. As yet, no large-scale problem with contamination of aquifers has been identified (Groundwater Consulting Bee Pee, 2010: 7). Paradoxically, despite groundwater's great importance from both the physical and human viewpoints, groundwater appears to be one of the neglected fields of hydrology in Zimbabwe (Wurzel, 1987).

Chigonda (2011: 296) observes that most of the water supply challenges in Zimbabwe are being experienced in the urban centres. This is due to rapidly increasing demand because urban populations are expanding at rates beyond the capacity for service provision. Currently, over 42% of the country's population lives in urban areas and by 2030 it is predicted that more than 55% of Zimbabwe's population will be living in urban areas (Chigonda, 2011: 296). Harare alone, now houses approximately 20% of the national population and its annual average water

consumption grew at a rate of 8.5% between 1986 and 1991 (Chenje *et al.,* 1998: 3). The cost of treating water has gone up radically over the years in Harare due to high pollution loads. This is because Harare is in the catchment area of its main water supply, Lake Chivero, and this has worsened water pollution problems (See Figures 5.4 and 5.5). The situation of water availability in Bulawayo, the second city, is even more critical because, in addition to rapidly growing water demand, Bulawayo is located in a dry region. During drought periods, there are households that go for long periods without water and some businesses are forced to scale down their operations Chigonda (2011: 296). Sources of raw water for the cities of Mutare and Masvingo were almost empty during the 1991 - 92 drought. Water demand for irrigation is also high for the major raw water supply lake to the city of Masvingo (Mutirikwi) and pollution levels are increasing (Chigonda, 2011: 296).

Chigonda (2011: 296) further observes that slums have developed in areas such as Dzivarasekwa, Mbare, and Highfield in Harare; Mbizo in Kwekwe; Mambo in Gweru; and Sakubva in Mutare. The suburb of Mutapa in Gweru was designed for 10,000 residents but now has about 30 000 residents. Houses in Mbare, Harare, were designed for an average of six residents but now the average is 30 (Chenje *et al.,* 1998: 3). Such overcrowding and squalor have added to the water supply challenges being faced by the urban settlements in Zimbabwe.

Having looked at the overview picture of Zimbabwe, the next subsections look deeper into the selected study areas in the country.

5.1.1.1 The Harare Province Metropolitan Municipality

The city of Harare in the Harare Metropolitan Province is the biggest city and capital of Zimbabwe. The metropolitan province is composed of Greater Harare, Chitungwiza, Norton, Ruwa and Epworth. The Harare Metropolitan Province is located upstream of Lake Chivero (see Figures 5.4 and 5.5 below). It falls under the jurisdiction of the Upper Manyame Sub-catchment, one of the five sub-catchments that constitute the Manyame catchment area (see Figure 5.2). The others are Middle Manyame, Lower Manyame, Angwa-Rukomechi and the Msengezi sub-catchments. The Manyame catchment is the most urbanised, populous and industrialised of the

seven catchment divisions of the country. This has created a huge water demand in this area, in addition to experiencing the most severe water pollution problems (Chigonda, 2011: 297).

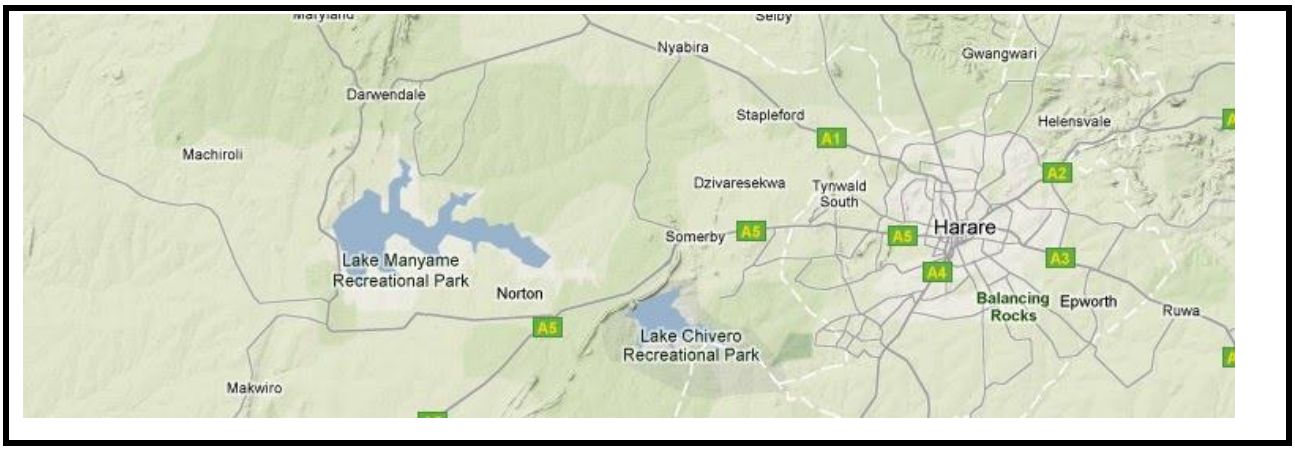

Figure 5.4: Parts of Harare Metropolitan Province showing major lakes supplying raw water to the Harare Municipality
(Source: Google Earth, accessed, 29 September 2011)

In terms of the Urban Councils Act (Act No 24 of 1995; Chapter 29.15), Harare Municipality is a water authority responsible for potable water supply and sanitation in its demarcated municipal area. The metropolitan authority obtains its raw water from a number of dams on the Manyame River and its tributaries:

- Seke Dam (capacity 3380 Ml);
- Cleveland Dam (910 Ml);
- Lake Manyame (480,236 Ml);
- Lake Chivero (247,181 Ml); and
- Harava Dam (9026 Ml) (Nhapi, *et al*, 2002).

Of these dams, Chivero and Manyame are the main reservoir sources of raw surface water supply to the metropolitan municipality. According to the government of Zimbabwe's Department of Water Records (files accessed on 25 January 2010), Lake Chivero was designed for a full capacity surface area of 26.5km^2, a volume of 247,181,000 cubic metres and a mean depth of

9.3m, with the deepest point measuring about 27m. The lake overflow level is at 1,368m above mean sea level (Nhapi, 2009: 221).

The rainfall pattern for the Chivero catchment varies greatly, with an average precipitation of around 830mm per annum. The spillway at Lake Chivero rarely releases water in the dry months of July to November, while inflows are observed throughout the year. There are no regulated outflows from Lake Chivero into the Manyame River because the floodgates are permanently closed. The lake inflow/outflow regime therefore mainly dictates seasonal water quality and, to some extent, the self purification capacity of feeding rivers and of the lake itself. Some of the water is abstracted, treated and used in towns after which it returns to the lake as sewage effluent. Only about 30% of the lake's inflows are abstracted for urban use. The rest either evaporates or flows downstream where some of it is abstracted for agricultural irrigation (Nhapi, 2009: 223).

The potable water supply scheme for the Harare Metropolitan Province is shown in Figure 5.6. The Prince Edward and Morton Jaffray water treatment works (WTWs) supply the Harare Metropolitan Province with reticulated and ready to use potable water.

Lake Chivero, although receiving the bulk of urban contamination, supplies most of the raw water actually abstracted for the Harare metropolitan area. On the other hand, Lake Manyame (which receives little urban contamination) supplies far less raw water abstracted for the Harare metropolitan area. Nhapi (2009: 224) observes that it is more rational to increase abstractions from Lake Manyame, which is much larger than Chivero, with a volume of 480,236,000m^3.

Harare began as a settler encampment in 1890. The settlers named it Fort Salisbury in honour of Lord Salisbury of Great Britain. Nevertheless, the local Shona continued to call the place and the new settlement Harare named after the small hills around the city. In Shona, *haarare* literally means 'one who does not sleep' by which is meant that the new white settlement surrounded by small hills became a busy area where if you slept you were likely to die of hunger in the unfriendly environment of the fast growing town. Harare became a municipality in 1897 and a city in 1935.

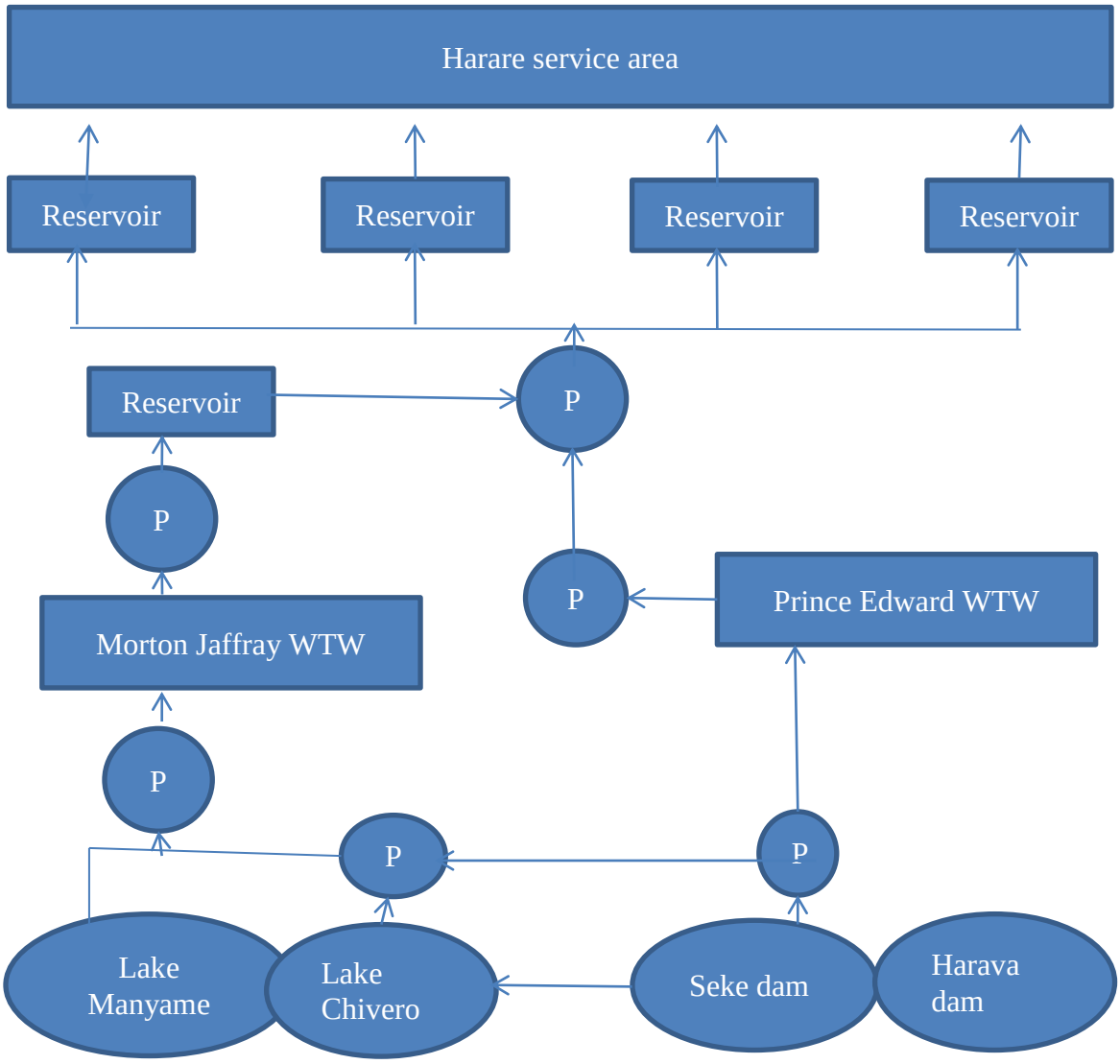

Figure 5.5: Schematic layout of water supply system for the Harare metropolitan area (P = pump, WTW= Water Treatment Works)

(Source: Nhapi, 2009: 225)

Since the establishment of Harare in 1890 the city's population, industrial and commercial activities have grown rapidly, but this growth has not been accompanied by corresponding water services infrastructure and professionalism, especially in the post-colonial period (Musemwa, 2008: 18). The Morton Jaffray water works built in 1953 to provide the city with clean water is yet to be upgraded. Harare's two main sources of water (lakes Chivero and Manyame) are seriously and continuously polluted by sewage effluent as well as industrial and agricultural

waste (Musemwa, 2008: 18). The decision by government in May 2005 to transfer the governance of water resources from the metropolitan municipalities to the Zimbabwe National Water Authority (ZINWA) exacerbated the situation (Musemwa, 2008: 16; Chakaipa, 2010: 18). Water borne diseases broke out regularly in the city culminating in the catastrophic cholera outbreaks of 2008 - 2009 (CHRA, 2009; Nyandoro, 2011: 155).

Figure 5.6: Aerial photograph of the city centre of Harare

(Source: Google pictures, accessed 25 January 2010)

Cleveland Dam was built upstream of Harare, and supplied the city until it outgrew the dam's capacity. Thus a bigger dam, Prince Edward Dam (now Seke Dam) was constructed on the Manyame River. Later Harava Dam (previously Henry Harlem Dam) was constructed to supplement the other two dams. By the 1950s the water supply of the city from the existing Manyame River dams was approaching their supply capacity limits. A new dam, Lake Chivero was located downstream of the waste effluent outflow. The city was now literally drawing water for drinking from a dam into which its waste water flowed! Although the common understanding

is that this contaminated water is purified before re-use, considering the economic meltdown in Zimbabwe in the past decade; the ageing and deteriorating potable water supply infrastructure; limited financial resources; largely underqualified human resources; and a bulging population, one has serious doubts whether the municipality is able to purify its potable water supplies to acceptable standards. In the light of the 2008 - 2009 cholera outbreak in Harare, it has been proven that Harare's potable water supplies are decidedly below acceptable standard.

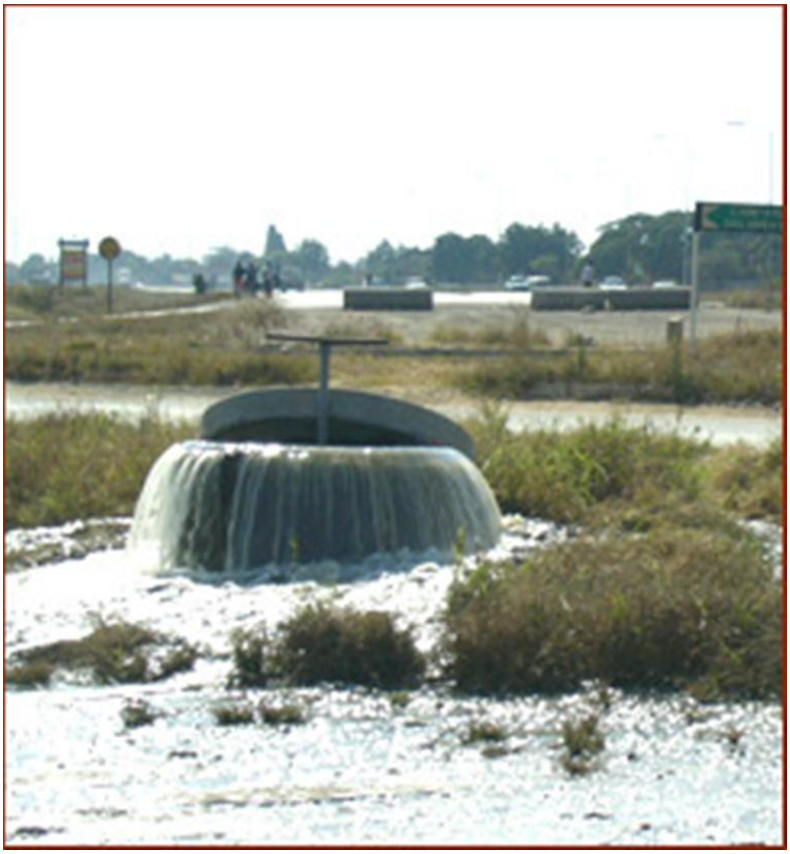

Figure 5.7: A sewage spill in Harare

(Source: CHRA website [www.chra.co.zw], accessed 10 November 2009)

From the interviews with Mr. I. Gaviro (research assistant, Harare, 25 January 2011), it was established that the management of potable water in the Harare metropole falls under the city's Department of Works which has two divisions: the planning services division and the engineering services division. Under the latter, there are several branches, one of them being sewerage and farming, and another being water. As reported by Laban (2003: 2), it is important that they remain separate, because the staff responsible for repairing sewerage pipes and the

equipment used should not be used for fixing water pipes. Unfortunately, due to dire shortages of virtually everything, not only are the repair crews used for both sewerage and water repairs, but the crews are often transported in the same vehicles. Laban (2003: 2) further observes that:

> One bad aspect of the branch separation is that when you say 'water' they only talk about water. If you want to talk about the whole concept, and the fact that we are polluting our own water sources, you have to consciously make the distinction and talk about water and sewerage. It is a bit frustrating because each branch has their own problems and wants assistance with those problems.

The water branch deals with the extracting, treatment and distribution of water. As already seen above, raw water extraction comes from at least five dams.

The projected demand for water, made in the mid to late 1990s, was 700 megalitres per day by 2002 (Laban, 2003: 3). The Harare raw water sources supply Greater Harare, Norton, Chitungwiza, Ruwa, Epworth, and Sublime Township. Through the Department of Water, Harare also supplies some major government establishments such as Nkomo Barracks, Elfrida Barracks and the ZDI, the Domboshawa Training Centre and Chikurubi Prison.

As reported by Nhapi *et al* (2002: 2) potable water treatment processes in Harare consist of a sludge blanket type clarifier; rapid sand filtration; and chlorination. The generated wastewater is either discharged into the river drainage system to Manyame River through a retention tank or pumped to farmland for irrigation purposes. Nhapi *et al* (2002: 2) further observe that wastage at water treatment works can be as high as 12% for Seke Dam and 26% for Morton Jaffray. These high values are because of frequent backwashing and the high dosage of coagulant due to deteriorated water quality and increased algae in the raw water. Water abstraction figures are fast approaching the design capacity of the plants.

Figure 5.8: Women carrying containers of water during the 2008-2009 cholera outbreak in Harare

(Source: CHRA website [www.chra.co.zw], accessed October 2009)

From this preliminary description of Harare the following challenges are noted in the governance of potable water supply by the Metropolitan Municipality of Harare in its area of jurisdiction:

- The municipality draws its raw water from the sources into which its waste water flows.
- There is an overstretched potable water supply infrastructure due to ageing pipes, rapidly increasing population, leakages and other geohydrological aspects.
- The management of potable water supply is just an appendage of the public works and planning division in the municipality's organisational structure.
- The management of water resources is not integrated. Water supply and sanitation management are treated as separate entities, while environmental matters, tourism, agricultural and mining issues are treated as if they have no links with water management.

- There is pollution of potable water due to poor urban sanitation and agricultural, industrial and mining activities in the area.
- There is rapid population growth without a corresponding improvement in infrastructure. According to Nhapi, *et al* (2002: 2) the population is doubling every 12 years.

Importantly, although ground water quality in the Harare Metropolitan Province is of good quality and highly suitable for human consumption because of the granite sandy alluvial soils (Moyo, 1985: 13), there is still a high probability of contamination due to extensive industrial waste, mining, agricultural activity, cemeteries, and rapidly growing human population concentration. Unlike the situation in the communal areas where habitation is relatively spaced, urban areas tend to be congested. During water cuts they use the nearby bushes for toilets. This waste gets into the alluvial soils in large quantities. Even gardening manure, fertilizers and other chemicals are likely to find their way into the ground water systems. Ashton *et al* (2001, xxxi) report that there are isolated cases in the Upper Manyame catchment where underground soils turn into dolomite rocks with fissures that allow free movement of liquids and small logs. Some respondents to this study believe that the 2008 - 2009 cholera outbreak in Harare originated from private deep wells (see unit 6).

The population of the Harare metropolitan area is currently estimated at 3 500 000 (see the study subjects in sub-section 5.2.4 below).

5.1.1.2 Masvingo District

Although it was also part of the main study, the city of Masvingo was used as pilot study (see section on research procedures below) to determine the appropriateness of the research instruments for the study.

Masvingo (formerly Fort Victoria, named in honour of Queen Victoria) is the central district of the seven districts in Masvingo Province (see Figure 1.4). It composes Masvingo City, Masvingo Rural, Mashava Mine and Renco Mine. The district is situated in the southern region of Zimbabwe and boasts many beautiful tourist attractions. Of particular interest is the Great

Zimbabwe monuments after which Zimbabwe is named. Lake Mutirikwi and Kyle National Park are also popular tourist destinations in the district.

Figure 5.9: Lake Mutirikwi

(Source: Archives, accessed 20 March 2011)

Masvingo District is situated in a drought-prone area in agro region 4 and 5 with an annual average rainfall of 600 mm per annum (Dube, 2002: 1). Rainfall is erratic, unreliable and unevenly distributed ranging from 450mm in the south to 300mm in the north. The rainy season is between November and April but the area is prone to periodic seasonal droughts and severe dry spells even during the rain season. The weather is hot and dry throughout the year, except during the summer when the rains come (Brown, 2010: 2). Agriculture is the main activity in the district, which is ideal for cattle ranching and growing of drought resistant crops (Dube, 2002: 1).

Most parts of the district are arable. Altitude ranges from 460 metres to 1544 metres (above sea level). The geology is predominantly granitic although there are isolated pockets of dolomite throughout the district (Brown, 2011: 1). The abundance of granite rocks has led to the formation of sandy loam soils. Granite rock is the most common rock. The area south and east of Lake Mutirikwi has young intrusive granite, gradiorite and adenelite rocks. The areas between the city of Masvingo and Lake Mutirikwi as well as Mashava have meta sediments and felsic meta volcanics. Areas around Bondolfi Mission and south west of the city of Masvingo have serpentine and ultramafic rock with contractions around Mashava on the western part of the district. The same type of igneous rock that is characteristic of the great dyke is rich in asbestos and chioromite. Small patches of dolomite derivatives are common. Alluvial deposits are commonly found along valleys to the southern part of the district. Thus as observed by Moyo (1985: 13) the soils of Masvingo are largely sandy loams which in some places are greyish to

reddish-brown and moderately shallow, course-grained sandy loams, dark-brown loams, and clay soils which are either red or black to blue black in colour.

This study covered both Masvingo rural and urban areas. Although the two residential areas fall under the same district and Sub-catchment (Mutirikwi Sub-catchment in the Runde Catchment), they do not share the same local governance authorities. Unlike the case in South Africa, where both urban and proximity rural communities fall under the same public administration or local governance authority, Zimbabwe has a dual governance system as already outlined above.

The city of Masvingo is located halfway from Harare to Musina on the Harare-Tshwane/Johannesburg road (the P1 in Zimbabwe and N1 in South Africa). It is at approximately 300km peg south of Harare and north of Musina. Masvingo is a commercial centre for cattle ranching and agriculture (grain, cotton, tobacco, fruit, and sugar). There is gold and asbestos mining in the vicinity. This makes its raw water sources vulnerable to contamination and pollution as in the case of Harare, Musina and Tshwane.

The city of Masvingo is the oldest contemporary urban settlement in Zimbabwe. The settlement was established in 1890 as Fort Victoria, named after Queen Victoria of Great Britain. It was upgraded to the status of sanitary board in 1894; became a town management board in 1926; and attained municipal status in 1953. Its name was changed to Masvingo (literally ruined stone walls, named after the Great Zimbabwe Ruins) in 1983. It gained city status in October 2002. The city has suburbs called Mucheke, Rujeko, Morningside, Target Kopje, Eastvale, Rhodene and Bushmead. The city has grown to become a major distribution and communication centre due to its central location with Harare, Bulawayo, Mutare and Beitbridge.

In terms of the Urban Councils Act (Act No 24 of 1995, Chapter 29:15) the city of Masvingo is a water authority responsible for potable water supply and sanitation in its area of jurisdiction, excluding the rural and communal areas surrounding the city which are under Masvingo Rural District Council. The main source of raw water for the Masvingo City is Lake Mutirikwi, the biggest inland lake in the country. The source is vulnerable to mining and agricultural pollution from the surrounding mining and agricultural communities, especially after the 2000s land

seizures. In the past few years, Action Fame (a NGO) has sunk boreholes in all the high density suburbs to provide unemployed women with water for gardening. These boreholes are also used for domestic water during frequent pipe bursts and subsequent water cuts.

Figure 5.10: Masvingo municipality offices
(Photograph: M. Musingafi)

As in the case of the Harare Metropolitan Province, it is important to note that although ground water quality in Masvingo District (Masvingo City included) has been found to be of good quality and highly suitable for human consumption because of the granite sandy alluvial soils (Moyo, 1985: 13), there is still some measure of contamination. During water cuts people use the nearby bushes for toilets. This waste gets into the alluvial soils in large quantities. Even gardening manure, fertilizers and other chemicals are likely to find their way into the ground water systems. In light of the fact that there are mining and agricultural activities and cemeteries

in the vicinity, it is concluded that ground water in the city of Masvingo is to some extent contaminated, albeit not as prevalent as in cases where there is full-scale dolomite rock.

According to the Masvingo city engineer, Mr. Tawanda Gozo (personal interview, 15 November 2010), the corporate body of the city comprises an elected mayor and ten elected councillors who each represent a ward and whose tenure of office is five years. In addition, three special interest councillors are appointed by the Minister of Local Government, Public Works, Rural and Urban Planning, bringing the number of councillors to thirteen. According to Mr. Gozo when the councillors and mayor assume office they undergo an introductory course on their roles, functions and the mandate of the city.

The following standing committees are appointed in terms of the Urban Councils Act of 1995:

- the Executive Committee;
- Finance and Procurement Committee;
- Health, Housing and Environmental Services Committee;
- Public Works and Planning Committee;
- Manpower Committee; and
- Audit Committee

Ordinary council meets once every month to deal with recommendations from committees and take policy position as a full board. All council meetings are open to the public. This is very important, because it means that the population is involved in the decision making of the city, has the impression that it is taken seriously and can express its own vision. Committee meetings, however, are not open to the public.

The administrative team is headed by a town clerk whose functions are specifically provided for in terms of section 136 of the Urban Councils Act of 1995. It is charged with the responsibility of proper administration and management of council's executive functions. The town clerk is assisted by heads of departments who include the chamber secretary, city engineer, city treasurer, chief health officer and director of housing and community services.

Basic amenities provided by the city, broadly speaking are:

- potable water and sanitation infrastructure;
- solid waste disposal;
- road network;
- housing;
- primary health care services;
- recreational facilities and welfare services;
- education; and
- marketing, publicity and investment promotion

The interview with the Masvingo city engineer, Tawanda Gozo (15 November, 2010) revealed that the management of potable water supply is under the water and sanitation manager, a post which at the time of the interview was vacant. This department is divided into two sections; the Water Works Section at Bushmead and the Water Fitting Section. The former is headed by a water superintendent with a post-graduate diploma in water and sanitation while the latter is headed by a water fitter at technician level who is a class one plumber/artisan. According to the engineer the water works at Bushmead was designed to serve at most 15 000 people, but now it is overstretched to serve more than 100 000 residents.

From this preliminary description of Masvingo District the following challenges are noted in the governance of potable water supply by both the Masvingo City and Masvingo Rural district councils in their areas of jurisdiction:

- Droughts and poor rainfall are more frequent compared to the Metropolitan Province of Harare.
- In Masvingo City potable water supply infrastructure is overstretched due to ageing pipes, rapidly increasing population, leakages and other geohydrological issues.
- In the city, the post of manager of water resources and sanitation is vacant.

- The management of potable water supply is merely an appendage of Public Works and Planning in the municipality's organisational structure;
- Potable water is polluted due to agricultural, industrial and mining activities in the district.
- There is a lack of piped water in the rural areas.

The district has a population of approximately 400 000 (see the study subjects in sub-section 5.2.4 below). The average population density is 28 people per square kilometre.

5.1.2 The Republic of South Africa

Figure 5.11: Map of South Africa showing the nine provinces

(Source: WRC website [www.wrc.org.za], accessed 24 January, 2011)

Figure 5.11 above shows that South Africa is located at the southern tip of Africa with a surface area of 1,219 million km^2. It is a water scarce country with a large percentage of the population falling below the poverty line (Naidoo *et al*, 2009: 1). South Africa is a semi-arid country and, as in the rest of Africa, 'urbanisation has led to deterioration in the quality of water in streams and lakes near urban centres' (Moyo and Phiri, 2002: 402). Deteriorating water resource quantity and quality is likely to become a serious restriction to future socio-economic development (Peart and Govender, 2001: 39).

According to Heath *et al* (2009: 4.1), South Africa is globally recognised as a leading supplier of a variety of minerals. Its mineral wealth is found in diverse geological formations, some of which are unique and extensive by world standards. South Africa has the world's largest reserves of platinum-group metal ores including manganese, chromium, vanadium, gold and alumino-silicates. It is also prominent in terms of reserves of titanium, zirconium, vermiculite, and fluorspar. More than 20 different types of precious metals and minerals, energy minerals, non-ferrous metals and minerals as well as ferrous minerals are mined in South Africa. From 1976, South Africa's coal exports have increased rapidly on the strength of the country being one of the world's most reliable suppliers (Heath *et al*, 2009: 4.1).

South Africa produces around 450 million tonnes of waste annually, with 70% of this generated by the mining industry (Heath *et al*, 209: 4.1). Surface mining of coal leaves large areas of land bare, without vegetation and soils. The land is often covered with waste rocks that have been separated from the coal, as well as residual coal materials. Mining activity has adverse consequences on water supply and the environment because it involves the use of large quantities of water to remove the overburden and wash the mineral ore (Heath *et al*, 209: 4.1).

Eales *et al* (1996: 182) observe that the greater part of South Africa is semi-arid and subject to variable rainfall, droughts, floods, and high evaporation. The mean annual rainfall is only 500 mm. In addition, this rainfall is poorly distributed relative to areas experiencing economic growth. Only a comparatively narrow region along the eastern and southern coastline is moderately well watered, whereas the greater part of the interior is arid or semi-arid.

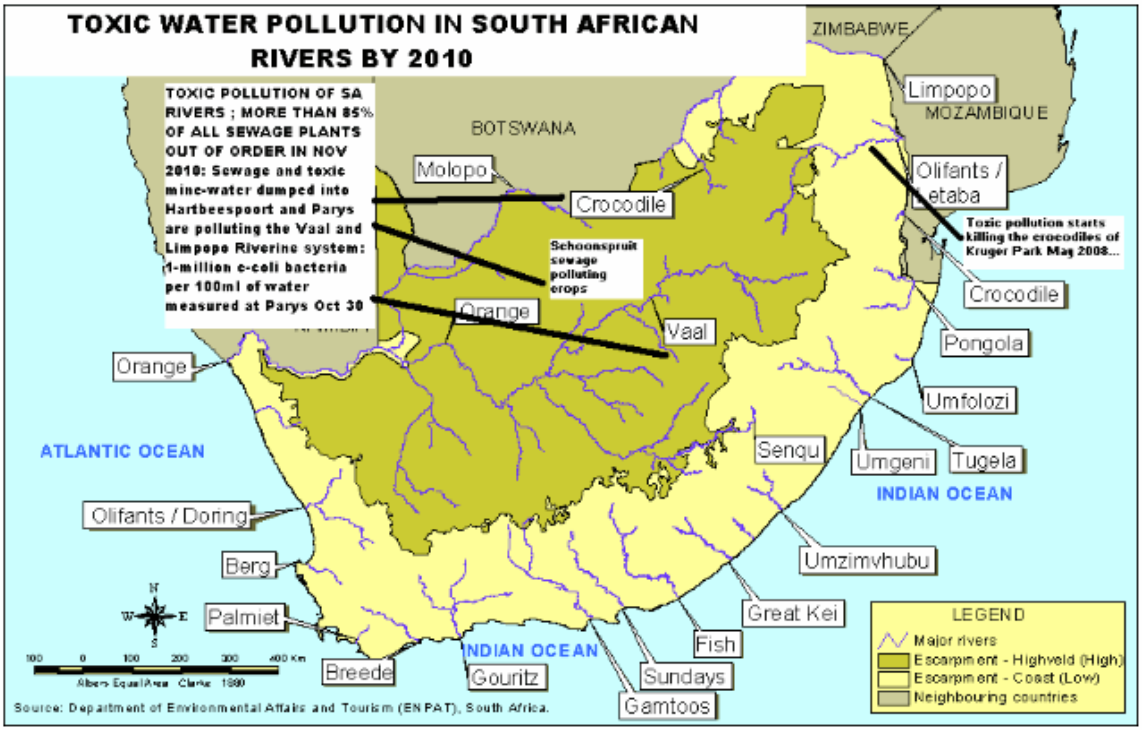

Figure 5.12: Toxic water pollution in South African rivers

(Source: Google Earth, accessed 16 October, 2011)

Given that 65% of the country receives less than 500 mm of rainfall annually (the level regarded as the minimum for successful dryland farming) and 21% receives less than 200 mm, South Africa's existing and future development depends to a large extent on the state's ability to move water in bulk from the well-watered regions to the centres of settlement and industry in the drier regions (Eales *et al*, 1996: 182)).

As in the case of Zimbabwe, Eales *et al* (1996: 187) observe that most rural people in South Africa rely on unimproved water sources (streams, rivers, and unprotected springs). This direct dependence on natural water sources has made many communities highly vulnerable to droughts, increases in water-abstraction patterns, upstream land-use changes, and effluent discharges. Furthermore, nearly all South Africa's surface water is unsuitable for human consumption in an untreated state, largely because of contamination by human, animal, and industrial waste (Eales *et al*, 1996: 187). This water must be treated if any reduction in rural waterborne diseases is to be achieved.

Figure 5.13: Acid mine drainage from West Rand endangers hippos in Hippo Dam

(Source: Google Earth, accessed 16 October, 2011)

Bond (2007: 2) observes that:

> In South Africa, there are millions of people who can tell stories of water 'delivery drought'. Rural areas are underserviced due to lack of operating subsidies which mean that a large percentage of taps installed in the post-apartheid era are now dry. And for those lucky to be on municipal water grids, mass disconnections due to unaffordability affect more than 1.5 million South Africans each year, even the government admits.

Unlike the situation in Zimbabwe, in South Africa local government is enshrined in the national constitution. Section 155 of the Constitution of the Republic of South Africa (Act 108 of 1996) provides for three categories of municipalities. These are category A, B and C municipalities. In category A are metropolitan municipalities that have exclusive municipal executive and legislative authority in their area. Category B comprises local municipalities that share municipal executive and legislative authority in their area with a category C district municipality in the same area. The category C district municipalities have municipal executive and legislative

authority in an area that includes more than one municipality. This simply means that category A is a metropolitan municipality; category B is a local municipality; and category C is a district municipality (of which the local municipality is part).

Thus, in South Africa the policy and legislative requirements affecting local governance are contained in the Constitution (Act 108 of 1996); the Local Government White Paper (RSA, 1998); the Local Government Municipal Demarcation Act; the Local Government Municipal Structures Act (Act 117 0f 1998); the Local Government Municipal Systems Act (Act 32 of 2000); and the Local Government Municipal Finance Management Act (Act 56 of 2003). The organisational structuring of local government is prescribed in the Municipal Systems Act (Act 32 of 2000) in section 51 which provides that, 'A municipality must, within its administrative and financial capacity, establish and organise its administration in a manner that would enable the municipality to:

- be responsive to the needs of the local community;
- facilitate a culture of public service and accountability amongst its staff;
- be performance orientated and focussed on the objectives of local government set out in section 152 of the constitution and its developmental duties as required by section 153 of the constitution;
- ensure that its political structures, political office bearers and managers and other staff members align their roles and responsibilities with the priorities and objectives set out in the municipality's integrated development plan;
- establish clear relationships, and facilitate co-operation, co-ordination and communication, between: i) its political structures, political office bearers and its administration; and ii) its political structures, political office bearers and administration and the local community;
- organise its political structures, political office bearers and administration in a flexible way in order to respond to changing priorities and circumstances;
- perform its functions- i. through operationally effective and appropriate administrative units and mechanisms, including departments and other functional or business units; and ii. when necessary, on a decentralised basis;

- assign clear responsibilities for the management and co-ordination of these administrative units and mechanisms; and
- hold the municipal manager accountable for the overall performance of the administration.'

According to the Constitution of the Republic of South Africa (Act 108 of 1996), local municipalities have original powers. Section 156 (1)(a) of the Constitution states that a municipality has executive authority in respect of, and has the right to administer the local government matters listed in Part B of Schedule 4 and Part B of Schedule 5 of the Constitution. Local municipalities are thus responsible for providing the following services:

- water services;
- electricity services;
- local roads and transport services;
- solid waste disposal services;
- community services (community halls, sport and recreation facilities, bathhouses and public toilets, libraries, arts and culture, resorts, beaches and swimming pools, child care, old age homes, cemeteries and crematoria);
- emergency services (fire fighting);
- security services (traffic policing, crime prevention, by-law enforcement);
- public works (maintenance of municipal infrastructure and facilities);
- environmental health services; and
- public housing.

The constitutional objectives for local government are set out in section 152 of the Constitution of the Republic of South Africa (Act 108 of 1996). These are:

- to provide democratic and accountable government of local communities;
- to ensure the provision of services to communities in a sustainable manner;
- to promote social and economic development;

- to promote a safe and healthy environment; and
- to encourage the involvement of communities and community organisation in the matters of local government.

Section 53 of the Constitution of the Republic of South Africa (Act 108 of 1996) states that:

> A municipality must structure and manage its administration and budgeting and planning processes to give priority to the basic needs of the community, and to promote the social and economic development of the community, and participate in national and provincial development programmes.

South Africa has 283 municipalities, based on three constitutional categories as outlined above:

- metropolitan municipalities: six (6);
- district municipalities: forty six (46); and
- local municipalities: two hundred and thirty one (231).

In the South African metropolitan municipalities power resides, first and foremost, with the mayor and secondly with the municipal cabinet which is called 'the mayoral committee'. The mayor is nominated by the political party with the majority of seats on the council. The mayor is a very powerful executive who holds office for five uninterrupted years. The head of the bureaucracy, unlike in Zimbabwe where he/she is known as the town clerk, bears the official title of municipal manager precisely to avoid being confused with the real chief executive officer (UN, 2001: 87).

5.1.2.1 Vhembe District (Musina Local Municipality)

The Vhembe District is one of the six district municipalities (category C local authority) in the Limpopo Province, situated in the northernmost part of South Africa (see Figure 1.6). Like Masvingo District in Zimbabwe, Vhembe District is largely rural and drought prone. It is composed of the local municipalities of Musina, Makhado, Mutale and Thulamela.

According to the Agriculture Research Council (ARC) website (www.arc.agric.za, accessed 29 September 2011), the Limpopo Basin within which the Musina Local Municipality falls is an arid to semi-arid region where water is of critical strategic importance to all development.

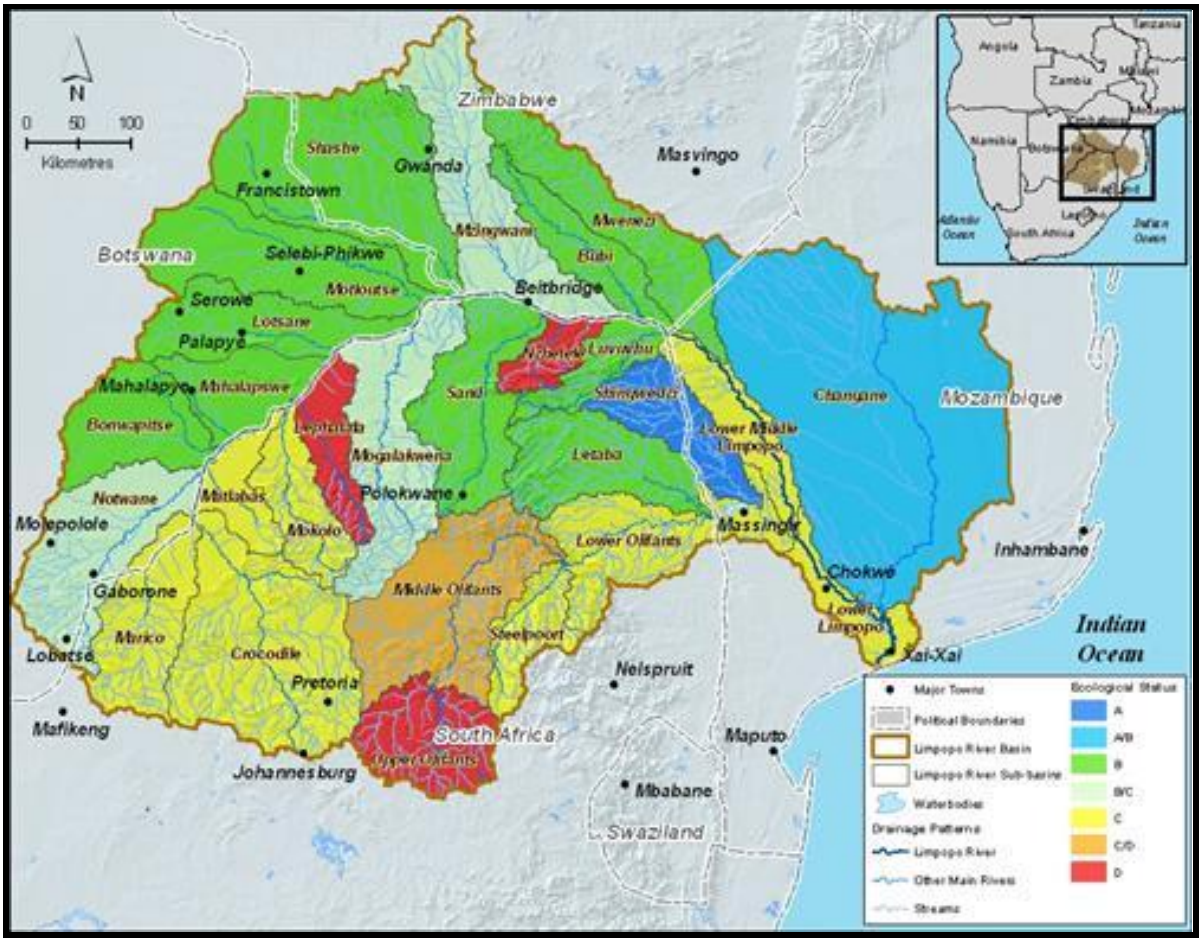

Figure 5.14: Ecological map of the Limpopo Basin

(Source: ARC website [www.arc.agric.za], accessed 29 September, 2011)

The Limpopo drainage basin covers an area of approximately 413 000 km2 and is one of the larger river basins in southern Africa, draining an extensive area of Botswana, South Africa, Zimbabwe and Mozambique, where it enters the Indian Ocean. The total length of the main river is about 1,750 km, located between 20° and 26° south and between 25° and 34° east (ARC website [www.arc.agric.za], accessed 29 September 2011). An overview of the annual rainfall per country in the basin area is given in Table 5.2.

Table 5.2 Annual rainfall per country in the basin area

(ARC website [www.arc.agric.za], accessed 29 September 2011)

Country	**Annual rainfall in the basin area (mm)**		
	Minimum	Maximum	Mean
Botswana	250	555	425
Mozambique	355	865	535
South Africa	290	1050	590
Zimbabwe	300	635	465
Basin	250	1050	530

The main focus of this study was on Musina Local Municipality (category B local municipality), the northernmost residential area in the Limpopo Province of South Africa near the Limpopo River border with Zimbabwe. Iron ore, coal, magnetite, graphite, asbestos, diamonds, semi-precious stones and copper are mined in the region. The municipality was named after the Musina tribe who originally discovered copper and settled in the area. In the twentieth century European prospectors rediscovered the large copper deposits and established the town of Messina. The spelling of the name was changed to Musina (i.e. the spoiler) in 2003 to correct the colonial-era misspelling of the name of the Musina people (Musina website, [www.musina.gov.za] accessed 21 May 2011).

Located in the heart of the Bushveld with its hunting farms, diamond mines and location on the major Zimbabwe/South Africa highway (N1 in South Africa), Musina attracts a conglomeration of different people. Many rural people from surrounding areas are drawn to the town by the opportunities of working in the mines or on farms in the area. Musina Local Municipality is therefore characterised by a relatively equal urban-rural population (see Table 5.4).

Since the beginning of the twenty first century, Musina has been under scrutiny due to unstable political situation in neighbouring Zimbabwe.

In the past few years many desperate people have crossed the border into Musina from Zimbabwe illegally everyday. Many of these illegal visitors used Musina as a stop-off point before making their way to Johannesburg while others found employment on farms in the area to make a living in order to take money back to relatives across the border (Musina Local Municipality, 2010: 29).

As observed by the mayor of Musina, Caroline Mahasela in the 2009 Annual Report, because of the influx of Zimbabweans into Musina Local Municipality, the 2008 - 2009 cholera outbreak in Harare was also exported to Musina (Musina website [www.musina.gov.za], accessed 25 February 2011).

Figure 5.15: Zimbabwean economic refugees in Musina
(Source: Google pictures, accessed 25 March 2011)

With the current relative political stability and subsequent economic improvement (thanks to the Government of National Unity [GNU]), the inflow of illegal Zimbabweans into Musina has subsided.

In its early days the mining town of Musina obtained its potable water from the Sand River by way of a pipeline and from wells in the town. The continued growth of the town resulted in these supplies proving inadequate and a pipeline was laid to the Limpopo River was constructed. Today, Vhembe District Municipality has a relatively new surface water dam, Nandoni Dam in the Luvuvhu River (see Figure 1.11) south of the Soutpansberg Mountains. This dam was built to supply the whole region with sufficient water. However, although the dam was completed several years ago, the link-up to the Musina Local Municipality in the north is yet to be made. Currently Nandoni Dam supplies water to the urban areas of Louis Trichardt and Thohoyandou and the rural communities in the northern part of the Limpopo (Bornman, *et al*, 2009: iii).

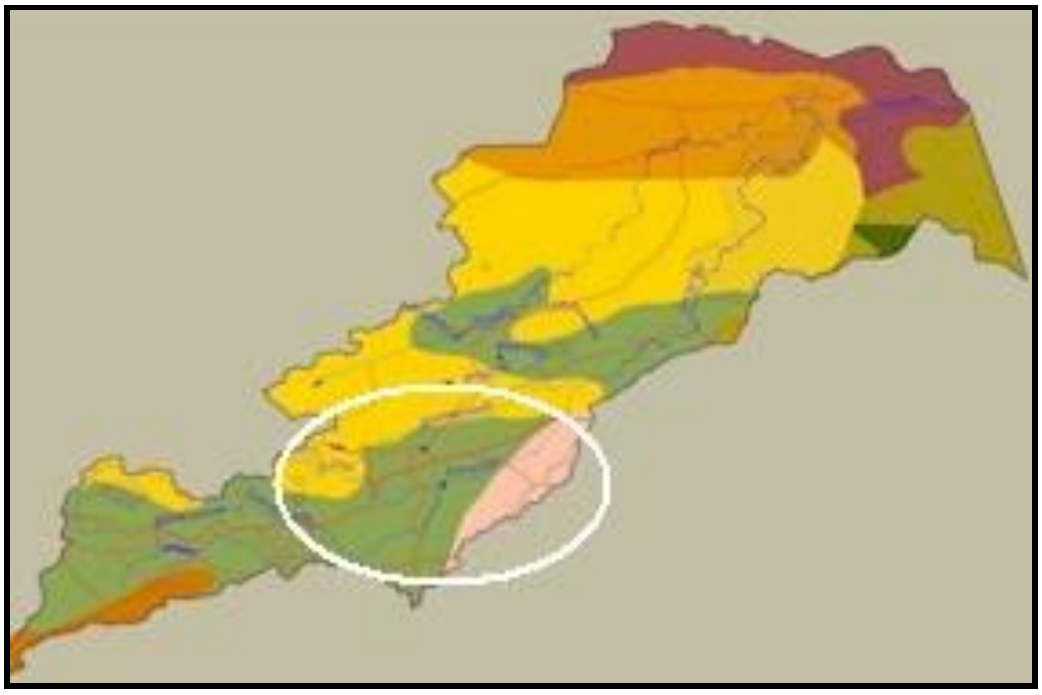

Figure 5.16: Luvuvhu River catchment and the DDT-sprayed area in Limpopo Province.

(Source: Bornman *et al*, 2009: 4)

It is important to note that water sources in Vhembe District, including the Musina Local Municipality, are highly vulnerable to contamination from the mining and agricultural activity in Limpopo Province itself and its southern neighbour, Gauteng Province (see Figure 5.16 and Figure 5.17).

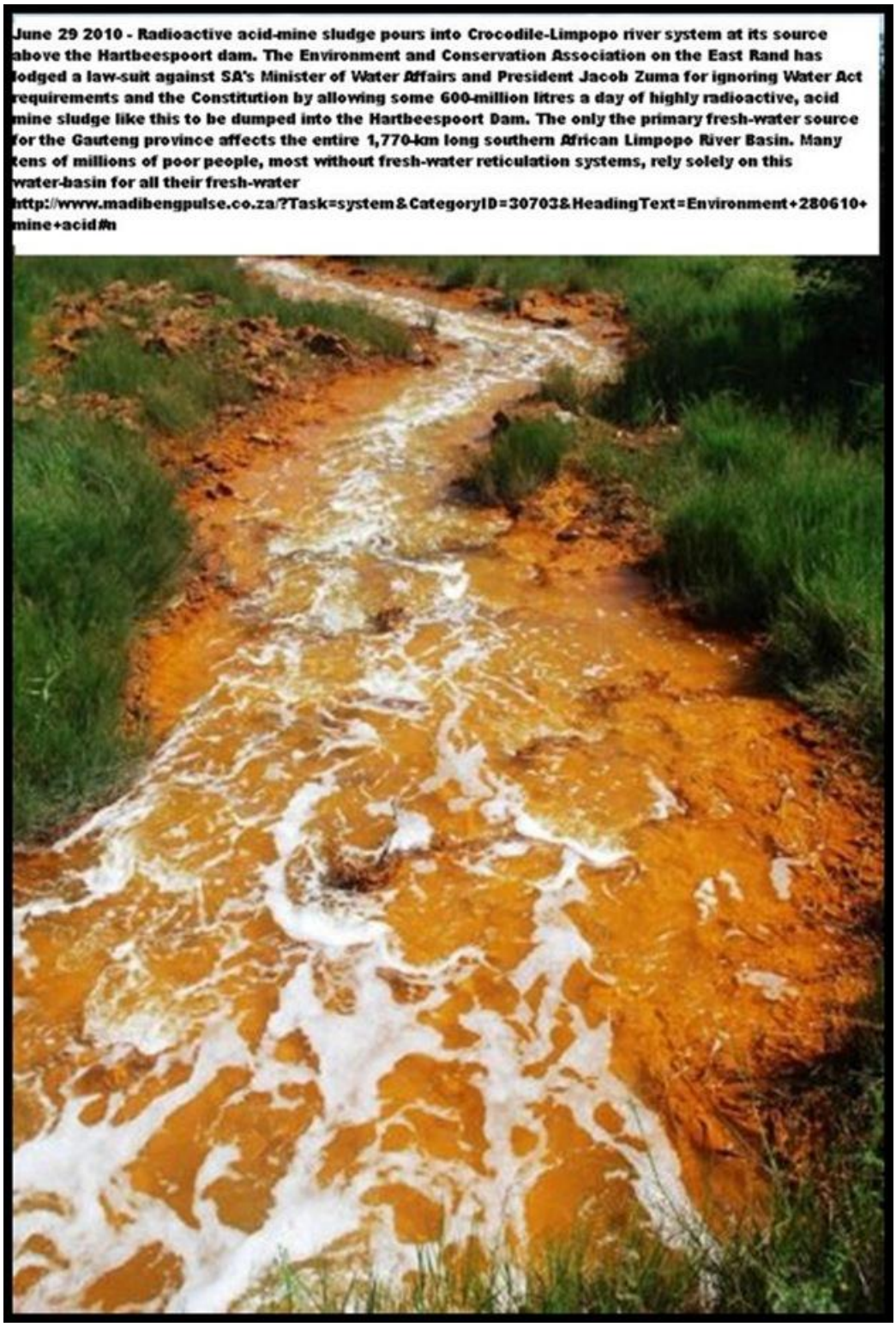

Figure 5.17: Radioactive acid pours into the Crocodile-Limpopo River system (Photograph: M. Liefterink, Google Earth, accessed 15 October 2011).

Nandoni Dam and the Luvuvhu River are reportedly highly exposed to DDT which is sprayed to control the spread of malaria:

> The Luvuvhu River Catchment ... near Thohoyandou, Vhembe District in Limpopo Province, is a tropical, high-risk malaria area where 1,1,1-trichloro-2,2-bis (pchlorophenyl) ethane (DDT) has been used annually since 1945 for controlling malaria. The Luvuvhu river and some of its tributaries (including the Mutshindudi and Mutale rivers) are perennial rivers that rise in the Soutpansberg Mountains and run for about 200 km through a diverse range of landscapes before joining the Limpopo river near Pafuri in the Kruger National Park (KNP) (Bornman, *et al*, 2009: 3).

The Luvuvhu Catchment is part of the larger Limpopo system, which extends into Mozambique. It covers 5 941 km^2, with a mean annual precipitation of 608 mm, mean annual evaporation of 1 678 mm and mean annual runoff of 519 million cubic metres (ranging from 85 to 1 900 million cubic metres) (Bornman, *et al*, 2009: 3).

According to Mr. Kwashirai Gomo, the research assistant in the Musina area, (informal discussion), Nandoni Dam was built largely in reaction to a serious drought in the early 1990s, when numerous boreholes dried up in the Venda and Gazankulu regions and drinking water had to be delivered by tankers. This triggered the Department of Water Affairs and Forestry (DWAF) to investigate into the feasibility of providing a safe and reliable source of raw surface water for the region.

The population of the Vhembe District Municipality's area of jurisdiction is currently estimated at 1 249 000 people. Musina Local Municipality has an estimated population of 57 195 residents (see the study subjects in subsection 5.2.3).

The Municipality of Musina sees its role as the provision of 'a good policy and legislative foundation to enable us to deliver quality services to the community in a sustainable manner' (Musina website [www.musina.gov.za], accessed 25 January 2011). The website goes on to outline the municipality's vision as the 'vehicle of affordable quality services and stability through socio- economic development and collective leadership'. It describes its mission as 'to

be a community driven municipality with a developing and adapting infrastructure, serving all people in a focused efficient and accountable manner.'

From this preliminary brief on Musina, the following challenges are noted in the governance of potable water supply by the municipality:

- droughts and low rainfall when compared to the eastern highlands of the country;
- potable water pollution due to agricultural and mining activity, especially at the source of the major rivers drainage systems (see Figures 5.20, 5.21 and 5.28);
- an overstretched potable water supply infrastructure due to the influx of Zimbabwean refugees, rapidly increasing population, leakages and other geohydrological aspects; and
- as in all four study cases, management of potable water supply is just an appendage of the public works and planning division in the municipality's organisational structure.

5.1.2.2 City of Tshwane Metropolitan Municipality

The town of Pretoria was founded in 1855 (De Lange, 2011: 2) by Marthinus Pretorius, a leader of the Voortrekkers, who named it Pretoria after his father Andries Pretorius. The elder Pretorius was a Voortrekker hero remembered for his victory over the Zulus in the battle of Ncome River. Pretoria became the capital of South Africa on 1 May 1860. The city of Pretoria was renamed Tshwane in the aftermath of national independence and the first democratic elections in South Africa, and is now the seat of the City of Tshwane Metropolitan Municipality.

The City of Tshwane Metropolitan Municipality (CTMM) is located in the north-western part of the Gauteng Province. The Gauteng Province covers a geographical area of 17 010 km^2 (1.4% of South Africa), while the Tshwane Metropolitan Municipality covers an area of 2.198km^2 (almost 65 km in length and 50 km wide) (City of Tshwane, 2010: 263). A unique feature of the CTMM is that it stretches over two provinces (Gauteng and North West) (Huchzermeyer, Baumann and Mohamed, 2004: 12). Largely low-income residential areas in the north of the metropolitan area fall within the North West Province (City of Tshwane website, www.tshwane.gov.za, accessed 25 January 2010). The city therefore has to deal with two provincial governments.

Figure 5.18: View of Tshwane's city centre

(Source: Google Pictures, accessed 25 January 2010)

The projected annual growth of the population of CTMM between 1996 and 2001 was 4.1%, which is substantially higher than the national average of 2.1% (City of Tshwane, 2010 264). The Tshwane Metropolitan Municipality was established on 5 December 2000, and is classified as a category A urban municipality. At the time of its formation, 14 municipalities and town councils that had previously served the Greater Pretoria and surrounding areas were integrated. The CTMM covers an extensive municipal area (2198 km^2), stretching for almost 60 km from east to west and 70 km from north to south (Roefs *et al*, 2010: 11). The municipal area is divided into 11 metropolitan councils and 76 municipal wards, plus a large number of townships, namely Pretoria, Centurion, Laudium, Eersterust, Akasia, Atteridgeville, Soshanguve, Crocodile River, Ga-Rankuwa, Mabopane, Winterveld, Hammanskraal, Temba and Mamelodi (see Figure 1.5) (Roefs *et al*, 2010: 11). The purpose of a ward committee is:

- to get better participation from the community to inform council decisions;

- to make sure that there is more effective communication between the council and the community; and
- to assist the ward councillor with consultation and report-backs to the community (Roefs, *et al*, 2010: 11).

Table 5.3 City of Tshwane Metropolitan Municipality, local authorities

(Source: Roefs, 2006: 3)

The Greater Pretoria Metropolitan Council	Urban
The City Council of Pretoria	Urban
The Town Council of Centurion	Urban
The Northern Pretoria Metropolitan Substructure	Urban
The Eastern Gauteng Services Council	Rural
The Pienaarsrivier Transitional Representative Council	Rural
The Crocodile River Transitional Council	Rural
The Hammanskraal Local Area Committee	Peri-urban
The Western Gauteng Services Council	Peri-urban
The Winterveld Transitional Representative Council	Peri-urban
The Temba Transitional Representative Council	Peri-urban
The Mabopane Transitional Representative Council	Peri-urban
The Ga-Rankuwa Transitional Representative Council	Peri-urban
The Eastern District Council.	Peri-urban

These local authorities in the Tshwane Metropolitan Municipality are shown in Figure 1.9. The main focus of this study was on Pretoria.

Tshwane is one of South Africa's three capital cities, serving as the executive (administrative) (Tshwane website [www.tshwane.gov.za], accessed 25 January 2010) and *de facto* national capital. However, there has recently talk of combining legislative and executive governmental functions in Cape Town (as South Africa's mother city) for political/economic reasons.

The main languages spoken in the Tshwane Metropolitan Municipality are Pedi, Afrikaans, Tswana, Tsonga, Zulu and English. Ndebele and Sotho are also widely spoken (City of Tshwane, 2010: 264). Its population is estimated at 2 415 000 (Demographia, 2010: 42).

The following is a pictorial water service development plan for the city of Tshwane.

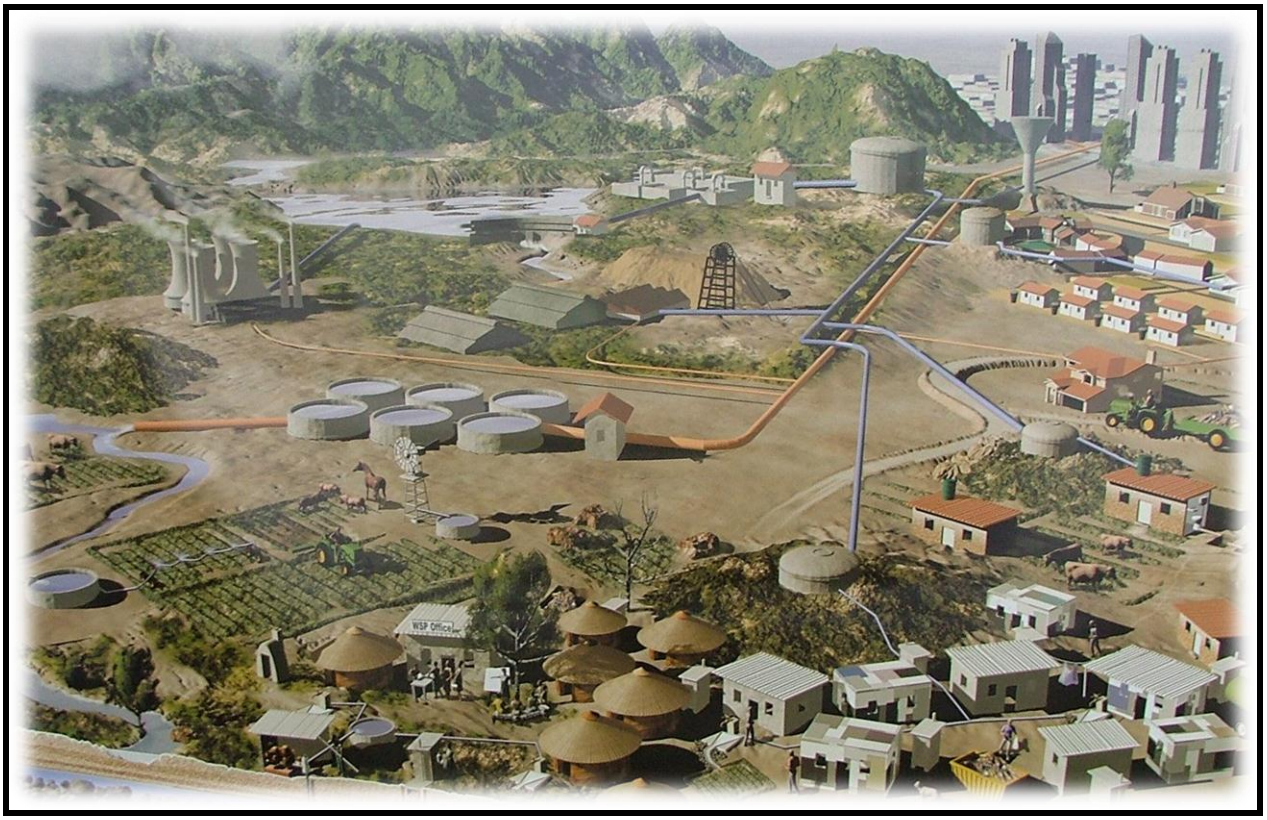

Figure 5.19: Water services development plan for the city of Tshwane
(City of Tshwane website, [www.tshwane.gov.za], accessed 29 September 2011)

CTMM is a water service authority in its area of jurisdiction in terms of the Water Services Act (Republic of South Africa, Act No 108 of 1997). Rand Water supplies 81.3% of the city of Tshwane's water, but this is augmented by boreholes and springs in dolomitic groundwater aquifers and water treatment facilities at Rietvlei, Roodeplaat and Temba (DWA, 2010: 12).

Rand Water gets the bulk of its raw water from the Lesotho Highlands Water Scheme (DWA, 2010:10) (see Figure 5.36). Rand Water is also the major supplier of potable water to another 21 municipalities including the Municipality of Johannesburg (DWA, 2010:10).

Figure 5.20: The Lesotho Highlands water project
(WRC website, [www.wrc.org.za], accessed 29 September 2011)

The CTMM boreholes and springs are located in dolomite rock formations which are known for forming cracks and sinkholes, having a high risk of pollution, and a high percentage precipitation recharge to the groundwater of the underground water aquifers. According to Mothopong Consulting (2005: 1) because of this characteristic of the underlying geology, soil and ground surface, the water sources are polluted by cemeteries, sewage, industrial and commercial waste, agricultural manure, fertilisers and other chemicals. Thus, although the city of Tshwane is not in the same desperate situation as the city of Harare, there is also an urgent need for finding solutions to this usually threatening water pollution issue.

De Lange (2011: 8) observes that the aquifers found in Gauteng Province are diverse due to the varied and complex geology of the province. She further notes that the quality of water in these resources is highly variable depending on the geology, ecological setting and influence of man. On the Witwatersrand, many of the aquifers have been clogged up with acid mine drainage as a result of gold mining activities in the region since the 1880s.

Figure 5.21: Acid mine drainage outflow from Hippo Dam
(Photograph: M. Liefterink, Google Earth, accessed 15 October 2011)

In addition to the acid mine drainage, Mothopong Consulting (2005: 6) identified the following as major potable water contaminant sources in the region:

- Laudium and Verwoerdburg cemeteries;
- petrol stations and fuel storage tanks;
- sewage pipelines and pump stations;

- high density septic tanks in subdivisions;
- industrial areas;
- fertilisers, herbicides from golf courses and irrigated greens; and
- diffuse urban contamination (oils, detergents, salts, herbicides, faecal matter, nitrates etc)

This contamination of the Gauteng Province's groundwater and surface water is considered detrimental for future plans to access groundwater to cope with the growing demand for water in the province.

Figure 5.22 shows the effects of water contamination to the ecosystem and animals that live in the water.

Figure 5.22: Water pollution: crocodiles dying in the Olifants River

(Source: Google Pictures, accessed 15 October 2011)

According to De Lange (2011: 3) the two springs in the Fountains Valley immediately to the south of Pretoria were originally the only source of water for the inhabitants of Pretoria. She further observes that although these two fountains, separated by a dyke, are completely independent of each other, both produce an abundance of pure water from the dolomite formation between Pretoria and Irene. Originally, the water was led to Pretoria along open furrows, but despite the fact that most of the town-people had their own wells, repeated epidemics of typhoid eventually convinced the authorities that water should rather be piped to the town (Panagos, 2003:2). This led to the first water scheme, completed in 1890, laid from the Fountains Valley into town with a cast iron pipe network serving Pretoria Central and Trevenna (De Lange, 2011: 3).

In 1929, the City Council of Pretoria purchased the water rights to the Rietvlei dolomitic fountains and Grootfontein. The construction of the Rietvlei Dam (see Figure 1.8) and purification works commenced in 1930 and the project was completed four years later in 1934 (De Lange, 2011: 6).

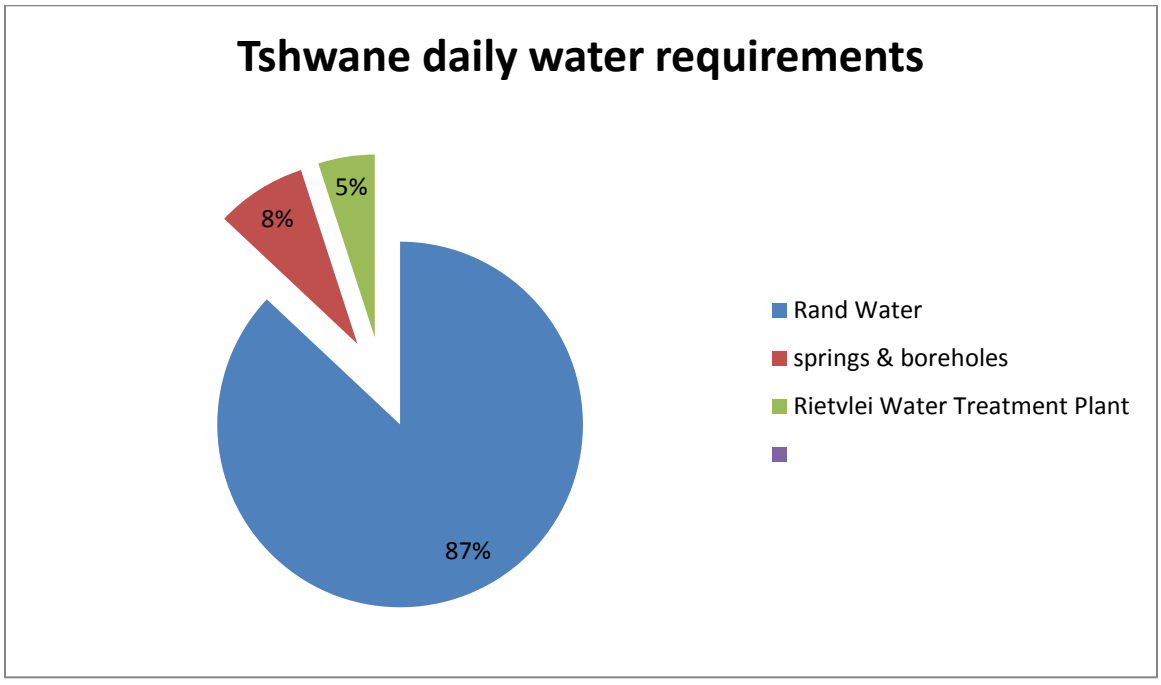

Figure 5.23: Tshwane daily water requirements

(Source: CTMM website [www.tshwane.gov.za], accessed 28 April, 2011)

Figure 5.23 above summarises the CTMM's daily water requirements.

Currently the CTMM has three water treatment plants, namely the Temba Water Treatment Plant at the Leeukraal Dam; the Roodeplaat Water Treatment Plant at the Roodeplaat Dam; and the Rietvlei Plant at the Rietvlei Dam. It also has ten waste-water treatment plants Daasport, Rietgat, Sandspruit, Klipgat, Temba, Babelegi, Rooiwal, Baviaanspoort, Sunderland Ridge and Zeekoegat. At these plants waste water is treated before it is discharged into the river systems.

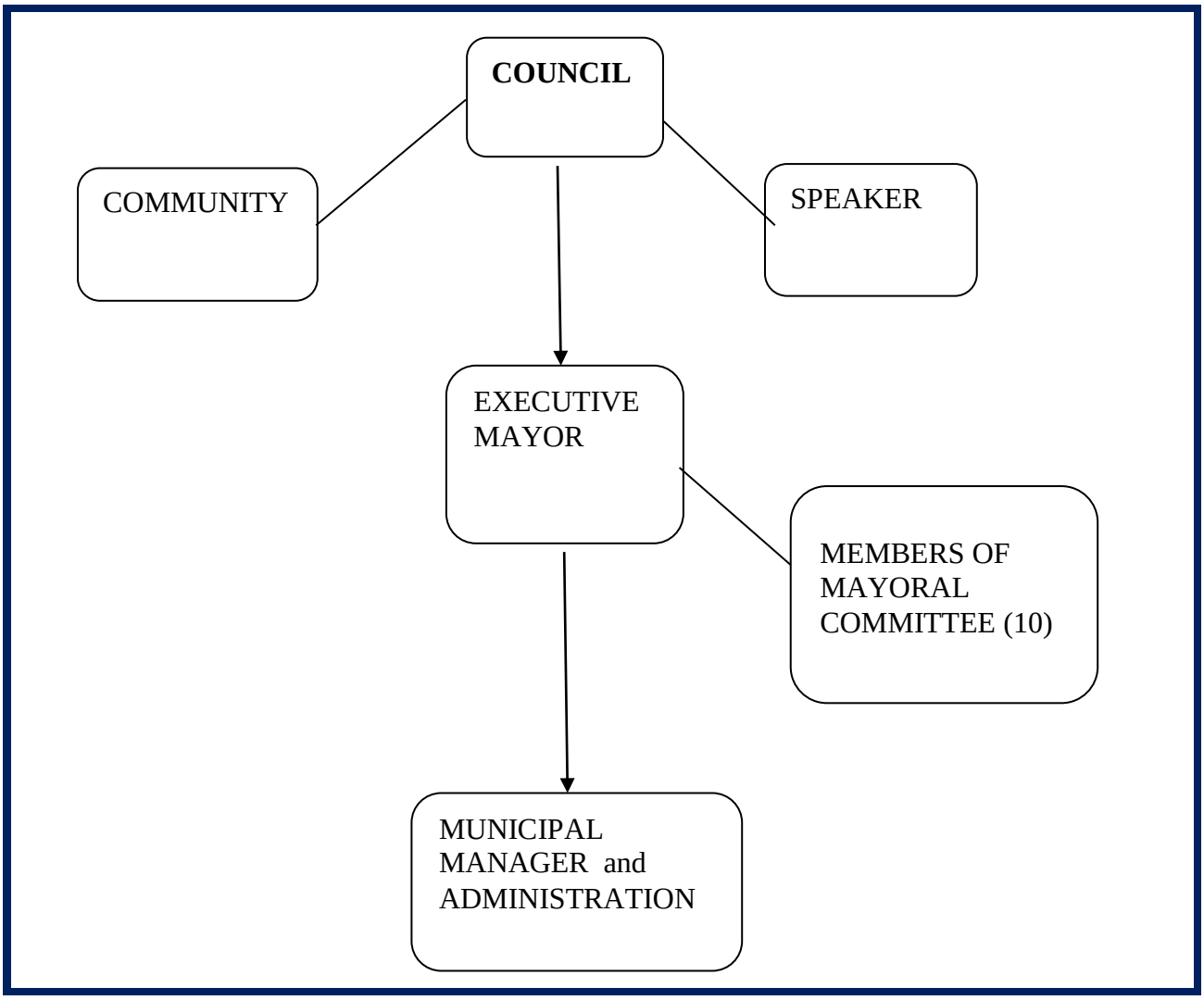

Figure 5.24: Governance system of CTMM

(Source: CTMM municipal chart)
Figure 5.24 above shows the CTMM governance system.

According to the CTMM website [www.tshwane.gov.za], the city of Tshwane aspires to become the leading African capital city of excellence that empowers its communities to prosper in a safe and healthy environment. To meet this endeavour, the municipality aims to enhance the quality of life of all residents through a developmental system of local government and the rendering of efficient, effective and affordable services. This vision is also shared by its water division that aspires to be the leading local government provider of sustainable, high quality water and sanitation services on the African continent.

From this preliminary description of the city of Tshwane the following challenges are noted in the governance of potable water supply in the metropolitan municipal area:

- high risk of pollution (acid mine drainage, agricultural chemicals, cemeteries, sewage drainage);
- management of water resources is not integrated (e.g. stormwater management and drainage systems are under the jurisdiction of the Roads and Stormwater division;
- area coverage falling into two provinces (Gauteng and North West);
- water sources are polluted by cemeteries, sewage, industrial and commercial waste, agricultural manure, fertilizers and other chemicals; and
- management of potable water supply is merely an appendage of Public Works.

In its 2008/2009 annual report, the CTMM (City of Tshwane, 2010: 314) acknowledges that:

> The bulk infrastructure for water and sanitation in the city of Tshwane is barely adequate and major investment in this component is required in the next five years. The City's growth rate is a continuing factor in demand for bulk services. The Backlog Eradication Initiative adds the equivalent of ten years growth in additional demand by 2010. All the WWTW's are under pressure. The Temba WWTW will have to serve an additional 36 000 households in December 2010 from backlog eradication in North East Region. The urgency to improve the quality of effluent discharged to our rivers and the shift in focus by DWAF to strict regulation necessitates upgrade and extension projects on all the WWTW's. Many of the bulk conveyance components are under pressure and additional capacity must be created to avoid spillage of raw sewage into rivers and streets. The City is dependent on potable water supplied by Rand Water Board. The Vaal

> River Management Demand Strategy of DWAF envisages a reduction of 30% in the demand from the Vaal System consumers by 2013. A growing city cannot achieve this unless other sources can be found. The rivers in the City receive treated return flow from our WWTW. This is a source which must be used. Extension to existing Waste Purification Plants and the construction of new WPP's will enable the city to meet the DWAF 30% reduction target. The Temba WPP must be extended urgently from 60Mℓ/day to 120Mℓ/day in order to meet the additional demand from 36 000 households receiving services by December 2010.

The population of the Tshwane metropolitan municipality is currently estimated at 2 415 000 (see the study subjects in subsection 5.2.2).

Having provided this background information on the study cases, the focus now moves to a detailed discussion of the study methodology.

5.2 METHODOLOGICAL RESEARCH DESIGN

Research design is the plan to be followed to answer the questions raised by the research problems. It is a formal, written set of specifications and procedures for conducting and controlling a research project (Leedy, 1985: 142). This study was a hybrid one, based on case studies, comparative, qualitative, historical and exploratory approaches. By a hybrid approach is meant a blended approach, or a mixed bag technique that translates into triangulation of different and complementary techniqes. This triangulation and hybrid design was chosen because it proved both flexible and adaptable to suit the demands of the situation. It gave the researcher room for both exploration and analysis of data using historical, multidimensional, interdisciplinary, qualitative and quantitative evidence in multi-stakeholder systems and public management theoretical framework as explained in chapter 1.

The major question addressed in this study, as outlined in chapter 1, is whether the theory of water governance as outlined in the new policies and legislation, has been applied in the development and governance of potable water supply by the selected municipalities in the respective municipal areas under their jurisdiction. How have Zimbabwe and South Africa (as represented by the selected cases) fared in the implementation of the IWRM governance

paradigm? What are the reasons behind the existing state of affairs? The focus of this study is thus a comparative analysis of the development of public policies and services relating to potable water supply and their implementation in the selected cases; the diverse patterns of municipal governance; access to potable water; different intervention mechanisms made by the local authorities; and the consequences of these interventions. What exactly can be learnt from the experiences and ideas of each of the selected cases?

The study addresses experiential and perceptive similarities and differences and then presents the findings in terms of a number of variables, namely locale, residential area, gender, level of education and age as independent variables. The aim is to come up with a theoretical framework that will help in cementing the gap between existing policy and practice not only in Zimbabwean and South African water governance processes, but also the rest of the SADC region if not Africa in its totality. The envisaged theoretical framework should begin with the challenges thereof and then address the major challenge on the ground, namely turning these challenges into prospects/opportunities through a balanced alignment of internal and international forces. Are internal forces really at variance with external and global forces? If so, what can be done to ensure that the grassroots are not driven deeper into desperation?

5.2.1 Research methods and methodologies

Whereas research method refers to a specific approach to data collection, research methodology refers to the overarching theoretical approach to research (Bangura, *et al*, 2007: 128). Research methodology is about the approaches and techniques used in administering a research project. A research project is designed and conducted to gather data that can be converted into information that helps to solve a problem. In this case the burning issue is improved household potable water supply governance through implementation of the IWRM policy framework as adopted by both Zimbabwe and South Africa. Jackson (1992: 3), Whitmore (1995: 15) and Cornwall and Jewkes (1995: 1669) argue that community based research should be carried out ‘with’ the people being studied rather than ‘on’ them. Jackson (1992: 3) further argues that such participatory approaches benefit the community studied rather than just the researchers and policy makers. The value of research lies in the changes it brings to communities rather than simply in the knowledge gained (Cornwall and Jewkes, 1995: 1669). The researcher wanted to use a full-scale participatory

approach, but because of financial and language (see research instruments below) constraints, he came up with what may be called a combination of some elements of participatory research and full scale descriptive survey research. This approach made use of ten research assistants who doubled as both researchers and subjects. The approach ensured that research was carried out with the people being studied rather than on them, and thus not only did the researcher benefit in terms of research skills upgrading, but also the different categories of participants benefited in terms of research skills development (research assistants) and enlightenment on the challenges facing their communities (policy makers and grassroots participants).

Survey research is the systematic gathering of information from respondents for the purpose of understanding some aspects of the behaviour of the population of interest (Tull and Hawkins, 1993: 123). Leedy (1985: 143) defines descriptive survey research as the method of research that looks with intense accuracy at the phenomena of the moment and then describes precisely what the researcher sees. It focuses on a defined population with respect to identified variables and thus provides answers to questions on the 'who, what, when, where and how' of a topic. This approach provides data on attitudes, feelings, beliefs, past and intended behaviour, knowledge ownership, personal characteristics, and other descriptive items. A descriptive survey thus attempts to gain a complete and accurate description of a situation.

Under descriptive survey research primary data is mostly gathered through some form of questionnaire, and thus the approach is concerned with the administration of questionnaires. The questionnaire may be in the form of a mailed/hand posted questionnaire or an interview schedule for either a personal or telephonic interview.

The descriptive survey approach was chosen because it was cost effective and allowed the researcher to reach as many of the widely dispersed respondents as possible. It was also the most suitable for a scattered sample population, especially considering that the sample included respondents from four city centres and from rural communities in two different countries.

However, as already alluded to above, on its own the descriptive survey approach was not enough. A comparative cross-national study of this magnitude is too complex to tackle

satisfactorily using a simple descriptive survey. Furthermore the primary concern of this community research project is to benefit the people at grassroots level. As already argued above, this study aims to measure the level at which grassroots and other stakeholders are involved (and can become involved in addressing challenges and prospects) in the development and management of potable water supply. This being so, a largely qualitative participative (focus groups and in-depth interactive interviews) approach seems more appropriate. It has been already noted that the language barrier (especially in South Africa) and financial constraints did not allow the researcher a full scale participative qualitative approach. The solution was triangulation - to use of a mixed bag of approaches, referred to in this study as the hybrid approach. This ensured that weaknesses of one approach were mitigated by the use of the next and alternative approaches.

A hybrid approach serves many functions in research. First, it fills in the gaps of one method or the other, and thus has far greater benefits. Methods can be combined in a variety of ways:

- through the quantification of qualitative data as in the collating and counting of recurrent themes in the qualitative data in order to add legitimacy to the researchers' conclusions (Onwuegbuzie and Teddlie, 2003: 480); and
- by accessing complementary quantitative data from within the same sample as in the use of quantitative survey instruments complementing interview data) in what could be described as a 'concurrent triangulation strategy' (Creswell, 2003: 12) and may incorporate multilevel mixed sampling (Kemper, *et al.* 2003: 471).

There are several other ways of looking at mixed methods/approaches (see Tashakkori and Teddlie, 1998: 3; Tashakkori and Creswell, 2007: 2). These approaches allow researchers to make deductions from empirical data while at the same time testing these deductions with the inferences that emerge to test hypotheses and build theory (Erzberger and Kelle, 2003: 455). This combination effectively validates the findings of both data sources.

Thus, as per triangulation analysis principles (Creswell, 2003: 4), the use of multiple and different methods has been used to measure, describe, evaluate, compare and contrast potable

water supply management and governance systems in the selected cases. Several methodologies based on case studies, comparative, qualitative, historical and exploratory approaches among others, were triangulated in order to corroborate evidence from questionnaire, observation, interview and documentary analysis to explore and analyse a theme in the management and governance of potable water supply systems in the selected cases.

5.2.2 Subjects

Subjects are the research participants; both the population and the selected sample of the population. Population can be defined as the universe of people, places, or things to be investigated. A sample is a subset of the population that is intended to represent the whole population (Tull and Hawkins, 1993: 125).

Table 5.4: Sampled research subjects by case study area

(Source: CHRA, 2010; Demographia, 2010; Primary data)

Case study area	**Population**	**Questionnaire sample**		**Interview sample**	**Total Sample**
		Residents	**Workers**		
Harare[16]	3 500 000	100	20	5	125
Masvingo urban	100 000	50	20	4	74
Masvingo rural	300 000	50	20	4	74
Tshwane[17]	2 415 000	100	20	5	125
Vhembe[18] (Musina) urban	25 582	50	20	4	74
Vhembe[19] (Musina) rural	31 613	50	-	2	52
Total	**6 372 195**	**400**	**100**	**24**	**524**

[16] Harare here includes Greater Harare and its satellite towns and municipalities of Chitungwiza, Epworth, Norton and Ruwa because they all depend on Greater Harare for potable water supply. Otherwise Greater Harare has an estimated population of 2 175 000 (Demographia, 2010).
[17] Access to the 20 workers employees was denied
[18] The total population for the Vhembe district is approximated at 1 249 044 (Vhembe Website, accessed 21 March 2010). Here interest is on the Musina locality where the actual study took place.
[19] The same as Vhembe (Musina) urban above.

An approximate target population of 6 372 195 people was used in this study. This population was composed of 3 500 000 Harare residents; 400 000 Masvingo residents; 2 415 000 Tshwane residents; and 57 195 Musina residents.

The subjects (population and sample) were distributed as in Table 5.4 above. Note that the population for Vhembe (Musina) is not for the entire district which is approximately 1 249 044. It is for the specific Musina study area.

Table 5.5: Trends in population growth in the study cases since 1900

(Source: Study case websites, CHRA, 2010; Demographia, 2010; Nhapi, *etal*, 2002; Beach, 1990; Marinda, 1999)

Case study area	**1900**	**1920**	**1940**	**1960**	**1980**	**2000**	**2020**
Harare[20]	12 411	19 446	32 000	300 000	850 000	2 600 000	5 200 000
Masvingo urban	300	1 000	4 000	10 000	31 000	70 000	200 000
Masvingo rural	33 595	37 184	55 000	70 000	100 000	250 000	500 000
Tshwane	25 000	35 000	90 000	400 000	900 000	2 000 000	2 840 000
(Musina) urban	200	4 000	6 000	11 000	13 000	18 000	28 000
(Musina) rural	1 000	4 000	8 000	13 000	15 000	20 000	40 000
Vhembe	21 806	35 000	90 000	400 000	900 000	1 000 000	1 500 000

Although the original intention was to distribute questionnaires proportionally by residential area (low density urban, high density urban, peri-urban, rural, etc), questionnaires were distributed randomly at municipal offices or directly to consumers in urban areas, and at schools in rural areas (see sampling procedures below). From a population of 6 372 195 potential respondents, the plan was to use a sample of 524 adult respondents (at least 18 years old) from 524 different households using a two tier random sampling approach. Workers (115) and residents (409) were to be randomly selected from people at municipal offices and on schools premises. Questionnaires would be left with municipal personnel and selected staff at schools to be

[20] Before 1962 statistics on the Rhodesian black population were based on records and reports by white district commissioners. These were by no means factual but were guesses based on the commissioners' experience, intuition, etc. After 1962 all population statistics and estimates were based on census records (Beach, D.N. 1990; Marinda M. 1999).

distributed to residents as they saw fit. At the schools, the request was to give questionnaires to the learners so that they could pass them over to their parents. The researcher believed that a sample of 524 households/adult respondents (although insignificant in percentage terms) was large enough to generalise the results of the study on condition that there would be a high response rate. It was felt that 524 respondents (although large enough to generalise) was also a manageable sample. Water engineers and executives (or their representatives) would be selected for interviews.

It is important to note that the empirical study did not sample any formal organisation outside water authorities. However, these would be informally catered for in residents samples, for example, interviewees in Harare included social workers and NGO workers (see appendix A). The central issue is stakeholder participation. Therefore, most of my findings and conclusions in chapter 6 and chapter 7 centre on the extent to which stakeholders are involved in potable water governance

5.2.2.1 Socio-demographic characteristics of participants

Participants were men and women in the 18 - 60 year age group. This was largely an economically active group, especially in the 20 to 54 year age range where the majority of participants were clustered (see Table 5.6).

The majority of questionnaire respondents (36.2%) were in the 20 - 34 year age group. Next was the 35 - 44 year age group at 34.2%, followed by the 45 - 54 year age group at 13.4% and the under 20s (18 - 20 year) age group at 12%. The last group was that of the 55 year and above age group at 1.2%. Note that the country by country analysis gives a slightly different picture with Zimbabwe being dominated by the 35 - 44 year age group at 25.8% compared to South Africa's 8.4% of the total respondents in the same age group. South Africa is dominated by the 20 - 34 age group at 25%, compared to Zimbabwe's 11.2% of the total respondents in the same age group.

The distribution of questionnaire participant/respondent rate is informative on the demographic characteristics of each country, especially *vis a vis* years of schooling and becoming independent

of parents as shown below. Whereas Zimbabwe had only 1.6% in the under 20s age group, South Africa had a significant percentage of 10.4% in the same age group of total respondents.

Table 5.6 shows the age distribution of questionnaire respondents by case study.

Table 5.6: Age distribution of questionnaire respondents by case study

(Source: Questionnaire/primary data)

Case study	Age range										**Totals**	
	Under 20yrs		**20-34yrs**		**35-44 yrs**		**45-54 yrs**		**55 plus yrs**			
	No	%	No	%	No	%	No	%	No	%	No	%
Msvo R	00	0	15	3	30	6	24	4.8	01	0.2	70	14
Msvo U	03	0.6	16	3.2	34	6.8	12	2.4	02	0.4	67	13.4
Harare	05	1	25	5	65	13	20	4	03	0.6	118	23.6
Mus R	15	3	30	6	02	0.4	02	0.4	00	0	49	9.8
Mus U	22	4.4	35	7	07	1.4	03	0.6	00	0	67	13.4
CTMM	15	3	60	12	33	6.6	08	1.6	00	0	116	23.2
Totals	**60**	**12**	**181**	**36.2**	**171**	**34.2**	**69**	**13.8**	**06**	**1.2**	**487**	**97.4**

Of the 487 respondents, 228 (46.8%) were women.

It seems there is more equitable distribution of sexes among questionnaire respondents in South Africa than in Zimbabwe. It is, however, important to note that there was a fair representation of both sexes in both countries.

Of the 487 respondents, 273 were married, 204 were single (divorcees and never married), and 10 were widowed. Most of the married respondents were Zimbabwean men, followed by Zimbabwean women, then came South African men, and lastly South African women.

The fact that there were more married people among Zimbabwean respondents compared to their South African counterparts may be explained by the fact that the majority of Zimbabwean respondents were in the 35 - 44 years age group, while South African respondents were in the under 20s and 25 - 34 age groups, that is were relatively younger. It may also be because culturally, marriage is more sacred among the Shona in Zimbabwe than any other indigenous group in southern Africa (see cultural Shona novels, e.g. Musingafi, 1992).

It is also interesting to note that in both countries more men were married than women. This may be because in the African context it is easier for a man to remarry after divorce or the death of his spouse than it is for women. It may also mean that men are dying younger as a result of the AIDs pandemic leaving behind their young wives.

The breakdown of the sexes by case study is shown in Figure 5.25 below. The figure shows the comparative sex ratio of questionnaire respondents by case study.

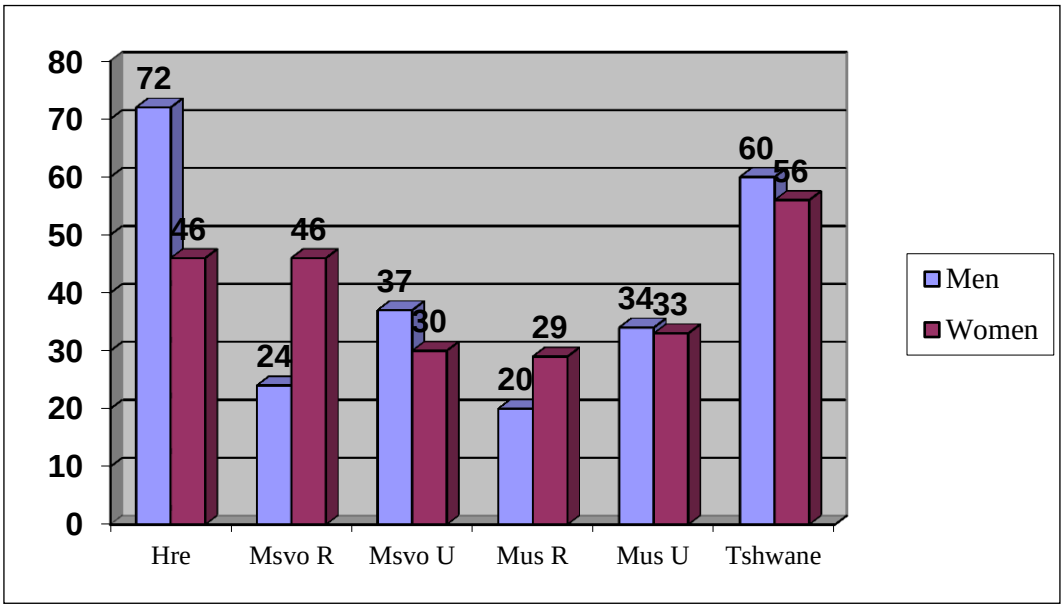

Figure 5.25: The questionnaire sex ratio of respondents by case study
(Source: Primary data)

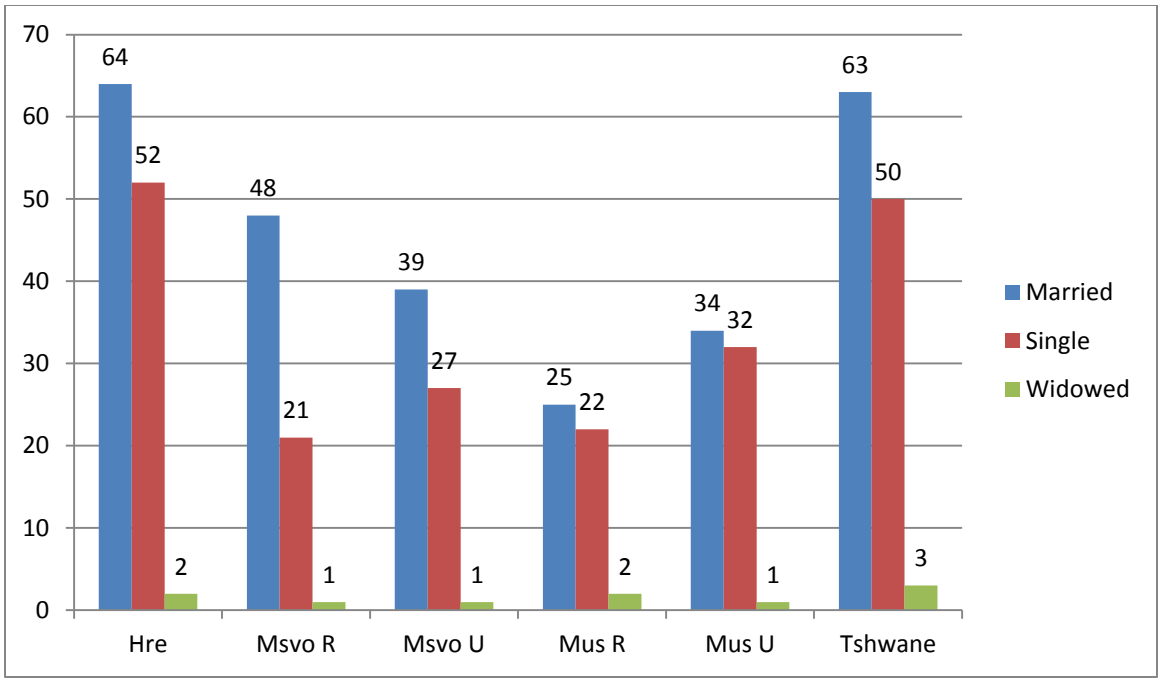

Figure 5.26: Questionnaire respondents' marriage status by case study

(Source: Primary data)

All questionnaire respondents had some basic formal school education. However, the majority of the South Africans had only attended school to Grade 12/O Level or below. Generally Zimbabwean respondents were better educated than their South African counterparts. Most had either degrees or professional certificates. This may be because Zimbabwe attained national independence 14 years earlier than South Africa. Thus Zimbabweans had access to adequate education earlier than South Africans. In both countries, men and women had almost similar levels of education as per the average level within the country. Although all respondents were literate, most South Africans had a relatively limited ability to communicate in English. Perhaps this was due to the influence of Afrikaans[21] and the lower formal education levels of respondents. To cater for this handicap the questionnaire was presented in both English and local languages in all study cases (see research instruments below). Nevertheless, most respondents preferred the English questionnaire. Only a small number (1 in Musina and 2 in Tshwane opted for the local language questionnaire). Table 5.7 below shows respondents' education levels by case study.

[21] In apartheid South Africa, Afrikaans was given more official prominence than other languages

Table 5.7: Respondents' education levels by study case

(Source: Questionnaire/primary data)

Study case	Formal educational level								Totals	
	Up to O Level / Grade 12		Higher Dip / Dip / Cert		First Degree		Post-Grad. Degree			
	Actual	%	Actual	%	Actual	%	Actual	%	**Actual**	**%**
Harare	19	3.8	39	8	35	7.2	25	5.2	**118**	**24.2**
Msvo U	05	1	27	5.5	25	5.1	10	2	**67**	**13.6**
Msvo R	10	2	20	4.1	35	7.2	05	1	**70**	**14.3**
Mus U	57	11.6	05	1	03	0.6	02	0.4	**67**	**13.6**
Mus R	39	8	03	0.6	06	1.2	01	0.2	**49**	**10**
CTMM	60	12.3	25	5.1	19	3.8	12	2.5	**116**	**23.7**
Total	**190**	**30.7**	**119**	**24.3**	**123**	**25.1**	**55**	**11.3**	**487**	**100**

Respondents categorised their areas of residence as either low density urban, high density urban, peri-urban or rural residential areas. Table 5.8 below shows the distribution of respondents according to residential area.

Table 5.8: Respondents' residential areas by study case

(Source: Questionnaire/primary data)

Study case	Residential area								Totals	
	Low		High		Peri-urban		Rural			
	Actual	%	Actual	%	Actual	%	Actual	%	**Actual**	**%**
Harare	35	7.2	77	15.8	06	1.2	00	0	**118**	**24.2**
Masvingo	14	2.9	50	10.2	03	0.6	70	14.3	**137**	**28**
Musina	10	2,1	57	11.7	00	0	49	10	**116**	**23.8**
Tshwane	30	6.2	84	17.2	02	0.4	00	0	**116**	**23.8**
Total	**89**	**18.4**	**268**	**54.9**	**11**	**2.2**	**119**	**24.3**	**487**	**100**

Note that both Harare and Tshwane metropolitan municipalities have some rural populations in their outskirts, but these were not sampled for the study.

5.2.3 Sampling procedures

Originally a proportional random sampling technique for all participants was anticipated. This technique requires that a proportional same percentage of all the cases categories (low density, high density, peri-urban, etc) of respondents have to be used. Practically this could have taken more time calculating the proportional numbers and percentages and then visiting the localities to distribute the questionnaires in person (or employing assistant researchers), yet the same goal was achieved by going to a central point where all these categories were likely to be represented. Also, the relatively smaller population of Masvingo and Musina cases would have translated into a very small number of participants, yet they represent an important constituent (rural/communal areas) in current African communities, and also for comparative purposes. Thus determination of study cases sample numbers became judgemental rather than proportional.

Slightly different sampling procedures were used for residents, employees and potable water managers in the study cases. For residents in all the four study cases a pure simple probability sampling technique was used. Central positions were selected for the distribution of the questionnaire, so research assistants distributed them on a 'first come first take' approach, especially those distributed in municipal offices where residents collected the questionnaires when they arrived to pay their bills. As for those distributed at schools and public places (like Pretoria's Church Square and banking halls), criteria for distribution were determined by the research assistant without interference from the researcher.

For the two urban centres in Zimbabwe, at least one focal point within the city was selected for the distribution and collection of questionnaires. The chosen focal points were the municipal offices in the city centre and Zimbabwe Open University (ZOU) offices in the city centre. For Musina urban, the research assistant, Mr. K. Gomo personally distributed and collected the questionnaires at respondents' residential areas and at the municipal offices during the lunch hour (for the 20 employees questionnaires). As for Tshwane, Miss S. Nyakanyanga used Church

Square, Church Square post office and banks in Pretoria's city centre to personally distribute and collect the questionnaires on the same day.

About 35 residents and 20 employees questionnaires were given to Mr. R. Murimoga (the municipality of Masvingo housing officer) for random distribution from his office in October/November 2010. Another set of 15 residents questionnaires were randomly distributed to staff and students at ZOU by the researcher through his office in Masvingo City the same period. Thus a total of 70 questionnaires were distributed in Masvingo (urban). Using two centres for residents' questionnaires was designed to cater for all social classes in the city. This also allowed for the possible selection bias if the housing officer had only given the questionnaires to his trusted colleagues. Only the city engineer (Mr. Tawanda Gozo) was sampled for an unstructured interview on management and governance of potable water supply in the Masvingo (urban) towards the end of November 2011. Informal discussions were also held with the municipality chamber secretary (Mr. I.S.L. Tanyanyiwa) in his capacity as the acting town clerk and Mr. R. Murimoga (housing officer) who doubled as both research subject and research assistant.

For Masvingo (rural), again two focal points were used. These were Mapakomhere and Mavhiringidze secondary schools. In early January 2011, questionnaires were given to Mr. M. Madzingo (the headmaster at Mapakomhere Secondary School) and Mr. A. Ndora (a teacher at Chinyan'anya Primary School situated close to Mavhiringidze Secondary School) to distribute them randomly to learners who would then take them to their parents for completion. These two men also acted as both research assistants and research subjects because the researcher held informal discussions with them on potable water availability and management in their communities. The 20 employees' questionnaires were given to Mr. M. Mubviro (the finance director in the Masvingo Rural District Council) for distribution among employees. He also managed to collect the 20 completed questionnaires. Furthermore, in late January 2011, when he collected the questionnaires, the researcher held an informal talk with Mr. Mubviro and Mr. C. Makwarimba (the Rural District Council's chief executive) on the management of potable water supply in the district. A formal, unstructured discussion on IWRM was also conducted with the

Rural District Council's engineer (Mr. C. Chenjerai) who is responsible for potable water supply management.

In Harare 75 residents and 20 employees questionnaires were given to Mr. E. Gaviro (of Harare's city Treasury Department) for random distribution in January 2011. Another set of 25 residents questionnaires were given to Mr. T. Tom (programme leader, Department of Development Studies, ZOU) to distribute randomly to staff members and students at ZOU. Thus a total of 120 questionnaires were distributed in the city of Harare. The two research assistants in Harare (Mr. T. Tom and Mr. E. Gaviro) became *ipso facto* research subjects since informal discussions on potable water supply issues in the city of Harare were also held with them. The Harare water engineer, Mr. C. M. Zvobgo, was unavailable due to pressure of work during the period of the study. The researcher managed to hold informal talk on water governance in the Harare Metropolitan Municipality with his personal assistant in August 2011. He also sent the director an email questionnaire on water governance in the Harare Metropolitan Municipality.

In Musina, all the 100 residents' (both rural and urban) and 20 employees' questionnaires were given to Mr. K. Gomo (a teacher at George Mbulaheni) to distribute them randomly on a 50-50 basis to rural and urban respondents in mid February 2011. Unlike the situation in Zimbabwe where rural councils are separated from urban municipalities, in South Africa both these residential areas fall under one municipality. Thus Musina Local Municipality is also responsible for the surrounding urban and rural communities. So the chosen 20 employee respondents covered both the rural and urban communities in Musina. Mr. K. Gomo identified someone to translate into Tshivenda. The translator thus became an *ipso facto* research assistant. Note that Mr. K. Gomo, as a research assistant and active participant automatically became an informal interviewee for Musina rural areas.

In Tshwane all 120 residents questionnaires were given to Miss S. Nyakanyanga in March 2011 to distribute among people in the city centre. Miss H. Muzii helped in getting the questionnaire translated into Setswana and isiZulu by identifying translators, who became *ipso facto* research assistants. Miss Nyakanyanga and Miss Muzii, as research assistants and active participants automatically became informal interviewees for the Greater Pretoria area. Access to the head of

municipal water and sanitation education (Ms. M. D. Monageng, who represented the water executive) for an unstructured formal interview on the management and governance of potable water supply in the Metropolitan Municipality of Tshwane was given in September 2011 as explained above. In addition, some formal discussions on potable water governance in CTMM were held with Mr. E. Bertram (an official at DWA) on 29 September 2011.

5.2.4 Research instruments

In this study the researcher used questionnaires; structured and unstructured interviews and discussions; documentary evidence; and municipal websites. These were complimented by the researcher's experience with potable water supply as a consumer in both urban and rural/communal areas in Zimbabwe. This hybrid combination and triangulation of research instruments ensured the reliability and validity of the collected data.

It is, however, important to note that despite every effort to reduce bias, it is accepted that 'the researcher cannot avoid having his data contaminated by bias of one sort or another' (Leedy, 1980: 26)

5.2.4.1 Questionnaires

Two questionnaires, one for residents and another for employees, with both closed and open-ended questions to obtain residents' qualitative opinions as well as quantitative data (see Appendix 3) were designed to measure the extent to which the case study institutions have implemented the integrated water resources paradigm as per the national policy and legislation. Whilst the use of closed questions made analysis of responses easier, the use of open-ended questions ensured flexibility, because respondents were able to express their own opinions. Open-ended questions were designed to give room for detail and elaboration of what respondents thought were the true facts of their situation. The final version of the questionnaire was prepared after pre-testing it in the preliminary and pilot study with the Municipality of Masvingo.

Given the fact that respondents were by no means at one place, the questionnaire became the most effective means of collecting primary data. Primary data can be defined as the direct

description of an occurrence by an individual who actually observed, witnessed, or took part in an event. This ensured immediate capture of the views of the affected people and most recent account of an occurrence. The fact that respondents were scattered throughout the four case study areas made the questionnaire the most time and cost effective method of reaching respondents. Also, the instrument helped remove interviewer bias/influence, and thus ensured a high percentage of actual respondent perception of the situation. The researcher also had ample time to revisit the questionnaires when examining and interpreting the data, since the questionnaire was available. Using the questionnaires the researcher took time to absorb and review the variables and ideas emanating from other sources (including relevant literature) and interviews with municipal and district potable water management representatives.

Since the majority of members had a limited command of English, the residents' questionnaire was translated into local African languages (Shona, TshiVenda and isiZulu as per the locality). Some respondents preferred English, especially the municipal and council workers. Thus the English version of the questionnaire was used on municipal and council workers across the bogy. The use of mother language ensured effective communication since most residents could not express themselves in any language other than their mother tongue. Nevertheless, the majority of respondents opted for the English version of the questionnaire.

However, it is worth noting that there was no assurance that the respondents understood all the questions, especially considering that for most of them this was the first time they had completed a questionnaire of this magnitude. Some participants, about 2% of urban respondents, failed to return the questionnaires. However, in the rural study cases all distributed questionnaires were returned because they were distributed through schools and the teachers ensured that each child who was given the questionnaire returned it the following day.

Questions in the residents' questionnaire were as follows:

- Demographic information about respondents (please tick in the appropriate box)

SEX	Female		
	Male		
MARITIAL STATUS	Single		
	Married		
	Widowed		
AGE GROUP	Under 20		
	20 - 34		
	35 - 44		
	45 - 54		
	55 and over		
EDUCATIONAL BACKGROUND (state the highest qualification attained)	'O' Level/Grade 12		
	H/Diploma/Professional certificate		
	Degree		
	Post-graduate		
	Other (Specify)		
RESIDENTIAL AREA	Urban (High density)		
	Urban (Low density)		
	Peri-urban		
	Rural (communal)		
	Rural (commercial farm)	Owner	
		Worker	
	Rural (Growth point)		
	Other (Specify)		

- Which of the following best describes your view on the quality of the public drinking water supply in your area? (Please complete as appropriate)
  I am satisfied with the quality of the public water supply. ☐

A) I am generally satisfied with the quality of the public water supply but wish to make the following comment _____

B) I have some concern/s about the quality of the public water supply for the following reason(s) _____

- Which water authorities are responsible for the supply of public drinking water in your area?_____
- Which of the following best describes your relationship with the water authority who supplies drinking water to the majority of water users in your area?

A) We have regular contact (more than once a year). ☐

B) We have irregular contact. ☐

C) We have annual contact. ☐

D) We have no contact unless there is an incident. ☐

- Do you think government is doing enough to ensure availability and accessibility of clean fresh water to all people in your community? Explain your position.
- Have you ever heard of the integrated water resources management (IWRM) concept?
- Do you make any contributions in the governance of fresh water supply decision making process in your community? Please explain.
- Who is responsible for fetching and ensuring that there is fresh water in your homestead? Explain.
- Who do you think are the most important actors in the governance of water resources in your area? Explain your position.
- The government has introduced a catchment water management system. Name both the catchment and the sub-catchment to which your community belongs.
- Is the above arrangement helping to improve water supply in your area? Explain your position.
- If there is anything else you would like to add, please make any other comments here.

Questions in the employees' questionnaire were as follows:

1. Demographic information about respondents (please tick in the appropriate box)

SEX	Female	
	Male	
MARITIAL STATUS	Single	
	Married	
	Widowed	
AGE GROUP	Under 20	
	20.34	
	35-44	
	45-54	
	55 and over	
EDUCATIONAL BACKGROUND (state the highest qualification attained)	"O" Level	
	H/Diploma/Professional certificate	
	Degree	
	Post-graduate	
	Other (Specify	
RESIDENTIAL AREA	Urban (High density)	
	Urban (Low density)	
	Peri-urban	

2. Basic water management information (Please tick in the appropriate box)

Statement/question	Yes	No
Are you involved in the management of water supply in your municipality/council?		
Do you ever attend water supply management meetings?		
Have you heard of the integrated water resources management concept?		
Are you happy with the management of water supply in the municipality/council?		
Do you think the water supplied to residents is good quality?		
Have you read national/public water legislation		
Are you happy with the legislation?		

Respondents attempted all questions though some were very brief even where they were required to be detailed. In most cases where questions required a yes or no answer and then a further explanation, the second part was not attempted. Questionnaire response rate was as in Table 5.9.

Table 5.9: Questionnaire response rate by case study

(Source: Questionnaire/primary data)

Branch	Distributed		Returned	
	Frequency	Percentage	Frequency	Percentage
Masvingo urban	70	14%	67	13.4%
Masvingo rural	70	14%	70	14%
Harare	120	24%	118	23.6%
Musina urban	70	14%	67	13.4%
Musina rural	50	10%	49	10%
Tshwane	120	24%	116	23.2%
Total	**500**	**100%**	**487**	**97.4%**

An overall 97.4% response rate was encouraging and thus findings may be generalized with great confidence. In fact, findings from this study have great indicative value.

5.2.4.2 Interviews/discussions

Interviews can simply be defined as face-to-face talks with respondents. In this study, interviews took the form of structured formal and unstructured informal discussions with municipal executives, water directors and/or their assistants, and assistant researchers. Most questions were directly linked to the research problem and sub-problems. As for the discussions with management participants, some questions were derived from sample members' views expressed in the questionnaire. Interviewees were given the opportunity to elaborate their views on the way forward. These interviews helped the researcher determine the consistency of the data provided by sample members. The interviews with management were used to complement the main research tool, the questionnaire, by exploring what those in authority felt about their performance.

The prepared questions for the structured interview with management participants were as follows:[22]

- Introduce yourself and your career background.
- What is your work like in relation to the water sector? What is your role in the water sector?
- What does a successful water sector look like? How different is that picture from the Zimbabwe / SA situation?
- What legislation regulates water governance in Zimbabwe/South Africa?
- What do they say about the management of fresh water?
- How important are the Dublin Principles in the management of water resources in Zimbabwe/South Africa?
- What is IWRM?
- What has been positive about the Zim/SA water sector's performance since the adoption of the IWRM paradigm?

[22] Note that this is merely a guideline. Follow-up questions would be determined by the respondents' answers to the preceding question

- What has been negative about the Zim/SA water sector's performance since the adoption of the IWRM paradigm?
- What can be done to improve the situation?
- Who are the most important actors in the governance of water resources in your area of jurisdiction?
- Who are your most reliable partners?
- In what direction should water governance move?
- What should be done to move the governance in that direction?
- Are there any challenges with regard to access and distribution among different users of water?
- How do you believe these challenges will be addressed within the current institutional and policy framework?
- What changes will need to be undertaken in the institutional structures and policy framework to accommodate changes?

5.2.4.3 Documentary evidence

Documentary evidence comprised official documents in the relevant municipal information systems. These included policy documents, minutes, plans of action, and workshop reports. The researcher was given access to some of these documents before distributing the questionnaire and administering the interviews with management personnel at municipal offices. Thus some of the questions in the questionnaire and the unstructured interviews were derived from these organisational documents. Data from this source were also very useful in determining whether a respondent's perception of the situation was consistent with what was on record, and what was actually happening on the ground, especially with regard to what the sampled managerial employees said.

5.2.4.4 Municipal websites

Although the Internet and websites were among the planned major sources of secondary data, they were only co-opted as major sources of 'primary' data after the initial resistance by front office authorities at CTMM and their advice that the researcher should make use of the CTMM website. Thereafter, Mr. Bertram's advice was to make use of the DWA, ARC and the WRC

websites. Websites were very useful especially for locality maps, satellite, aerial and other photographs.

5.2.5 Data collection procedures

Through the use of an introductory letter from Professor Tempelhoff of the NWU School of Basic Sciences VTC (see Appendix 5), permission was obtained from the relevant study cases' management to conduct this research among their employees and residents.

The empirical study was undertaken in three stages. First. a preliminary overview was conducted of the study cases and their water sources; followed by a pilot study with ten members from the city of Masvingo; and finally a full-scale study in all four study areas. The time schedule was as follows:

- April 2009 to August 2010: Preliminary field studies including documentary analysis, informal talks and unstructured interviews with residents and other stakeholders, and visits to water sources in the study areas.
- First week of September 2010: Pilot field study in Masvingo urban.
- October 2010 to January 2011: Main studies undertaken in Masvingo (urban and rural).
- November 2010 to October 2011: Harare.
- January 2011 to October 2011: Musina (urban and rural).
- February 2011 to October 2011: Tshwane.

The first phase of the studies focused on visits to potable water sources and treatment sites in the study cases in Zimbabwe, including Lake Mutirikwi (early April 2009), lakes Chivero and Manyame (August, 2009). Then followed documentary analysis of potable water supply governance in municipal, national, international, NGOs, and professional institutes' libraries. Relevant websites and those dealing with the selected areas were also trawled. This preliminary study helped to shape the structured and informal interviews, questionnaires and informal discussions that followed.

In early September 2010, an empirical pilot study to pre-test the questionnaire was carried out in the city of Masvingo before the main study was implemented. Questionnaires were given to 10 Masvingo residents (2 clerks and 3 general hands at ZOU Masvingo Regional Campus, and 5 municipal clerks). The pilot study was to determine whether the instructions and questions in the questionnaire were clear and could be understood by typical respondents; and to check whether the questions yielded useful information on the key issues raised in the research problem and research questions. The ten pilot study participants were then excluded from the main study. This ensured removal of bias from the first exposure or experience with the questionnaire. Some of the technical questions on potable water legislation and IWRM concepts were thus removed from the residents' questionnaire because it was evident that they were too technical for many residents.

In the main studies, 500 questionnaires were distributed among the sampled participants. Both the English and mother tongue versions of the questionnaire had an accompanying letter requesting the respondents to fill in the questionnaire. The letter read:

> My name is Maxwell Musingafi. I am a postgraduate student studying for a PhD in Public Management and Governance at the North-West University (NWU) in South Africa. I am carrying out research on water supply governance in Zimbabwe and South Africa. My mission is to determine, evaluate and suggest a possible way forward for the improvement in the governance of water supply in the two countries. The information you provide will be treated as confidential and meant only for academic purposes. I therefore kindly request that you answer the questions as truthfully as possible. Please do not write your name anywhere on this questionnaire. Place a tick in the appropriate box/boxes or fill in the space provided

In the formal structured interviews, a set of questions was prepared to serve as a guide to stimulate discussion (see Appendix 2). Interviewees were given an option to either participate or decline participation.

Comprehensive field notes were documented throughout the visiting and discussion periods. The researcher moved from case to case throughout the field study period. It is important to note that the distribution and collection of questionnaires in Musina and Tshwane was done solely by the

designated research assistants who were also responsible for identifying the translators of the questionnaires into local languages.

5.2.6 Data presentation and analysis procedures

After the collection of the relevant data the findings were tabulated according to themes, including the variables and the various relationships. The findings were compared with the different authors' views in the literature review chapter. To make the information more meaningful to the reader, data were reduced to narrative descriptions, tables, bar graphs and pie charts, and actual frequencies and percentage responses. Narrative descriptions were used to explain given scenarios and relationships. Tables condense statistical/numerical data and thus make the reading easier to understand. In addition to condensing data, graphs and charts have a pictorial appeal that makes them easier to compare.

5.3 MORAL AND ETHICAL CONSIDERATIONS

As is standard practice in the research fraternity, there were some ethical issues taken into cognisance. First the research proposal was submitted to the faculty and university higher degrees committee for clearance.

In accordance with accepted university higher degrees guidelines the study made use of an introductory letter from the NWU School of Basic Sciences VTC and an introductory and consent letter from the researcher. This ensured that the participants understood the objectives of the study, while assuring the respondents that the researcher would treat all responses as strictly confidential.

Also, in light of the fact that water management facilities are, as a rule, national key point localities, the assurance was given that a concerted effort would be made not to disclose any information of a sensitive nature. Where interviewees indicated that a specific comment should not be used in the study, the researcher respected the request of the informant.

The researcher also indicated that once the study was completed, a report of the findings would be provided to each municipality that contributed to the study, and a feedback symposium involving academics, municipal authorities, government policy makers and other stakeholders would be held in the city of Masvingo, Zimbabwe, jointly hosted by the city of Masvingo and the Zimbabwe Open University. Although the first session of the symposium would centre on findings from this study, other presenters and researchers would focus on the theme:

Local authorities: Water to the people, for the people, and by the people.

Special invitations would be sent to participating municipalities and an appeal would be made to other local authorities and stakeholders in the region and beyond to participate in the symposium. In addition to this thesis feedback report, the idea is to come up with a collection on fresh water supply governance in local authorities that will serve as a point of reference in the governance of potable water supply in municipal and local authorities not only in Zimbabwe and South Africa, but southern Africa as a whole.

5.4 CHALLENGES FACED DURING FIELDWORK

There was a small challenge in the big cities, especially in South Africa. During the initial stages of the study, Public Works front office municipal official in CTMM and Musina advised the researcher that all the information he required could be accessed from their websites. In Harare, the water director was hardly accessible, because he was always busy. Later, the researcher discovered that in most local authorities, information pertaining to water supply services is regarded as a security item. The representative from the CTMM water division front office told the researcher that any information that could not be accessed on their website was not for public consumption. Even when the researcher told her that he wanted to measure the relationship between policy and practice and the challenges thereof to come up with a possible roadmap for the future of the region, she maintained that, ‘that type of information could be gleaned from the consumers themselves without the involvement of the authorities’.

After the researcher was refused access to the municipal employees, he emailed the municipal manager to no avail. He then went back to the water division where the same official told him to try the Water Research Commission or the Department of Water Affairs for 'they have done extensive research with us. You can get some empirical reports from them'. However, the same official gave the researcher the green light to conduct research with the consumers/residents. The researcher then assigned Miss S. Nyakanyanga (research assistant in the CTMM study area) to keep on visiting them in person. The result of her several visits to the CTMM offices bore fruit in the form of official permission to carry out the study communicated by the water and sanitation planning and regulation director on 28 June 2011 (see letter in Appendix A5), when the researcher was almost through with compilation of this report/thesis. Thus, with the help of the study promoters (Prof Johann Tempelhoff and Prof Eric Nealer), an interview with officials in the CTMM water sector was then organised and conducted in September 2011.

This very same problem was replicated in Musina although the research assistant succeeded in getting through to the workers who agreed to complete the questionnaires on condition that they remained anonymous. The administrator/secretary (Ms. Chantall) in the director's office said the director was too busy to entertain the researcher. She however had no problem with the distribution of questionnaires among municipal residents. The research assistant went further and distributed questionnaires to both residents and workers as shown in subsection 5.2.3. Formal permission to carry out the study was however granted later in September 2011. Because of this delay in obtaining formal permission to conduct this study in this municipality, formal face-to-face interviews with authorities in the Musina Local Municipality were dropped and replaced with email communications.

The anticipated 20 CTMM anticipated participants (employees) were thus dropped from the sample because they were initially inaccessible. The two water management officials participated albeit not as per the original plan. As a result the sample size would have fallen to 502 respondents. To ensure that the sample size remained the same, an extra 20 residents were sampled as questionnaire respondents and 1 DWA official as interview respondent in the Tshwane Metropolitan Municipality.

It is important to note that despite the above handicap, both the CTMM and Musina websites were very useful in providing some of the required data, especially when the data from the websites were compared with qualitative data from residents' questionnaire respondents and the informal discussions with the research assistants. This was also true of subsequent interviews with representatives from the CTTM Water and Sanitation Department and Mr. Bertram from DWA. The assistant researchers, Kwashirai Gomo, Sally Nyakanyanga and Hatzel Muzii, also had some informal discussions with the questionnaire translators (see data collection procedures). Also note that the use of a hybrid approach helped to mitigate the Tshwane/ Musina/ Harare hurdle.

5.5 LIMITATIONS OF THIS STUDY

This study was largely a case and community development study. For such studies to be effective in the development endeavour, they have to take a participatory approach so that participants' skills are also sharpened during the research process. Participatory approaches, especially in-depth interviews and group discussions, also help both the researcher and the research subjects to establish a cordial rapport and read between the lines of what is being communicated. This research tended to be largely survey in character with some limited participatory characteristics. However, it benefited from the largely hybrid design as already outlined in this chapter. It is therefore recommended that:

- a more detailed and deeper participatory study be carried out with other major cities and other rural communities in the two countries;
- related comparative studies in other countries in the SADC region be carried out; and
- regional comparative studies (SADC versus ECOWAS, etc.) be carried out.

However, in the absence of other relevant information, this study will hopefully have great indicative value.

5.6 SUMMARY

Chapter 5 looked at the study areas, research design, subjects, sampling procedures, research instruments, data collection procedures, data presentation and analysis procedures, moral and ethical considerations, challenges faced during field work, and limitations of this study. The research design is hybrid, although dominated by the descriptive survey approach. All the study areas were found to be at high risk of potable water scarcity/stress and contamination due to geohydrological factors, nearby mining and agricultural activity, and the rapidly increasing population in the study areas, among other things. The design matched well with the target population and the sample comprising people who were scattered all over the four study case areas. Questionnaires, interviews, documentary evidence, the Internet, websites and participant observation were all used in the collection of data for this study. The empirical study was carried out in three stages: first a preliminary study of the study case areas and their water sources; then a pilot study with ten members from the city of Masvingo; and finally, a full scale-study of all four study cases. Five hundred and twenty four (524) people were sampled for the study. Questionnaires were distributed through municipal offices, ZOU offices and local schools. Interviews were conducted with municipal and council executives, water directors and their assistants. Furthermore, informal discussions were held with all direct research assistants. Data were then collated and analysed for presentation in narrative descriptions, tables, graphs, and actual frequencies and percentage responses.

Before closing this chapter, it should be noted that the study was conducted during a difficult political and economic period in Zimbabwe. The findings from this study should thus be analysed and interpreted with this background in mind. Nevertheless the researcher forged cooperation from both municipal management and members, and collected data amidst political and economic stress. Unexpectedly, the researcher met with resistance from the most advanced of the municipalities under review (Tshwane). He anticipated a measure of this type of reaction from Zimbabwean municipalities where there is a hyper-economic and political crisis.

Having outlined how this research was carried out and its presentation in this chapter, the next chapter looks at the findings of the study.