

**Title: Challenges in water provision in Mbulwane area of uMvoti Municipality**

**By**

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## **DEDICATION**

This research is dedicated to my mother Thandi, my brother Sifiso and my sisters Neliswa and Nomfundo who have been a pillar of strength during my studying journey. Their unconditional support, prayers, care, and love will always be appreciated.

## **DECLARATION**

I would like to state that the thesis entitled "**Challenges in water provision in Mbulwane area of uMvoti Municipality**" is the work carried out by me under the supervision of Mr. Ntini in the school of built environment and development studies. Furthermore, this study has not been undertaken before. The bibliography is provided and quotations are presented where necessary thus, this work is unique.

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Signature

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## **ABSTRACT**

Clean water provision is a challenge around the world. The aim of this study was to explore the challenges to water provision in Mbulwane area of uMvoti Municipality. The study sought to explore water provision, challenges and possible solutions in Mbulwane area. The study used the Social Justice and Human Right Theory as an anchor. The study employed the qualitative research approach by interviewing key informants and community members as well as examining documents related to water provision. The findings of the study revealed that that in Mbulwane there water is scarce and is of poor quality. This is due to poor governance and corruption. The study recommended community empowerment; improved distribution of infrastructure, concrete government approaches public participation as well as environmental change mitigating factors.

## ABBREVIATIONS

<b>Abbreviation</b>		<b>Explanation</b>
ANC	–	African National Congress
DRWH	–	Domestic Rainwater Harvesting
DWAF	–	Department of Water Affairs and Forestry
FAO	–	Food and Agricultural Organisation
FBW	–	Free Basic Water Policy
IDP	–	Integrated Development Plan
		International Children’s Emergency Fund
JMP	–	Joint Monitoring Program
MDGs	–	Millennium Development Goals
UDHR	–	Universal Declaration of Human Rights
UN	–	United Nations
USAID	–	United States Agency for International
WHO	–	World Health Organization
WHO/UNICEF	–	World Health Organization / United Nations

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# **Chapter 1: Introduction**

## **1.0 Introduction**

This chapter outlines the background information on the challenges of access to water provisioning in the international context, African context and particularly in South Africa. The study also presents the location of the study area as well as an overview of the subject matter in the study area. The chapter states the research problem, theoretical and conceptual framework that is social justice and fairness theory. Furthermore, it provides the aim of the study, objectives and the key research questions, which comprises of the main research question and sub-questions of the study.

## **1.1 Background**

One of the key human right recognised internationally is the provision and universal access to clean and potable water for all (Grady, Weng and Blatchley, 2014). According to the UN General Assembly Comment 15 of 2002 access to clean water is one of the major elements which enforce government to protect this right (Scanlon, Cassar and Nemes, 2004). Regrettably, clean water for everybody is an objective that is yet to be realised in the realm of water provision. Water provision is one of the present and future increasing pressure throughout the globe that requires the most urgent interventions at international level, authors have projected that about 80 % of the world's populace is vulnerable to water shortage (Vörösmarty, Douglas, Green and Revenga, 2010). According to Gleick (1998), the provision of water is highly considered as the most important resource for survival.

In their study Kusi, Agbeblewu and Nyarku, (2015) pointed out that in 2006 Sub-Sahara Africa suffered the most with a probable 800 million of people living in Sub-Saharan Africa, about a third of them stay in an environment with less groundwater. Furthermore, the results given at a conference in 2012 concerning water insufficiency in Sub-Saharan Africa estimated that about 75 million to 250 million will be living in water stress environment by 2030 (Kusi et al., 2015). The authors add that although policies are in place and as good as, they are, people's right to the reliable water supply is not yet realized. The administrative system fails to implement, develop and manage water resource to ensure that this constitutionally enshrine right is observed (Gleick, 1998),. The researcher was then motivated to embark on this research after observing the

challenges of water provision in Mbulwane in uMvoti Municipality where residents struggle to access water service delivery.

## 1.2 Location

Mbulwane area is a deep rural area situated within the still underdeveloped ward 1 at the uMvoti local municipality, whose main town is Grey town. Mbulwane area, Ward 1 has high poverty rates in the country falling under uMzinyathi District in KwaZulu-Natal. It is also one of the eleven wards under uMvoti Municipality, which is located 66 km away from the urban centre of Grey town, in the Southern direction under uMvoti Municipality and 50 km away from Stanger. The map below depicts Mbulwane ward 1.

**Figure 1.2: Mbulwane Ward Map (Source, Umvoti Municipality)**



### 1.2.1 Water in Mbulwane Area

The Mbulwane population mainly relies on other sources of water such as streams, boreholes, springs and wells for water usage, conversely, rainfall in Ward 1 at Mbulwane is low, and periodic seasonal droughts are common and this has led to low yields, drying up of water points as well as groundwater. Thus, this community experiences high levels of water shortage. The majority of the population is involved in community vegetable gardening as a high percentage is unemployed and therefore cannot afford financially to equip themselves with the necessary tools

to access water in order to run the gardens effectively. Thus the majority of the population rely on government social grants for example pension, foster care grants, child grants, etc. The community vegetable gardens project tends not to last long even though most of the people rely on the income generated from them. The gardens are a source of nutritious nourishment; consequently, it was vital to embark on this investigation in order to discover the pressures that lead to several challenges to water provision in this rural community. Furthermore, it was imperative to conduct this study to ensure that the communal projects that create revenue for the families and communal areas have access to water.

### **1.3 Research Problem**

Many individuals living in abject poverty predominantly in the Less Developed Countries (LDCs), everyday face enormous privation because water provisions are neither adequate nor innocuous. This insufficiency in the quantity of water has lately been attended to in worldwide echo as a grave and threatening occurrence (McDonald, Clarke, Boden and Kay, 2010). Mounting pressure owing to the cumulative need for water may be a basis of conflict and the universal gauge water fairness is reflected largely due to illness as well as the absence of improvement concerning the active delivery of water in addition to sanitation (McDonald et al., 2010). In excess of 2 million perish annually from water-borne ailments and a much bigger forfeiture of significant industrious fit years (McDonald et al., 2010). In many nations, “water and sanitation policies, plans and strategies are in place to reach vulnerable groups such as those living in poverty” (World Health Organization, 2014). However, World Health Organization (WHO) believes that monitoring improvement in access in addition to service delivery for the underprivileged is done in slightly below 50% of African nations (World Health Organization, 2014). In some instances, people, particularly in rural areas like Mbulwane, the study area, are not treated well.

### **Theoretical and conceptual framework - Social Justice and Fairness Theory**

This research study is grounded on the social justice and fairness theory. Grey (2011) refers to justice as fairness, equality and having rights. Social justice theory advocate for justice it argues that any wrong that has been done, one is accountable and therefore a strong effort and commitment is required to remedy that unfairness (Grey, 2011). Grey (2011) argues that any unfairness should be addressed. This also brings a call for a new model of justice called fairness theory (Folger and Cropanzano, 2001). Grey (2011) and Folger and Cropanzano (2001) agree

that if ever anyone has been treated wrongly or unfairly, they hold someone accountable to address that particular act or conduct of fairness or justice where the wrong act, injustice or unfairness has been done. The implication of this theory is that it is about engaging in good choices, ideas, and actions. Therefore, this theory is more relevant to this study because, in terms of water service delivery, it brings a call for the decision makers to provide fair share and equal distribution of resources to the people. According to Social Justice and Fairness, theory if the decision makers fail to provide clean and safe water to the people it means that they have failed to engage in good actions. It also suggests that any unfairness must be addressed. Therefore, through this study, the above-mentioned theory raises awareness of holding water authorities accountable for failure to ensure sufficient water supply in their areas of jurisdiction. The issue of holding these authorities accountable and ensuring a response to that is questionable because in many instances being underprivileged and unable to challenge the politicians and superiority is never an easy task (Folger and Cropanzano, 2001).

In some instances, people, particularly in rural areas like Mbulwane are not treated well. An example of rural areas that experience social injustices is found in Bangladesh where rural people still walk long distances to access water from rivers and streams. This implies that the poor and marginalized i.e. old and sick people who are unable to fetch water by themselves and without money to hire other people for assistance are ignored and deprived access to water (Organization, 2001) However, even just for a while, few days, a week or a month people cannot live without water (McDonald et al., 2010). The authors add that a healthier nation is not promoted in this regard and this impacts negatively on poverty alleviation and the sustainability of development, therefore, governments should promote measures that improve basic service delivery to the people bearing in mind the poor and marginalized (Chowdhury and Rasul, 2011).

#### **1.4 Aim of the study**

The study was aimed at exploring the challenges to provision and access to water in the rural community in Mbulwane area in uMvoti Municipality.

#### **1.5 Objectives of the study**

1. To describe water provision
2. To describe the causes of water shortages
3. To describe the challenges in water provision
4. To explain what could be done to ensure adequate water provision

## **1.6 Main Research Question**

- What could be done to reduce challenges to water provisioning in Mbulwane Area?

### **Sub-questions of the study**

- What is water provisioning?
- What are the main challenges in water provisioning in Mbulwane area in the uMvoti municipality?
- What could be done to ensure adequate water provisioning?

## **1.7 Conclusion**

The chapter explored a brief background to the water problem in the developing countries and cascaded to the study area, Mbulwane. Key research questions were mentioned. The next chapter is going to explore literature related to water challenges. This research study is grounded on the social justice and fairness theory.

## **Chapter 2: Review of Related Literature**

### **2.1 Introduction**

This chapter offers a conceptual framework introducing the key concepts used in other literature. The chapter then presents two theoretical outlines that systemise the foundation of the research namely: Social Justice and Human Right Theory. This chapter also presents a review of the universal literature concerning the challenges, limitations, and setbacks towards access to clean water. Reviewing related literature is essential in establishing the relationship of the challenges. From reviewing prior literature, the research will find gaps that led to further extrapolation in the study. This lays the basis for an extra examination in Chapter 4.

### **2.2 Conceptual Framework**

#### **Water Supply**

Water supply is the provisioning of water by public services, profit-making institutes, and community or by individuals, usually via a system of pumps and pipes; it is the availability of water for the community or region (Verhoeven, Arheimer, Yin and Hefting, 2006). Moreover, water provisioning is the source or delivery system of water to society (Brikké, Bredero, Supply and Network, 2003). However, Verhoeven et al. (2006) postulated that variations in water excellence have happened because of agrochemicals as well as siltation. Verhoeven et al., (2006) argued that however, it consequently contaminated the flowing water in addition to groundwater. Likewise, the quality and quantity of water on which the society especially the poor and marginalised depends on for survival is negatively affected by chemicals in agricultural production through water pollution (Corvalan, Hales, Mcmichael and Butler, 2005; Finlayson, Cruz, Davidson, Alder, Cork, De Groot, Lévêque, Milton, Peterson, and Pritchard, 2005). This hinders the means to eradicate poverty since poor water quality and quantity adds to water poverty (Ahmad, 2003). The true value for the definition of the concept by (Brikké et al., 2003) is that it contributes to the improvement of information about water provisioning term and challenges. Moreover, the literature by Finlayson et al. (2005), provides various underlying factors affecting the quality and quantity in the provisioning of water and thus, enables the study to answer the question of what is water provisioning challenges in the study. Furthermore, it makes it possible for the study to achieve its objectives concerning the description of water provisioning as well as the description of the causes of water shortages those results to the challenges in water provisioning. Hence the larger and proposing matters of practicable in the

Millennium Declaration are central in association with water as the human right or to either an explanation about the core value of water and sanitation to the excellence of life and operational (Joint Monitoring Programme Organization, 2000).

### **Water Access**

According to Grady et al. (2014), the United Nation (2000) provided a definition of water access, which mainly concentrates on 3 different quantifiable features of consumption water fonts such as the amount of "water, the safeness or quality of water", and the distance for collecting water. Grady et al. (2014) assert that the recognized daily amount of water is 20 litres per person for each day, however, it is harder to quantify but it stresses that harmless and secured is minus organic or chemical causes directly harmful to individual well-being. Poor water quality and quantity contribute to water poverty (Ahmad, 2003). Likewise, shortage of water for agriculture also contribute to poverty since livelihood has a negative impact on the economy of a country due to a decline in agricultural production for income generation which also results to unemployment (Ahmad, 2003). Ahmad (2003) and Grady et al. (2014), search for contribution to the information on the relationship that exists in relation to poverty and access to water.

Understanding the factors mentioned above will help the study in the planning of an alternative approach which ensures poverty reduction and improves access to water provision, Accordingly, this will help to answer the research question in relation to the challenges of water provisioning. In 2005, on the other hand, goal 10 connecting to the universal retrieval of clean water is can be linked to goal 7: 'ensuring environmental sustainability'. Three interpretations are likely. Lack of access to water and sanitation needs special attention and a study as a feature of poverty. Therefore, despite the fact that income procedures of poverty are contained within goal 1, the inclusion of water and sanitation targets among other things can be measured as taking a multi-dimensional view of poverty and inclusion of non – income aspects of quality of life. A second interpretation is that target 10 implies the influential environment of water and sanitation to the attainment of some of the additional objectives such as child mortality, gender equality, and environmental sustainability. A third interpretation is that target 10 is an acknowledgement of the essential significance of the operatively organized encouraging by universal water access (WHO, 2002).

Inside the conversion of communication associated with water from the Millennium Declaration of Target 10, the term access is puzzling (UN General Assembly, 2000). The phrase in the pronunciation, give the impression to point three important connections (WHO, 2000). Firstly,

that access to water is more associated with poverty and ant connections. Secondly, that access to water is more associated to poverty and hunger, that water policy should pay more attention to the provision of safe water; and that it should concentrate on those who are more vulnerable the lack of clean water access. report that in 2000, the percentage of an African population with access to improved water supply was 62%, giving it the lowest water supply treatment of any area in the biosphere (Vörösmarty et al., 2005). This unapproachability was more severe in communal areas “where coverage is only 47% matched to 85% in urban areas”.

### **Equal Access to Water**

According to Langford (2005), equal access to water is one of the advantages of the human rights approach that exceed standards or levels to look at the groups that are affected or having a chance of being affected and those at risk of discrimination. It can be said that as a human right brings a call for the government to challenge the obstacles encountered by the wide variety of individuals in accessing water, including the poor and marginalized. Countries like South Africa provide free water in accordance with this principle of the right to water policy (Langford, 2005). Even though only 25 litres per person is, free and any excess is not free of charge, which fails to look at the issues concerning equal access and control over water. In 2000, the percentage of an African population with access to improved water supply was 62%, giving it the lowest water supply in every region worldwide (Langford, 2005). This concept contributes to the body of knowledge in this study since it critically examines some of the questions underlying debates about unequal access to water provision. Vörösmarty et al. (2005). Argues that the debate fails to adequately address questions concerning equity and justice. This would be necessary to understand the current situation in water provisioning and to understand the driving force that hinders the smooth flow of water provision, thus answering the research question on water provision.

### **Human Right to water**

This term refers to putting drinking water provision first mainly to those who lack basic services (Miroso and Harris, 2012). Human Right to water advocate for access to water for the vulnerable people by means of organisation and assembling the regional and global powers to stresses and efforts to the national authorities (Keck and Sikkink, 1998). According to Keck and Sikkink, (1998) and Miroso and Harris, (2012) access to basic water is a prerequisite and a central human right indirectly and directly which is also reinforced by global law, announcements and country best practice. This researcher of the study will gain a valuable instrument for tackling a pressing

tragedy in the research problem asserted by poverty (World Health Organization, 2014). This will also help the study in addressing the main challenges of water provisioning.

According to Langford (2005), the UN (2002) describe and incorporate water quality concept to the World Health Organisation (WHO)" adequate levels of water supply, sanitation and hygiene relevant to health and safety of human needs. , the dirt thus, this according to the United Nation (2000), agricultural production, industrial activities and urbanisation (waste from domestic) has been a source of water contamination since the beginning of individual. Consequently, it affects negatively the quality of water and affects the right to water provision which brings about challenges in water provision.

Inadequate access to clean water affects the health of the populace and this all too often is the reason for illness, unnecessary anguish, conflicts, lack, besides even demise. Galvan (2012) further argues that this implies a situation characterized by countless unacceptable injustices. Hemson and Galvin (2006), state that it enables contribute to improving information in the study. Quality of life is linked to the quality (adequate, harmless, easy to get to and affordable) of water. This shows the effect of a decrease in the quality of water, which forms the foundation of this study.

## **2.3 Theoretical Framework - Social justice and Human right**

### **Social Justice**

The term “social justice and water refers to the fairness of access to water resources and equality of burden from poor water quality and water hazards” (McDonald *et al.*, 2010:100). According to Langford (2005), the “global scale water justice is mainly unequal in respect of resource distribution and lack of progress towards the effective provision of water”. Langford (2005) notes that rural people carry more burdens owing to the dearth of water access, in excess of over a billion who have scant access to water, the majority of disturbed are the rural people with the projected amount of 80 % experiencing water shortage (Langford, 2005). The implication of this is that further basic human rights and equity concerns on defenceless and has not yet been addressed (Mehta *et al.*, 2014). Tisdell (2003) believes that, if freedom of chances is in existence the society should equally benefit from that. It should be accessible to everyone regardless of gender, race, age, and language but everyone should be equal before access to that freedom of opportunities (Tisdell, 2003). Moreover, if water policies and principles do not stimulate equality

on access to water at that point the freedom of the entire society lose respect and diminished which is unfair conduct in contrast with social justice principle (Tisdell, 2003).

An estimation of 800 million of people does not have safe water by WHO (2010) cited by Mehta *et al.* (2014), even though there is an extensive acknowledgement that water access is key to achieving the global objective (Mehta *et al.*, 2014). This is contrary to the significant ideal of water provision to the households in relation to enhanced hygiene, health standards and a decrease in sicknesses (Moe and Rheingans, 2006). Access to pure water is critical to improving human well – being. Furthermore, it is a basic need for survival (Chowdhury and Rasul, 2011). Accordingly, meeting basic needs is the necessity for equity in which social justice theory advocate for (Chowdhury and Rasul, 2011). This theory has argued that there is a need to develop a range of notions when speaking of social justice. At the global level, it should further be noted that the water problem is central to the international level. Langford (2005) and Chowdhury and Rasul (2011) made the point that we need to look at legal systems, histories of racism and systemic political conditions in which all play a role in response to the possible solutions on the research question of what could be done to ensure adequate water provisioning. This will help in the study to recognize how social justice is perceived and practised. In addition, Langford (2005) for example criticises unequal distribution of resources and lack of development in the direction of the real facilitation of water. This argument will add value to the information in the study, the current situation on water provisioning thereby achieving the objectives of the study

### **Human right**

The Universal Declaration of Human Rights (UDHR) postulates that every person in the world “has the right to a standard of living acceptable for the welfare and safety of himself and of his family” (Brownlie and Goodwin-Gill, 2010). Furthermore, the right to water is deep-rooted within the broader concepts “of the right to an adequate ‘standard of living’” (Mehta *et al.*, 2014). Other countries like South Africa obtained the opportunity to free water in accordance with the right to water policy (Langford, 2005). In terms of the policy, the mandatory water quantity per month is six thousand litres per person which makes the quantity of 25 litres for everyone each day within the family of eight and the least possible distance is 200 meters (Hall et al., 2006). This establishment is directed to the underprivileged people. This is reflected as a direct drinking, food preparation, and personal hygiene however not adequate for a full in good physical shape and productive lifespan (Langford, 2005). Based on the above information water rights are interrelated to quite a few rights: the right to food, health, housing and healthy environment. This

necessitates the state's accountability for the safe drinking water provision. Adequate food, health, and water are the constituents of acceptable living standards associated with requirements optimal good lifeline with the constitutional mandate in chapter 8 of the South African Human Rights Commission.

Even though only 25 litres per person is free and any excess used is to be paid. For Langford, the "term price of water and water should be free" is questionable since in this context the issue is about water for basic needs and social right (Langford, 2005). Yet the concept of cost-effective comes in. According to Langford (2005), the World Bank introduced water sector developments aimed at the commercialization of water and water privatization. The World Bank's water privatization policy emanates from the belief that the provision of free water is not economically beneficial and thus, the poor and marginalized should pay, as this will essentially escalate access to clean water together with the poor and marginalized (Langford, 2005). However, the World Development report of 1992 articulated that although the poor must pay for water resource policy, this consists of various preferences and alternatives available on water provision levels that they are prepared to expand. By so doing, this enables the suppliers' financial feasibility to achieve their necessities and prerequisites.

Petrova (2005), Glennon and Scarcity (2005) and Bakker (2010) postulate that a particular country's failure to supply water services to the urban slums; small towns and villages; and incapability of piped water access provisioning to the poor led the World Bank to support of private participation as a way out to public delivery failure. However, for water to be free, reasonable and accessible to all lies to the state's effort to realise this human right of access to water for all. Langford (2005) revealed that even though this policy is in place it does not seem to be benefiting everyone. About 1 billion people who lack access to water, the majority of affected are the rural people with the projected amount of 80 % experiences water shortage (Langford, 2005). The disadvantaged areas were not provided with financial resources or social assistance that would enable them to implement this policy (Langford, 2005). Evidence from South Africa, Chile and Colombia show that for water to be free, reasonable and accessible to all lies to the state's effort to realise this human to water access and that policies and pricing will be determined in accordance with each country's situational structures and history (Langford, 2005). In Chile, the cost of water is full amount while water enterprises are entirely paid; merely 60% of the small earnings quantity aided contrary to that, all Colombians with low-income areas got assistance with funds for water (Mehta et al., 2014).

In their study in the UK McDonald et al. (2010) revealed a future projection of more than 65 million population prior to 2020 while a decline of temperature in summer and summer rainfall respectively is expected which leads to more domestic water demand and agrarian need at a period of depressed river heights. This implies a continuous deprivation of the right to water, as the basic need present in the constitution (Keck and Sikkink, 1998). The productivity loss and price increases due to lack of sufficient water in all streams always take place. Thus, confronted with a perilous state of competing demands, collection and ranking will be essential which also exacerbate basic human rights and equity concerns that keeps on defenceless and has not yet been addressed (Mehta et al., 2014). A study by Moe and Rheingans (2006) revealed that the supply of water systems may be particularly vulnerable to pollution problem and could contribute to the widespread and wide-ranging of waterborne illness in contrast with the right to satisfactory living standards (Keck and Sikkink, 1998).

#### **2.4 Challenges in water provisioning in the International perspectives**

Water provision is an approach for development, which performs a key part in poverty reduction and in humanizing the lives of the poor and marginalized (Mukheibir, 2010). According to Moe and Rheingans (2006), water provision is an essential element for survival. The Millennium Development Goals (MDGs) play a vital role in shaping a well-developed population state to reduce the percentage of those without access to a clean and safe environment. During the programme, the WHO/UNICEF Joint Monitoring Program (JMP) examined the improvement and released the results has for example, in the main universal accomplishment the safe drinking water objective was successfully achieved in advance by 2010 instead of 2015 which was stipulated in the time frame of the Millennium Development Goal. The report also highlights an amount of work still, the JMP has also followed and offered information that clarify amongst other things discriminations and differences like gap between urban and rural peoples, the gender problem of water collection and the insistent elimination of the underprivileged from water and sanitation services (World Health Organization and UNICEF, 2015). For example, according to Debbané and Keil (2004), dealing with the issue of the past on water provision remained the centre of an African National Congress (ANC)'s governmental obligation. The ANC has called for its promises to environmental fairness such as the White Paper on National Water Policy in which DWAF (1997) cited by Debbané and Keil (2004) state that the White Paper on National Water postulates that many South Africans lacked access to safe water. Furthermore, to over twenty million of the South Africans water and sanitation remains difficult to achieve. The National Water Act also provides water services in lieu of supplementary commitments, such as

means of support and an arrangement for authorizations has been recognized for safeguarding the right to have water (NWA, 1998). Correspondingly, the Department has brought forward programs such as "Working for Water". The most important objective of these programs like working for water is to intensify the water supply by eradicating environmental harm organism. Correspondingly, the Department also introduced the Free Basic Water Policy (FBW) during December 2000 (WHO, 2000) More and Rheingans (2006) presented the following challenges for water provisioning. Likewise, Miller (2006) also views the contamination of groundwater as the global challenge in water provision furthermore, Miller believes that drought, increasing demand as well as a depletion in groundwater also increases challenges in water provisioning.

According to the United Nation (2000), Agricultural production, Industrial activities, and urbanisation (waste from domestic) affect the right to water provision. Furthermore, the internal mass/dirt has been a source of water contamination since the beginning of individual thus, this affects negatively to the quality of water. Hamdy, Ragab and Scarascia-Mugnozza (2003) note that the agricultural sector is the main water user in the universe with an expected amount of 80 – 90% consumed by this sector. Moreover, this sector does not consider the significance of water preservation as it was suggested that the ignored percentage of water during water use is not above 45% conversely, the water loss exceeds 50% (Hamdy et al., 2003).

According to Kумму et al. (2010), the worldwide populace faced with a vast growing rise in water scarcity around the globe. During the period of 1800, lack of water began in earnest at around 1900, when 2% of the global people was below long-lasting water scarcity (<1000 m<sup>3</sup>/capita/yr.). In 1960, this measurement had increased by 9%. Commencing at that time proceeding, the total people below water shortage increased rapidly to the year 2005, in which 35% of the world population lived in areas with chronic water shortage. Thus, from this, it is evident that all states move into a progressively worsening situation where water scarcity for consumption and needs are increasing (Forouzani and Karami, 2011). Hamdy et al. (2003) report that the World Commission on Environment and Development revealed that roughly, by now it estimated that as many as 80 countries with 40% of the global populace are concerned about the severe level of water scarcity. However, the most affected people are the rural population in which most affected people are 80 % yet more than 1 billion people experience water shortages (Langford, 2005). Homer-Dixon (1991) put forward four underlying relationships between environmental change and a very serious conflict namely: Reduced agricultural production, Economic decline, and Population displacement

Disruption of regular and legitimised social relations, the proposed conflict is more likely to reach a serious level more particularly in developing countries (Homer-Dixon, 1991). Furthermore, Homer-Dixon (1991) believes that the current viewpoint for the realisation of the existing security problems is not enough for the recognition and clarification of the factors that underpin the association between environmental change and conflict. Rosegrant (2002) believed that water is the greatest single aspect of the intimidating resource that will restrict the upcoming food production. Forouzani and Karami (2011) support the statement by Rosegrant (2002) and Hamdy et al. (2003) by postulating that sustainability is now limited in agricultural sector due to water shortage mainly in arid and semi-arid regions. Despite the fact that sustainable agriculture must be financially viable, ecologically sound and socially responsible (Forouzani and Karami, 2011). In contrast to that, there are common collective opinions that amongst other things, agriculturalists must yield extra nutrition for every unit of water (Giovannucci et.al, 2012). According to Giovannucci et al. (2012) however, they will have to ensure this even though they are facing with climate change and unstable food needs, and the growing insufficiency of the greatest physical factors of production (Giovannucci et.al, 2012).

### **2.5 Causes of Challenges in Water Provisioning in the International perspectives**

The United Nations (2000) postulates that nitrate chemical from agricultural production systems is one of the most global contaminants of groundwater. This means that the agricultural production system is one of the causes of huge water pollution in their activities, which comes mainly from chemicals. Moreover, the application of fertilizer to agricultural land leads to the degradation of surface water quality (United Nations, 2000). One can argue that in many rural areas such as Mbulwane area, which is dominated by agricultural produce also, contribute to water pollution. This is because their main means of income is generated through agricultural produce which uses fertilisers the most to regulate their plant growth or agricultural output. Thus, this means that they will have no access to safe drinking water since they depend on surface water such as rivers and lakes as their main sources of water. One can argue that surface water is an important resource of safe drinking water for people and the environment so, it can be argued that water pollution is unprincipled, it is not worthy for all organisms and living beings that need water for survival. In Mbulwane area, there are many people who do not have access to clean and safe drinking water and because they have no choice, they have to drink contaminated water as the only source available for survival. This means that surface water pollution is harmful to human beings and animals as this means the restriction of rivers and lake biological and environmental health to fresh water. It can be said that there is no reasonable

relationship between the social and environmental costs and the benefits of reinstating fertilisers for food production enhancement.

Dealing with water pollution factors is something that everyone (including governments and local councils) needs to get involved. The United Nations (2000) conducted a study sixteen years ago which is quite a few years' backs and might also happen that learning and education by that time were not familiar, however, in this current situation learning about the issue is the most important step to take. Moreover, learning about constructive issues such as buying more environmentally safe alterations that result in a biological balance between human and environment can be ideal. Thus, the study by United Nations (2000) is more relevant to this study because it describes the causes of water shortages and it explains what could be done to ensure water provision in Mbulwane, which is my area of study.

Schewe, Heinke, Gerten, Haddeland, Arnell, Clark, Dankers, Eisner, Fekete and Colón-González, (2014) believe that climate change is one of the other causes of water provision challenges. Schwete projected 2 °C of the global warming (almost 2.7 °C above preindustrial) which is said to increase approximately 15% of the population which will result in more decrease of water due to more people living under absolute water scarcity (<500 m<sup>3</sup> per capita per year) by another 40%. Thus, it is evident from this that the population in the developing world is increasing, leading to growing demands for water resources and, unfortunately, to more pollution that effectively reduces the availability of clean and safe water to meet human needs. Tiwari (2001) asserted that coal mining also has a negative effect on the quality of water. During the process of mining, a huge amount of acidic water is discharged which allows environmental contamination through surface and groundwater contamination (Tiwari, 2001).

The growing movement of people from rural to urban areas and an increase of the populace in developing countries more particularly in Sub-Saharan Africa means more demand on the existing water system (United Nations, 2000; Hamdy et al., 2003; Moe and Rheingans, 2006). Furthermore, this also leads to illegal connections to the distribution systems where there is limited distribution infrastructure in which many systems have cracks and high leakages which pollutes and worsen the situation in terms of water provision where water quality becomes more polluted problematic (United Nations, 2000; Moe and Rheingans, 2006). One can say that there is an inverse relationship between the available resources and increase in population. As the population increase, the ability of the available resources to satisfy the increasing population decreases (UN, 2000). Furthermore, it can be said that this situation creates problems of reaching

the point where people have no choice but to do whatever it takes to get what they want which in this case is water.

This might also be the reason for drinking poor water in my area of study because when people have no choice they do anything to get what they want. There is poor water for drinking however, people drink water with cows in the river. Such a situation exacerbates unfavourable condition within the communities such as the unlawful installation of water supply resources, which worsen the situation. The limited resources available for water supply are less than the population due to urbanisation and increase in the population. The study reflects a constancy issue of an increase in the population growth and the increase in demand for water as the period of time increases. This means that the population growth is occurring among the global population, it can be said that this problem persists to exist. One can argue that the population is still increasing and water is still going down which is an alarming problem. However, according to (Falkenmark and Rockström, 2010), administration procedures which intensify manageable water use more competently and limiting population growth is necessary for sustainable development.

A shared vision for accountability of local, national, and international governments, industries, and other governments are necessary for successful energetic water management. There is also a need for an understanding of demographic power to implement effective policies, which result in reduced population growth. This means that effective policies of water use, voluntary preservation measures in water management plans and effective distribution mechanisms for improved water management are essential for sustainable development. Furthermore, one can say that participating in determinations that slow the amounts of population growth through increasing access to energetic water management can help ensure that sufficient water is available for global food production, ecosystem health, and political and social stability.

## **2.6 Possible Solution on the challenges of Water Provisioning: An International perspective**

According to (Miller, 2006), reclaimed water and recycled water help in advocating for sustainable ways to enable an alternative water resource, which intends to improve water resource management and long-term supply of high-quality water within the globe. This refers to the treated municipal and industrial water due to a high rate of demand for an alternative source of water to satisfy water needs such as irrigation, industry, non – potable and potable water use for achieving the objectives of water conservation (Asano, 1998). It emanates from the international high demand for water and water scarcity around the globe due to overwhelming

droughts and reliance on a single source of water supply (Miller, 2006). This implies inadequate conservation of the current measures to resolve the issue of water scarcity.

## **2.7 Challenges of Water Provisioning in Africa**

Asano (1998) and Vörösmarty et al. (2005), see Africa as much more than simply a dry continent with pressing water problems. This means that African countries including my area of study in Mbulwane where people continuously experience drought. Furthermore, it can be said that there is little or no rain on the continent and thus, people are experiencing water shortages where there is limited or no water supply due to drought (Asano, 1998). From this perspective, Vörösmarty et al. (2005) used an example that approximately 75% of all Africans live in the arid and semiarid regions of the continent, twenty per cent of all Africans live in areas that experience high inter annually climatic variability with exposure to restricted freshwater supplies. A new paradigm is necessary to guide water use and management in this new decade, for example, Domestic Rainwater Harvesting (DRWH) (Kahinda, Taigbenu and Boroto, 2007).

Falkenmark (1989) suggests that three Groups of Countries East Africa, North Africa and South Africa in which the Water shortage is reaching shocking dimensions. According to Tropp and Jagerskog (2006), the Middle East and North Africa are amongst other African countries undergoing a scarcity of Water for survival. Allan (2002) cited by Tropp and Jagerskog (2006)), notes the country essentially experienced water shortage long in the '70s and currently it relies on external sources of water through food importation (Tropp and Jagerskog, 2006). This implies societal and commercial impacts on those who largely depend on subsistence farming for survival, thus a decrease in water leads to an increase in poverty.

Likewise, water supply condition in Eastern Africa amongst others like Ethiopia, Tanzania, and Kenya is not different from the general situation of developing countries as a whole (Abay, 2010). As of 2004, national water scarcity estimates that Ethiopia is at only 37% of water scarcity mainly of any country around the globe, the problematic issue of water supply is profoundly embedded and multi-dimensional in Africa (Abay, 2010).

Gordon, Nukpeza, Tweneboah-Lawson, Ofori, Yirenya-Taiwiah, Ayivor, Koranteng, Darko and Mensah's (2013a) study on access to water in Ghana reveals the water resources vulnerability. According to Gordon et al., (2013a) the water policy of Ghana wishes to attain a well-organized and operative administration system for the supportable improvement of water resources and to adopt complete socioeconomic well-being for present and future generations.

Among others, the principle of the basic right of all people to safe and adequate water to meet basic human needs guides Ghana's water policy (Gordon et al 2013a). The principle of acknowledging water as a limited and defenceless resource, given its multiple uses and the principle of the polluter, pays, to serve as a disincentive to the uncontrolled discharge of pollutants into the environment. However, in various circumstances, rules are satisfactory but then again, they are not followed to or applied. This has mostly been due to a lack of official capability or administrative obligation (Gordon et al., 2013a). For example, (Gordon et al., 2013a) suggest that access to safe drinking water fluctuates from 50 to 84%. The poor and underprivileged people in rural areas experience unequal access to safe drinking water than the people in urban areas. However, many of the people are residing in rural areas, with agriculture being the most essential livelihood. The authors estimate that rural families drinking safe water from boreholes, pumps, or piped water taps amount to 53%, then 83.3% residing in the urban area. They add that 51% of the poorest people have access to safe water in contrast to 73% of the least poor have access to safe water.

Ashton (2002) cited by Turpie, Marais and Blignaut (2008)) believes that South Africa is the most persistence water scarce resource country in which the annual accessible water for everyone concerned is 500 m<sup>3</sup> and 1000 m<sup>3</sup>. Scholes, 2001 cited from Turpie et al. (2008) support the statement by Ashton, 2002 on water scarcity when he emphasizes the shortage of surface water due to high demand that in turn imported from the nearby nation-state. Ohlsson, (1995) adds that South Africa's water scarcity hinders peace and harmony towards the smooth flow of social development policy track in the context of the developing countries capacity thus; intimidate the social wellbeing of Southern Africa. This is worsened by pressure which challenges the government to face with enamours increase in population growth, land scarcity and water resources constraints (Ohlsson, 1995).

The above-mentioned countries are more dependent on farming to satisfy their growing population furthermore, they also depend mainly on water security to ensure sufficient crop production and the maintenance of farming produce. This is the most significant issue in such a way that the countries can even rely on exporting agricultural products to feed the growing population on a subsistence level with water scarcity growing to an extent that by 2025 it will face with the level of absolute water scarcity (Abay, 2010). All of them depend on water security for high-level agricultural yields or may even have to import food to feed their populations on a subsistence level basis, and they will all have arrived at absolute water scarcity by 2025 (Ohlsson, 1995).

In the year 2000, Kariuki, Collignon, Taisne, Valfrey and Plummer (2003) projected that in Africa more than one in three African's inhabitants are experiencing a lack of adequate access to better-quality water supplies. According to Vörösmarty et al. (2005), 64% of Africans depend on water resources that are inadequate and highly inconstant. Where existing, river corridor flow is life-threatening in enhancing local overflow, decreasing bearings of climate changeability, and refining access to freshwater. An important element of cropland resides in Africa's driest regions, with 39% of the irrigation not maintainable. Kariuki et al. (2003) argue that the continuous misuse and water pressure are extraordinary for 25% of the population with a further 13% facing drought-related stress. Water stress for the huge Africans remains threatened, replicating poor water infrastructure and service, and small intensities of consumption. The increase in water consumption could diminish limitations on economic development, pollution, and challenges to human health (Vörösmarty et al., 2005). Thus, the above-mentioned data helped the study to identify the likely challenges and to identify alternative ways or possible solutions to deal with the matter effectively, therefore, answer the research question and objectives of the study.

According to Tropp and Jagerskog (2006), groundwater is an unseen difficulty, from the time when various nations remove extra than the costs. This makes irrigated agriculture more vulnerable to hazardous factors and results in the imposition of salt water right next to the sea. Fragile ecological legislature results in groundwater contamination, which in turn underestimate its value (Tropp and Jagerskog, 2006). Sometimes, in some cases, the regulations on water quality do not impose specific guidelines on the quality of water during disposal, therefore, contaminated water with chemicals are used in groundwater and thus, pollutes groundwater (Tropp and Jagerskog, 2006).

### **2.7.1 Causes of Challenges on Water Provisioning in Africa**

According to Machethe (2011), urbanization and population growth, although roughly sources of water scarcity are natural, others are affected by social interaction. Lack of sufficient water can be the results of human behaviour, for example, population growth and urbanization can hinder the sustainability of water available for consumption. The population growth will increase at a high rate in 2020 by 50% rate (7.9 billion), although Africa is indicated that it's presently urbanization is growing faster and by 2020 it is anticipated that above 50% of the population in Africa will be living in urban areas (Machethe, 2011). Thus, more than 30% of the residents in urban areas currently lack access to adequate water services and facilities (Kariuki et al., 2003). Likewise, the urban water region in many developing countries is experiencing severe

restrictions in realising the objectives to make available sufficient water sustainably to all urban residents in Zambia, Ethiopia, Nigeria, Ghana, Malawi, Senegal, Tanzania, and Mali. Lack of water supply is amongst the complications that necessitate more consideration and accomplishment. Numerous approaches are necessary to make water available to all populations. However, due to inadequate constructions accompanied by a vastly growing population and urbanization, the breach concerning the demand and supply of water continues to expand (Abebaw, Tadesse and Mogues, 2011).

USAID Administrator, Brian Atwood, recently said, "Collapsing societies and unsuccessful government with their political conflicts and less stable refugee movements have imaged as the utmost threat to global stability (Ohlsson, 1995). The fire of unsuccessful government is fuel by widespread poverty; increased populations; food uncertainty; ecological deprivation; and unbalanced and unfair administrations". Buzan (2008) notes that a "more compound risk to the populace can stand up from human immigration. This intimidation works largely at the communal level, predominantly once the arriving populace is of a diverse traditional or cultural standard from those previously occupant. It can also work in the financial and ecological segments if new arrival overloads a breakable atmosphere or contest for limited means in peripheral desert lands." The author adds that this uninhibited exponential development and undertaking of the social populace dwellings stresses on the costly, farming capabilities and water properties. This can result in the kinds of war recognized by Homer-Dixon (1994), but more characteristically of the group-identity and relative-marginalized types.

According to Ohlsson (1995), water scarcity in developing countries from arid regions extends to a universal limitation on water provision. Moreover, water scarcity preservation cannot be isolated from the population development policies and approaches in place (Ohlsson, 1995). Experiential indication occurs that ecological deprivation, emphasized by populace development and scarceness, can generate bulk migrations of societies not capable to sustain 70 themselves in their home grounds (). Within Southern Africa, the relocation of drought-affected refugees from Mozambique to Malawi and Zimbabwe in 1992 is a recent example (Arnestrand and Hanson 1993). The controversies for water is at its most life-threatening in arid drainage basins that also have rapid populace growths and the main degree of war because of this can be anticipated to emerge from Africa (Falkenmark, 1986). In fact, it is important that it is between the emerging nations that all forceful fights concerning the population feature have taken place (Leroy, 1986). Falkenmark (1990) summaries one problematic of special significance to a forthcoming examination of the extreme water scarcity that will grow due to an alarming increase in

population growth, in which the anticipated water scarcity is more likely to cause risk factor to the semi-arid districts where many river systems are common between numerous republics. Ohlsson (1995) measured this in a new SADC study, which demonstrates that by the year 2025, both Malawi and Tanzania will fall below the life-threatening point of reference of 0, 07 hectares of cropland per capita in 2050 together with Lesotho, Mozambique, and Swaziland. This is the main standard that is the starting point away from which countries cannot support themselves; they are reliance on accumulative efforts of in cooperation to fertilisers and irrigation (Ohlsson, 1995). The implication of this point of reference to a dissertation grounded on the underlying principle of 'virtual water' is that the financial prudence of certain of the countries in Southern Africa is centred on an affluence type of agriculture. According to Homer-Dixon (1994) “this implies that the more decrease in food production is the more increase in migration thus, an inverse relationship between the decrease in food production and an increase in migration. Thus, unintended exterior evolving hindrance influence industrialized financial prudence”.

Furthermore, these unintended exterior evolving hindrances can probably affect negatively from a 'virtual water' based approach (Ohlsson, 1995). He further argues that population growth within Southern Africa has a positive relationship with both water scarcity and land availability, when the population increases, more water is consumed which leads to water depletion. Leroy (1986) suggests a model that illustrates the impact of population growth on international relations. The important point to note is that this model tries to explain that international repercussions of population-resource shifts in certain countries are fully appreciated when comparing them to the other states in the same competitive system (Leroy, 1986). The county alignment of circumstances, therefore, turns out to be central, when the entirety of the countries are facing related complications (Leroy, 1986).

The central impact of speedily emergent inhabitants on water resources is that it diminishes the liberty of self-determination between accessible opportunities and preferences, by reducing the existing water (Falkenmark, 1986). In the example of the Southern African region, the population of most countries anticipates doubling in the next 20 - 30 years (MacDonald, 1990). The author states this should bring a call for special attention to the problem, as this period will take some countries beyond the 'water barrier' from where retrieval by means of existing ranks of expertise is not likely to happen. As both MacDonald (1990) and Arnestrand and Hanson (1993) seriously advised, the foreseeable population growth in sub-Saharan Africa is, therefore, to be expected to execute a severe tension on water resources in the next two decades regardless of any unexpected decline in productiveness amounts, which indicates little chance of happening in the current

conditions. (Ohlsson, 1995) postulates that Southern Africa, with only some 2% of the worldwide populace, estimates to contribute about 6% of the global population growth by the year 2050 (Ohlsson, 1995). Jacobson (1988) brings together the notion of an 'environmental refugee' to state that this set of emigrant individuals has become the largest on its own in the world, precisely where they relocate owing to the forces of reduced access to basic resources. Hudson (1996) discusses 'ecological refugees' an aspect which can cause a war over already scarce resources, resulting in regional disagreements. This trans-boundary consequence is the cause of the fact that many ecosystems include national borders (Leroy, 1986).

Government limitations apart from reasonably rare circumstances where strong government interests are joint with high organizational abilities are mostly absorbent to human movement (McNicoll, 1984) creating this a certain regional difficult. Buzan, (2008) concurs by means of declaring that even though international immigration is well ordered in philosophy through the putting into practice of migration guidelines and principles by government, practically very limited countries can successfully stop their borders. After an extensive investigation, Homer-Dixon and Percival (1996) determine that ecological inadequacy can contribute to people movements, economic decline and weakened states, which in turn can cause a sequence of socio-political complications.

## **2.8 Causes of Challenges on Water Provisioning in East Africa**

According to Eriksen, Brown and Kelly (2005), during climate change, East Africa experiences heavy rain and drought that in turn exacerbate socioeconomic constraints caused by poor agricultural produce due to water scarcity. For example, in the two case studies of Tanzania and Kenyan, the author revealed that the population in East Africa experienced heavy rain and drought that eventually led to a poor harvest that resulted into excessively small income and reduced selling opportunities. Thus, from this study, it is evident that there is a positive relationship between water scarcity, poverty, and hunger, furthermore, the lower the water provisioning the more malnutrition and ill-being will be, as the healthy nation will cease to exist. The study by (Eriksen et al., 2005) indicated that the two case studies in Tanzania and Kenya revealed that during the 1996 drought crop disasters and incidence of food insecurity took place as results of drought caused by global warming. The two locally applicable displays of reduced consumption were the reduced meals (two or less meals a day or meals reduced in quality) and school dropout rates (which increase as children are employed in coping strategies or due to lack of funds to pay fees) that took place due to lack of participation in coping mechanisms food production failed. However, the case study also revealed that the population that had access to

salary or transfer of funds during the 1996 drought tended to be affected less negatively in terms of access to food, school attendance, or both. Twenty-nine per cent (29%) show the difference concerning the degree to which families affected during the 1996 drought in Mbitini and Saweni, respectively.

Thus, some alternative ways or coping strategies is critical in managing climate change stress as a possible solution to the above environmental stress. This indicates severe poverty and livelihood constraints more particularly to underprivileged people in rural areas and other regions where their livelihoods are deep-rooted in agriculture for survival. The study by (Kaiser, 1989) similarly witnesses this as he postulates that there will be a rise in prices because of climate change in relation to the deterioration of the overall production. Therefore, climate change is not just an environmental issue, on the other hand, it is a development issue, therefore, there is a solid relationship between sustainable development and climate change mitigation (Palut and Canziani, 2007).

Pollution results to the vital elements such as reduced access to clean drinking water and sanitation, which in turn reduces the effective quantity of freshwater available for human use (Leroy, 1986). Poor water infrastructure and delivery systems turn into water pollution, which in turn leads to public health problems that cause existing restrictions to water provision, economic and social development (Vörösmarty et al., 2005).

A study by Marshall (2011) pointed out five causes of water challenges, which includes droughts, floods, a lack of water supply management, the contamination of water, and population growth. However, there are similarities in this study by Marshall (2011) and the study by Eriksen et al. (2005) in which they both see climate change and drought as one of the factors, which hinders water provision in East Africa. Furthermore, the study by Marshall (2011) correspond with, the study by Vörösmarty et al. (2005) in which they both see pollution as one of the causes of challenges in water provisioning in the East African continent.

The study by Marshall (2011) revealed that the global warming is one life-threatening feature-influencing food production in Kenya due to the drought that results to the limited water for irrigating crops for that reason; millions of Kenyans are incapable of producing their harvest and retain their farm animals in good health. The study revealed that agriculture in Kenya form a measure of complex livelihood activities adopted by Kenyans households in which production sector functions as the basis of income and subsistence food production. This was regardless of its significance and application for poverty alleviation and development. Quite many boundaries

in the literature go through such as severe drought due to climate change. This also comprises of a slight manufacturing subdivision, which functions as the basis of income and subsistence food production, however, in acknowledging the significance of limited water for irrigation to preserve water for other use, the possibility for the non-farming economy as part of expanded income and livelihood strategies in conjunction with agricultural activities is necessary (Marshall, 2011). The problem of present and upcoming development approaches is, therefore, to go "away from farming," to recognize the suitable components of an incorporated strategy that best supplement the fundamental role of a better linked agricultural sector to limited water availability (Leroy, 1986).

Both the study by Kariuki et al. (2003) and the study by Abebaw et al. (2011) agree with the study by Marshall (2011) on urbanization and population growth as the sources of water scarcity. The study by Marshall (2011) revealed that due to an increase in population growth in Kenya, there is an additional adverse influence on the right to safe water for all. According to the World Bank (2010) cited from Marshall (2011), approximately 23 million of the inhabitants in 1990 were residing in Kenya however, in 2008 the population increased to almost 40 million people because of migration. Consequently, there is a lesser amount of accessible water available. Marshall (2011) notes that in Kenya, more people migrate from the rural to urban areas and thus, the population is projected to increase more to the urban areas soon. For example, in 1990 the population of Kenya in the rural areas decreased by 82 per cent to 78 per cent in 2008 (Marshall, 2011).

Marshall (2011) points out the incapacity to conserve clean water in Kenya as one of the main cause for the deteriorating of the water crisis in Kenya. Many Kenyans consume boreholes to acquire local water and use pit latrines that are frequently close by in distance to the boreholes. This causes contamination of the wells because the bacteria come from the pit latrines to the wells. The wells need not be located right next to pit latrines, however; it has a duty to be in distanced areas from pit latrines, which however is the opposite in overloaded urban shantytowns. Moreover, the case study was undertaken by Elizabeth, Wambui, Kimani-Murage and Ngindu (2007) cited by Marshall (2011) also revealed that about 34 per cent of the respondents in the study said that pollution is caused by children dropping filthy substances into water birthplaces. Of these, 24 per cent report that people use unhygienic containers when fetching water from the water sources. 19 per cent revealed that the domestic animals also contaminate water sources through excreting around. Finally, about five per cent reported washing clothes in water source by the inhabitants as another cause of water contamination.

According to Marshall (2011), attendance of water management in Kenya, demand for financing, improvement, and administration of water resources have been an issue due to population growth and increasing demand of agriculture for the growing population. However, all these measures have failed; the National Report of the state (2006) in Kenya revealed that failure was due to maladministration of water resources through the country's unsustainable policies regulating water in Kenya Marshall (2011). According to the State Report (2006), poor water provision and an increase in population growth is a course of failure and the growing degradation of rivers, lakes, wetlands, aquifers, and their catchments.

Marshall (2011) proposes that Kenya undergoes floods due to climate change with heavy rain in various regions of Kenya. The Maximum portions of Kenya consist of two rainy periods in the year that is March to May (long rains) and October to November (short rains). According to a report of the Government of Kenya (2001) cited by Marshall (2011), in addition to annual local floods, the nation-state also suffered serious floods in 1961 and in 1997/1998. Thus, the situation is growing more and more despite mitigating factors to eliminate the status quo.

## **2.9 Possible Solution for Causes of Water Provisioning in Africa**

Policy shift from national self-sufficiency to an industrially based regional political-economy

Ohlsson, (1995) appeal for some alternative user-friendly ways to water management that will allow water resource availability for water provision more particularly to the disadvantaged people. For example, Ohlsson (1995) calls for a possible restructuring of the agricultural and industrial sectors to move away from the conflict generating strategies of increasing water supply alone ('supply side management'). This can be achieved by making a policy shift away from favouring traditional uses of water for marginal agriculture. Based on the paradigm of national self-sufficiency, where the 'returns to water' are low, to an industrially based regional political economy that is more spatially balanced (Leroy, 1986).. Where the 'returns to water' are higher, the increased wealth generated can allow for the importation of 'virtual water' inherent in heavily subsidised cereals readily available on the international market. Brooka and Saade (1997) maintain that water is essential for food security, and is referred to access to sufficient high - quality nutritional to lead active, in good physical nature of lifespan. This is mainly factual in developing countries. Societies with improved access to water are likely to experience nutritional problems (Leroy, 1986). If water is a basic component to food security, the absence of it can quantify the foundation and the basis of food shortage and malnutrition, more particularly in regions and every place where individuals and societies count on agriculture for food and

earnings for a living (Brooka and Saade, 1997). Moreover, inconsistent precipitation and cyclical variances in water accessibility are able to result in short-term nutritional deficiencies; the overflow of water is also able to affect some of the utmost demanding food advents negatively. The accessibility of water fluctuates mainly through countries. Making the best use of it can be able to build up agricultural productivity (Brooka and Saade, 1997). Msangi, Sulser, Rosegrant and Valmonte-Santos (2007) mention that access to water and food security a combined demonstration that integrates procedures of water resources access, ecological issues, and the burden on resources.

The main product that is consumable from irrigation is more than the maximum production that produced from the rain-fed agriculture (Msangi et al., 2007). On the other hand, irrigation is costly and outside the earnings of small-scale farmers in developing countries. Irrigation can also result in water groupings or salinization, once the land harvests a smaller amount instead of more food. Even though there are problems in agriculture, irrigation seems likely to be effective or successful in the future in increasing food productivity and security, on condition that it is dealt with more competently. (Msangi et al., 2007).. Batchelor, Rama Mohan Rao and Manohar (2003) contend that the right to food is not negotiable. Between now and 2030 the global populace is projected to increase by 2 billion people. Providing food for these emerging people and dropping deprivation will be probably only if agricultural products can be improved meaningfully and viable. By means of considerable water on earth being utilised for agriculture, it is clear that the enhancement in the administration of agricultural water turns out to be fundamental into the accomplishment of international food security. DeFries, Rudel, Uriarte and Hansen (2010) support that the global population growth will have need of about 50% more food by 2030 equated to 1998. In the last 30 years, food production has been greater than before by more than 100 per cent (Msangi et al., 2007).

#### **2.10 Possible Solution on the Challenges of Water Provisioning in West Africa**

According to Gordon et al. (2013b), the upcoming engagements to deal with water scarcity should integrate population growth and development demand on resources by all countries within the Volta Basin. This is done by means of the unforeseen in continuing modifications in climate statistics and temporary inconsistency, emphasis must be engaged on enhancing the capability to be able to face with the yet to come likelihoods through the dropping of present exposure of the society and communities to climatic variability and extreme events, and the use of potential changes. Putting into practice of many procedures, such as effective water administration,

decrease in water demand and practice, new approaches for drought- and flood-resistant farming, and the practice of proper and reasonable supervision practices, will all contribute to the decrease in the effects of the negative impact for average temperature on water resources (Gordon et al., 2013b).

### **2.11 The Fundamental Regulations for Water Provision in South Africa**

South Africa consists of three legislations governing water provision namely, the Constitution of the Republic of South Africa, 1996, the Water Services Act, 108 of 1997 and the White Paper on Water Supply and Sanitation Policy, 1994 (Thompson et al., 2001).

#### ***The Constitution of the Republic of South Africa, 1996***

The Constitution of the Republic of South Africa, 1996 Chapter two of the Constitution of South Africa 1996 contains the bill of rights that is the foundation of social equality in South Africa. Section 7(2) of this constitution clearly articulate that; it is the government's duty and obligation to obey these this right through the realization of its objective in the bill of rights(Thompson et al., 2001). This constitution also preserves equal right. Section 9(1), (2), (3), (4) of this constitution also protects a person from unfair discrimination irrespective of, ethnic group or social origin thus, everyone is equal before the law. Furthermore, section ten of this constitution protects the right to human dignity (Thompson et al., 2001) and this constitution also preserves the right to health care, food, water and social security. According to Scanlon et al. (2004). Subsection two of this section articulates that the government is obliged to ensure that all these rights are fully and effectively realised. Section 74 (2) (c) of the Municipal Systems Act, 32 of 2000, as amended, entails that the municipality must deliver basic services over a variety of steps. For example, the Free Basic Water Policy was adopted by South Africa in 2000 in order to provide sufficient water for all its citizens. In terms of the policy, the mandatory water quantity per month is six thousand litres per person which makes the quantity of 25 litres for everyone each day within the family of eight and the least possible distance is 200 meters (Hall, Leatt and Monson 2006:58). This establishment is directed to the underprivileged people. The Municipalities govern this provision by having an indigent policy in place for people who qualify to fill the necessary form for them to get a rebate (Msangi et al., 2007).

#### ***The Water Services Act 108, of 1997***

The water services Act 108, of 1997 is responsible for the rights of access to basic water and sanitation. Furthermore, this Act also ensures the establishment of Weatherboards and water

services committees. The rights of access to basic water supply and basic sanitation that will guarantee the atmosphere that is not detrimental to society necessitate a responsibility to be recognized and realized. In terms of section 3(1) of the Water Services Act, 1997, every single individual has the right of accesses to basic water supply and sanitation. Subsections 2, 3 of this section stipulate that water services institution must ensure the successful achievement of this e-right. Every water authority must in its water services development strategize and be responsible for the means to accomplish this right. Water provision must be non- discriminatory and justifiable the provision of water must be fair and equitable to the beneficiaries. Section 4 (1) (2) of the Water Services Act 108, of 1997, makes it clear that water services must be provided in accordance with terms and conditions set by the water services provider. These environments need to be available to the community. Subsection (2) (C) provides for the conditions for payment, tariffs and the circumstances under which water services may be limited or discontinued must be made public to the citizens. The water panels and the water services authorities, as well as their jurisdictions, are clear in the stated in the above Act. The Water Services Act 108, of 1997, states, "every water services authority has a duty to all consumers" to provide water which is free from contamination. The water services experts include; the national, provincial and the local government. Conversely, about the Water Services Act, 108 of 1997, the obligation is with the local government to make water available to the people inside its region.

Everyone has a right to access to clean water Republic of South Africa 1996 Act 108 of 1996. In consequence, DWAF by means of guiding principle introduced the water supply and sanitation programme in 1994 with an intention to realize this constitutionally enshrine the right of access to sufficient water and healthy environment for all with the focus on the rural area. Moreover, the Free Water Policy was put into place in July 2001 and in 2004 approximately 155 of the 170 water service experts appealed to be providing Free Basic water. The objective aimed at in 2004 remained at 70% of the populace even though the concrete measurement of the entire population attended was 65% this reveals a slight underperformance (Burger, 2008). In 1998, the legislation approved the National Water Act of 1998. The Act intentions are to regulate and the use of water resources as well as safeguard them from pollution, obstruction, and exploitation. Moreover, to guarantee that every person has equitable access to them, to incorporate the administration of surface water and groundwater (Burger, 2008)

The implication of these guiding principles and Water Acts is to guarantee that the water service excess that occurred when the different constitutionally nominated government emanated to control is pointed out and that water provision must be a worldwide right and not for the special

few as it was the case in the apartheid regime. The serious implication of these policy frameworks is to address the inequalities of the past with respect to delivery of water resource to all citizens.

### ***The White Paper on Water Supply and Sanitation Policy***

According to Muller (2012), Prof Kader Asmal announced this White Paper, MP Minister of Water Affairs and Forestry in the Republic of South Africa, This White Paper was made known to the public since water and sanitation were because they were essential to the RDP development. Over 12 million people lacked access to basic water and sanitation. On July 1, 1994, a new department called the Department of Water Affairs and Forestry imaged. South Africa remained separated into eleven various homelands, six self-governing regions, and the main RSA region, administered by the tri-cameral parliament. In addition, all this took place just before the Department of Water Affairs and Forestry came into being. Water supply matter was to be addressed instantaneously after jobs and housing. The Republic of South Africa regrettably was experiencing inequality in water supply and consequently, the introduction of the White Paper on Water Supply and Sanitation was taking place. Towards the end of the nineteenth century, people were still experiencing severe inequality in terms of water supply services in South Africa. According to Machethe (2011), piped water supply, for instance, was between 95.4 and 100% for the Indians, whites and coloured. Only 43.3% of the black community had piped water to their households.

The maximum quantity of water in South Africa for that period was catered for white commercial agriculture, on the other hand, Section C of the of the Water and Sanitation Policy indicates that basic services together with the provision of water are a human right. In terms of the constitution of South Africa, 1996 everyone regardless of colour, race, and gender are the same before the law. For that reason, everybody is eligible to free basic water supply (Affairs and Forestry, 1994). In relation to the White Paper on Water Supply and Sanitation Policy (1994:14-15), the free basic water supply is well defined as 25 litres per person per day. This measures the least possible prerequisite for direct use, for the preparation of food and for personal hygiene. The least possible distance is 200 meters. The accessibility of water from the channel must not be less than 10 litres per minute (Msangi et al., 2007). The consumer of the water services must pay for this service. The South African government also embark on funding the underprivileged people that could not afford required payments (Msangi et al., 2007).

The misunderstanding that may perhaps come out about the government support may be that everyone irrespective of the poor or rich, people might all want to benefit from the government.

These may possibly turn out to be a problem for the department (NWA, 1998). The white paper is also responsible for the role of water panels as; acting of managers or representatives of DWAF at the provincial level (DWAF, 1998). The roles assigned to the water boards are the improvement of water supply and sanitation facilities at the regional level. The local water committees play a supportive role to the local democracy (Affairs and Forestry, 1994). The role of the national government is to make sure that, what is taking place at the grassroots level meets the average. Therefore, the role of central government is monitoring, performance auditing and regulating functions. Furthermore, it is vital to associate women in all constitutional organizations, in the water segment as well as local water committees. It is in this white paper that the controlling of drought and other disasters is underlined.

The white paper control irrigation boards because the historically, the South African water development was focused on irrigation and massive public assets were assigned to the development of water resources for the possessors of appropriate agricultural land. The owners of land started a very small amount of the population (Affairs and Forestry, 1994). In conclusion, this white paper inspires development that is demand driven and community-based. Monitoring and auditing are still within the authority of the central government (Affairs and Forestry, 1994). Provincial government improves and advances local government and local government implements. The water boards may also be responsible for services straight to the users in the nonexistence of local government. To accomplish the objectives of this white paper, a united common undertaking of government, the private sector, NGOs and the communities is stimulated (Affairs and Forestry, 1994).

According to Gleick (1998), section 27 of the constitution of the Republic of South Africa offers a right to health care, food and social security. Likewise, Gleick (1998), supports the statement on the South African Constitution (Act 108 of 1996) in Chapter 2 of the bill of rights and Section 24 that enshrines the right of everyone to have an environment that is safe to their health or well-being. Section 27 emphasizes the significant right that everyone has the right to have access to sufficient food and water and Social security, including appropriate social assistance. On the other hand, an unreserved commitment of the government responsibility or an obligation to make available health care, food and water service delivery are in demand. The right to water condition point towards the states obligation to provide basic services merely to individual's components of the population deprived of the resources to guarantee the right to have health care, food, water and social security (Gleick, 1998). However, those who have resources by now indeed do have

access to health care, food, water and social security, as they can manage to pay for them, and therefore are not entitled to these services from the state.

Section 27(2) stipulates that the government needs to proceed with law-making and supplementary procedures, contained by the constitution to accomplish the progressive realisation of these rights. The constitution ensures accountability for instantly recognizable regulation as to the implication of adequate water. More significantly, to the concept of the quantity and quality of water for each of the single individual entitled to access and the significance is thus far to measure by a South African court of law (Gleick, 1998).

According to Bond and Dugard (2008), despite legitimate rights South African poor people are not fortunate to enjoy the equal rights on access to water as rich people. The authors argue that the rights have to consider that they are not far-reaching, and an argument relating to the restriction of such rights is consequently justified. Hence, the basic right to have access to water and liberties are not absolute. Their limitations are set by the rights of others and by the legitimate needs of society (Bond and Dugard 2008).

The residents of Phiri Township in Johannesburg people are required to connect prepaid meters (Bond and Dugard 2008). The authors believe that this is unconstitutional and unlawful because it allows water disconnections to the poor communities where a "user" with a conventional meter "fails to pay the amount due to the provision of water services will be discontinued. This policy automatically discriminates against large poor households in which only the rich people must enjoy adequate access to water provision (Bond and Dugard, 2008). Likewise, the South African government employed the free basic water (FBW) policy in July 2001 to ensure that all South Africans had access to a basic amount of safe water by 2004 (Conteh, 2008). However, the FBW provision does not ensure the fundamental water supplies and special water necessities of most low-income households (Conteh, 2008).

Low-income families need additional kilolitres than the 6-kb portion and are therefore expected to pay the full price for their water service. According to the affordability crisis has not been addressed as tariff structures and cross-subsidization mechanisms remain inadequate. Bond and Dugard' (2008) study shows the negative relationship with the existing systems within the country of South Africa, which is not the kind of market-friendly rights relationship or system that preserve poor people in water poverty. Furthermore, based on the confirmation of Bond and Dugard (2004) there is a need for an alternative approach and thorough examination to the existing policies that constitutionally-guaranteed human rights and look at the South African

Constitution as the enhancement of human dignity and the realization of equal opportunity on access to free basic services. This helps to achieve the objectives of the study to describe the causes of water shortages and answers the question on the main challenges of water provisioning in the study. Moreover, it answers the question over the possible solution to ensure adequate water provision. This also corresponds with the ideas postulated in the background of this study that although policies are in place and as good as, they are, people's right to a reliable water supply is not yet realized. The administrative system fails to implement, develop and manage water resource to ensure that this constitutionally enshrine right is observed.

The argument below highlights the challenges facing urban and rural development and the supply of basic services such as water and sanitation in developing countries in general and South Africa. This is regardless of policy, lawmaking and institutional restructuring that has taken place since 1994. The current underperformances in the delivery of basic services enquire the root of policy origination and carrying out. The consequential complications approximating the short supply of basic services such as water, sanitation, and the rapidly increasing of informal settlements in urban centres are often testified to poor policy implementation. These obstacles question the natural surroundings of relationships water and sanitation policies. The degree of incorporation and management in the implementation of such policies thus come to be open to discussion. This study is, therefore, an attempt to examine the challenges and its causes in the provisioning of water as the basis of the study.

## **2.12 Challenges of water provisioning in South Africa**

Lack of water is the worldwide challenge. South Africa is not an exception to this, about 9.7 million (20%) of the people lack sufficient water supply (Kahinda et al., 2007). This means that many regions within the country such as Mbulwane area fall under this challenge of a shortage of water supply. Regardless of the new policies that were established in 1994 where South Africa entered a new era with the aim of ending apartheid and the rise to power of a democratically elected coalition led by the African National Congress (ANC). The new policies of the ANC focus largely on redressing inequalities. In 1996, a similar approach guided the country's new constitution, using the language of human rights extensively and devoting the entire second chapter to a "bill of rights". Section 27 stipulates, "(1) everyone has the right to have access to sufficient food and water." Sub-section (2) adds that the state must take reasonable legislative and other measures, within its available resources, to achieve the progressive realisation of each

of these rights. This means that all persons are created *equal* and therefore shall be *equal* before the law it can be said that, this right obliges governments to ensure that people can equally enjoy clean, available, acceptable, accessible, and affordable water irrespective of their race, gender, ethnicity, national origin, disability or any other characteristics, without privilege, discrimination, or bias.

### ***2.12.1 Causes of Challenges for water provisioning in South Africa***

#### **Failure of rural groundwater schemes to deliver acceptable quality drinking water to consumers**

Mackintosh and Colvin (2003) see the failure in the rural groundwater schemes to provide adequate quality drinking water to the users as a matter of concern, which persists to occur as it, has happened in the past in more than a few areas of Southern Africa. It can be said that the country is being overwhelmed by the seriousness of the water quality issue because this is what people want. Furthermore, there is an unsatisfactory situation of the most significant water quality challenges in the long term. The 1991 investigation of the entire Transkei ruling party water-supply schemes, revealed that only 10% of the water supply scheme was functional for the provision of acceptable quality and quantity of water Ravenscroft and Cain (1997) cited from Mackintosh and Colvin (2003). Many of the earlier 'homeland' regions remain the legacy of inadequate provision schemes. Thus, it can be said that this study might be able to answer the research question on the causes of challenges in water provision.

#### **Population growth, Industrial development, Economic growth and the Change in Lifestyle**

Kahinda et al. (2007) argue that water scarcity problem exists all over the place in the world due to various needs such as agricultural produce and industrial produce to satisfy living and non-living organism around the world. For example, about 70 per cent of water consumption is for food making (Calzadilla, Rehdanz and Tol, 2010). It can be said that due to the water scarcity problem, there is less or no agricultural food products available. This means that more poor and unemployed people like in Mbulwane area are experiencing hunger, poverty, and lack of healthy nutritional food. Water scarcity problems alone can cause more problems such as sicknesses in people's lives due to unhealthy lifestyles and more money for transport fees and medical treatment. This means that the more water available the more poverty is alleviated in terms of hunger, malnutrition and well-being.

According to Schröter (2013), demand for water is projected to grow due to an increase in the population growth, economic growth and the change in lifestyle propelled by advanced developed individual wealth. This will increase pressure on water resources as economic activity motivates water demand straight through agricultural irrigation or indirectly through the production of electric power (Schröter, 2013). Mbulwane is more dependent on agriculture for food production and farming thus, if water scarcity problem persists to exist it means that there will be more poverty and no means for survival. Moreover, the Mbulwane community relies on community vegetable gardens as an income activity and for consumption. One can argue that there will be more demand for food, which exacerbates an increase in prices, yet there will be no means or income to buy healthy and nutritional food. This means that more poverty is approaching Mbulwane area if there will be no alternative ways to deal with the major challenge of water scarcity. Schröter (2013) argues that there is pressure on water scarcity due to population growth, economic development, industrial development as well as a change in lifestyle. It can be said that any growth and development within the community put more demand for the limited available resources which is water in this case.

### **The inequity of apartheid segregation and segregation of people according to their income class and race**

As a result of background, owing to the legacy of apartheid and the very unfair legacy of economic development, South Africa is the second largest unequal country in the world (after Brazil) (Bond, 1999). Only 27% of African households have running tap water inside their residences, only 34% have access to flush toilets, and only 37% have their refuse removed by a local authority (Bond, 1999). Rural African women are furthest affected by such backlogs; however, with established cost-recovery systems to sell water and electricity to low-income households will result in only a slight advance. It can be said that there is a number of people who are water-poor and poor in governance and institutional capacity to manage water. Furthermore, one can say that the inequalities in water delivery have an emotional impact between water users today and exacerbate social marginalization (Bond, 1999). This situation is not different from the situation in Mbulwane area where people are water scarce. Mbulwane community also suffers inequality due to poor communication in governance and the poor institutional capacity to manage water. There are some persistence restrictions by the racial, economic, or social constructions that hold and repeat dominant power relations (Bond, 1999).

In order to break this cycle of sidelining or judgemental, the way in which liberal policies are employed requires a different approach by the state so that confidence can be implanted. Integration of some basic aspects of socio-economic cost-benefit analysis into investment decision-making: More time and resources for women (Bond, 1999). Failure of policymakers to incorporate into investment administration some of the basic aspects of socio-economic cost-benefit analysis which cover amongst other factors more time and resources for women, developmental, ecological and geographical factors is severe distress (Bond, 1999).

Indeed in South Africa, as elsewhere in the emerging world, women are the most important homemakers and caregivers hence, the benefits of infrastructure and service delivery are disproportionately felt by women likewise, the problem of unsatisfactory standards of infrastructure also fall upon women (Bond, 1999). This means that the component of time savings from better-quality infrastructure is more significant particularly to women as the time savings due to the closeness and accessibility of better-quality water source could lead to a healthier circumstance and welfare for every person together with the poor and marginalised such as women and children (Bond, 1999).

However, Bond (1999) believes that there are some features to women's utilisation of time that can be improved by infrastructure investments and service delivery, such as time spent in water queues that could otherwise be directed elsewhere if proper infrastructure was in place. One can say that more emphasis has been placed on the quality of infrastructure however; there is often a lack of a serious note on the quantity for water use and preservation.

### **2.12.2 Possible solutions**

#### **Breaking down geographical barriers and reducing segregation of people according to their service delivery and income class within the continent.**

According to Bond (1999) Deepening South Africa's democratisation process will to a large extent depend upon breaking down geographical barriers to the people more particularly the poor and marginalised, as well as reducing segregation of people mainly according to their gender, race and income class considerably. Furthermore, the state intervention on investment spending, which comprises of better-quality preservation of public assets and the delivery of basic household infrastructure, mainly, the provision of high-quality infrastructure that keeps in mind sufficient flexibility to allow improvement of individual household standards is essential.

*Provision of basic household improved infrastructure*

This means that the element of time savings from improved infrastructure is more significant particularly to women. Time savings due to the nearness and availability of an improved water source could lead to better family health (Bond, 1999).

#### *Environmental protection and conservation*

Regarding water treatment, most local water researchers stress the importance of carefully managing South Africa's limited water resources, warning that water pollution is already a serious problem (Bond, 1999). Furthermore, Bond (1999) postulates that poor water quality not only affects South Africa's ability to continue to provide clean drinking water to a growing population, but the ecosystem as a whole suffers from a lack of biodiversity. The major environmental hazards associated with low service standards – and the benefits associated with improved standards should be taken into account before policymakers make decisions.

### **2.13 Conclusion**

This chapter provided a conceptual framework introducing the key concepts used in the literature. The chapter also explored two theoretical frameworks that form the basis of the study namely: Social Justice and Human Right to water. This chapter reviewed the challenges, limitations, and setbacks towards access to clean water. This review was necessary to establish whether there is, in fact, an inter-relationship between the challenges and causes of those challenges in the international and national perspectives as well as in the area of study, and if so, what is the nature of that relationship.

## **Chapter 3: Research design and methodology**

### **3.1. Introduction**

This chapter outlines how data was gathered for the study. It also gives an account of the research design and sampling techniques used, as well as the data collection tools. Furthermore, data analysis and the ethical consideration followed in carrying out the same. This study was grounded on social constructivism. The researcher employed the qualitative research approach. The study population was 10 municipal workers, 1 councillor and 463 community members. In this research, non-probability sampling, particularly purposive sampling, was used to choose only five participants. The study employed data collection methods namely: Interviews and Document analysis. Data from interviews were scrutinised by employing thematic analysis. Data from documentary sources were analysed through content analysis. This particular research sought to eliminate risks through the observance of various ethical considerations.

### **3.2 Philosophical Grounding of the study**

This study was grounded on social constructivism. Andrew (2012) refers to social constructivism as an approach to qualitative research which stresses the socially constructed nature of reality based on the meanings people attach to their experiences and therefore, subjective in nature. This is relevant to the study because the main aim was exploratory in nature and required the researcher to build a close relationship with specific local people and local stakeholders of Mbulwane area who had some knowledge of the area. This enabled the researcher to understand the number of challenges (causes and possible solution) that underpin the delivery of water services in rural communities of Mbulwane (Stebbins, 2001). The research questions in this study asked the following questions: What is water provisioning. What are the main challenges in water provisioning in Mbulwane area at uMvoti municipality? In addition, what could be done to ensure adequate water provisioning? The researcher employed the social constructivism approach because it is subjective in nature, and is based on what is real about water challenges of Mbulwane area. Jenner et al. (2004) are of the opinion that qualitative research refers to the worldview from the point of understanding of the participants in the study and it seeks a better understanding of social reality. It is therefore interested in the everyday routine and the construction of social reality which tend to pursue the subjective meaning of reality (Jenner et al., 2004). When looking at the definition of constructivism approach and qualitative method, they both share common characteristics, what links them together is a kind of data collection method they employ. According to Crouch and McKenzie (2006), in order to gain knowledge

and understanding of the research being studied during the process of data collection, the researcher must be deeply involved in the field through a qualitative or exploratory approach to research and engage with participants.

The investigator employed one of the common techniques called in-depth interviews, which enabled the interviewer to genuinely discover the participant's world's views on the number of challenges, which influence the provisioning, causes and possible solutions to the causes of water in rural communities at Mbulwane. This involved an IDP manager, water-engineering officer the ward councillor and two community members from the area of study.

This helped the researcher to gain a close relationship between the study populations. Furthermore, it means that judgment and generalizing of the findings to the community members were not done in this study, which eliminates bias and promotes accuracy in the study in order to ensure the validity of the results being studied. Thus, the researcher used a constructive approach because the study followed a qualitative approach to collect data. The researcher gained an understanding of how social experiences are created and given meaning and this called for the understanding of the processes (Andrew, 2012). The researcher in the study obtained an understanding of the worldview. The implication of social construction in this study enabled the researcher to listen and understand the world on water issues as the individuals within the community understand them.

### **3.3 Research Approach and Design**

The researcher employed the qualitative research approach. The methodology that was used in this study was a qualitative research approach, which was conducted through fieldwork because qualitative research design examines facts on life experiences. The information was obtained through interviews. According to Sale, Lohfeld, and Brazil, (2002), qualitative research is not independent of the people being studied but instead, it emphasizes the significance of socially constructive nature of reality. Therefore, using qualitative research methodology in this study enabled the researcher to engage to the people's lives experience, the investigation into the meanings people make of their experiences, learning a person in the situation of his or her societal background and also to investigate where it is hard to build up the same tool. This method was chosen for the reason that it is a suitable technique to answer, for example, the question on the causes of challenges in water provisioning and the possible solutions to these problems. This

enabled the researcher in the study to recognize the nature of the research problem and to get understandings from the people themselves as to what are their perceptions in relation to the problems explored. Thus, the qualitative approach contributes to the building of research knowledge as this research methodology require researchers to observe and interview in order to interpret phenomena (Sale, Lohfeld, and Brazil, 2002).

### **3.4 Study population and sampling**

Kumar (2011) define the study population as a group of people living in the same area in which the researcher selects the sample. The study population was 10 municipal workers, one councillor and 463 community members (2011 census statistics). Kumar (2011) also define sample size as the group of participants from which the researcher obtain information to be studied, sampling design or strategy is defined as the way of selecting people to represent a large population and the sampling frame is defined as a list identifying each student, family or elector (Kumar, 2011).

In this research, non-probability sampling, particularly purposive sampling, was used to choose only five participants in total to be used for data collection in an effort to gather and compile data from the people being studied. Welman, Kruger, and Mitchell (2005), referred to purposive study as the most significant type of non – probability sampling in which the researcher’s focus is based on experiences in the study, it is a sampling technique in which the researcher in the study relies on his or her judgement when choosing a sampling frame to participate in the study. This means that the researcher decided to choose these participants on purpose simply because of the belief that they were the kind of people who were required in this study based on prior information which is qualitatively generalizable, such as that they were involved in the community as ward councillor, area officers from the local municipality and the community members.

Thus, purposive sampling assisted the researcher in this study to identify possible answers to the challenges of water provisioning from the local municipality perspectives as a service provider for water to the community and from the community members. The researcher in the study chose the small representatives who were put into two categories. The first category was the Key Informants consisting of the uMvoti municipality with two municipal officials namely: an IDP manager and water-engineering officer, the second category consisted of the community members a ward councillor, one man, and one woman. This means that in this study, the sampling

frame that the researcher chose was based on their knowledge and professional judgement about the challenges of water provisioning in Mbulwane.

Tongco (2007), suggest two main possibilities of setbacks when conducting the purposive study in which the first one is biased because the study is completely grounded on the researcher's judgement. Secondly, the reliability of the study is not guaranteed particularly if the study were to be repeated by another researcher.

### **3.5 Data Collection**

There are two data collection methods that were employed to collect data in this study namely: Interviews and Document analysis.

#### **Interviews**

A meeting in which one or more person have a dialogue with another person for reasons is called an interview (Kumar, 1999). The researcher chose this method because it enabled the researcher in the study being conducted to develop a dialogue between the researcher and informant to gather valuable information about the respondent's views on the challenges of access to water provisioning at Mbulwane. Furthermore, it enabled the researcher to feel that the data collected was true, honest and original by nature because of the face-to-face interaction with the participants. Finally, this method was suitable for this study because it assisted the interviewer to make use of an interview guide (see Appendices A, B, and C) which lists of questions that were to be covered during an interview. Thus, this is more relevant to the study since it enabled the researcher to provide a clear set of instructions for interviewees and provided reliable and comparable qualitative data which enabled the researcher to answer the research question in chapter one.

#### **Document Analysis**

Document analysis is a form of qualitative research in which the researcher brings together several relevant codes and reviewing them in order to understand business analysis area of study (Maree, 2007). Likewise, when the researcher analyzes a document it is significant to recognize the content, its implication as well as integrating them into the research being studied (Alasuutari et. al., 2008). Thus, this method is suitable for this study because it enabled the researcher in the study to get all the information acquired and to give meaningful data about an evaluated subject. Moreover, this helped the researcher to cite the applicable portions that were considered as a

testimonial to validate individual research objectives. Finally, this approach to qualitative data analysis also enabled the researcher to eliminate the research bias through the uses of a document analysis worksheet (see Appendix B).

### **3.6 Data analysis**

Data from interviews were scrutinised by employing thematic analysis (Mogalakwe, 2006). According to Maree (2010), “thematic analysis allows a researcher with qualitative method and design to develop themes and a code, use a check on the consistency of judgment”. In this research, it was essential to decode the data given by participants and appraisals into themes and to pursue forms of connotations. Since the materials collected were in the form of written words, those words were grouped into meaningful categories or descriptive labels, then organised to compare, contrast and identify patterns. First level coding was done to reduce the data to a manageable size. Before beginning the coding process, the researcher formulated basic domains that categorised a broad range of phenomena, for example, setting, types of activities, events, relationships and social structure, general perspectives, strategies, process, meanings and repeated phrases.

Data from documentary sources were analysed through content analysis. This included texts from policy statements, Acts of Parliament, public speeches, peer-reviewed journals and civil society reports. Deductive content analysis was used to analyse these texts. Deductive content analysis is used when the structure of analysis is operationalised on theory testing (Mogalakwe, 2006). The researcher developed a categorisation matrix and coded data according to categories. After developing a categorisation matrix, the researcher reviewed all the data for content and coded according to identified categories.

### **3.7 Ethical considerations**

Participants were given relevant information about the risks or harm that could arise from participating in the research. The purposes, procedures, risks, potential danger and consequences of research were thoroughly explained to the participants. Participants of semi-structured interviews could exercise voluntary consent, retaining the option of refusing to take part in the research or terminating involvement at any time. Participants were informed that they were being recorded, and the recorded conversations and field notes were being kept in a safe place. The study ensured that participants were not exposed to any undue physical or psychological harm. The study also tried as much as possible to protect the anonymity of the research participants and

the confidentiality of their disclosures by obtaining consent for the release of any personal information. Participants' information and responses shared during the study were kept private and results were anonymously presented to protect the identities of participants. All research transcripts were kept in a safe box as soon as the research was complete. This study was conducted following the issuing of an ethical clearance certificate by the College of Humanities, University of KwaZulu-Natal.

### **3.8 Conclusion**

This study was grounded on social constructivism. The researcher employed the qualitative research approach. The study population was 10 municipal workers, 1 councillor and 463 community members. In this research, non-probability sampling, particularly purposive sampling, was used to choose only five participants. The study employed data collection methods namely: Interviews and Document analysis. Data from interviews were scrutinised by employing thematic analysis. Data from documentary sources were analysed through content analysis. This particular research sought to eliminate risks through the observance of various ethical considerations.

## **Chapter 4: Research Findings and Discussions**

### **4.1. Introduction**

The focus of this study is to discuss findings from two different categories. The first category is the uMvoti municipality with two municipal officials namely; an IDP manager and water-engineering officer, the second category is community members, which comprises of Ward councillor, one, and one woman. The information was obtained through interviews in both categories based on the qualitative nature of information about the challenges of water provision. This study found that water-provisioning challenges are water scarcity where the quality and quantity of water in Mbulwane is very poor. The results of the study show that the challenges of water provisioning in Mbulwane are partly caused by climate change, population growth, human behaviour, poor governance and water contamination. Recommendations on domestic rainwater harvesting (DRH), groundwater utilisation and community empowerment, improved dispersion of infrastructure, concrete government approaches, and local rainwater harvesting (DRWH), community empowerment and environmental change were made to improve the water situation in Mbulwane.

### **4.2 Research Participants**

#### **4.2.1 uMvoti Municipality officials**

According to Jiménez and Pérez-Foguet (2010), the human right to water propels the state accountability at a different level. Thus, this study would not be appropriate in the absence of the municipality as one of the government spheres at a local level. The initial data collection for the water provisioning survey was carried out to the officers in a study area called uMvoti Municipality, starting with the officials of Mbulwane at uMvoti Municipality. These two municipal officials were an IDP manager and water-engineering officer. Interviews were made directly by visiting the experts in their offices. The research participants such as uMvoti Municipality officials who are the Integrated Development Plan (IDP) Manager, Water engineering officer, Mbulwane Community Members who are the Ward Councillor and Local Women and Men were interviewed to obtain information, which is discussed below, see items 4.2.1.1, 4.2.1.2, 4.2.2.1 and 4.2.2.2.

#### **4.2.1.1 Integrated Development Plan (IDP) Manager**

The Integrated Development Plan (IDP) is a method of planning future development in a specific area or ward. The IDP manager is one of the interviewees that was free, confident and willing

to talk to the researcher in this study. He is the local municipal officer with eleven years of experience who possess the required skills of managing the overall process of this IDP for the development of the municipality (Saldanha Bay Municipality, 2011). Involving these officers was relevant for the study to gain detailed information that helped the researcher in the study to provide a sustainable solution to water quality and availability (Appendix A).

#### **4.2.1.2 Water engineering officer**

According to Mays (2010), a water resource engineer is somebody who design processes to conserve water. Moreover, engineering comprises of the activities that deal with repairs, maintenance and construction of infrastructure. Thus, the water-engineering officer has the ability to communicate professional information to the researcher with detailed information on water problems in Mbulwane. Please see Appendix A, for the interview schedule. This officer has five years' experience in water engineering field at uMzinyathi district municipality, which is responsible for ensuring the provision of safe and clean water at Mbulwane. Therefore, involving this municipal water-engineering official in this study enabled the researcher the opportunity to be well equipped in understanding the structure of drinking water supply systems including water treatment, maintenance, and distribution in Mbulwane. Furthermore, this helped the researcher to gain an insight into water quality criteria, standards, and their relation to public health and the environment. This also enabled the researcher to share information pertaining to this and to consider gaps and take action to remedy problems

#### **4.2.2. Mbulwane Community Members**

Unstructured interaction was also held with the citizens of Mbulwane to gain insight from their perspectives about water service provisioning in their area. In other words, the qualitative information about the challenges of water provision was conducted into two categories. The first category is the above-mentioned one which consists of the uMvoti municipality with two municipal officials namely: an IDP manager and water engineering officer. The second category, which is currently presented, consists of the community members, which comprises of a ward councilor, one woman, and one man. The information was obtained through interviews in both categories.

#### **4.2.2.1 Ward Councilor**

According to Wilson and Game (2011), a Ward Councilor is an elected local political leader who advocates for the local people in his or her jurisdiction, which can be held increasingly accountable to local users, stakeholder groups, and communities. This means that the ward councillor is an elected community representative with more information and ideas of the community experiences on the provision of basic service delivery such as water service provisioning. Therefore, the involvement of ward councillor in this study assisted the researcher with information and understanding of the needs and the views of the community on water provisioning, please see attached annexure A2 for the interview conducted with her.

#### **4.2.2.2 Local Women and Men**

Gender inequity is the main challenging concern around the globe in which women and girl child are the centre, however, the poor and marginalised rural women are the most vulnerable ones yet traditionally, men are less if not at all vulnerable to this occurrence (Koch, 2011; Prakash, 2003). Thus, involving both the local men and women in this study allowed the researcher to gain information that is more relevant from experienced participants of the study. Moreover, this helped the researcher to successfully gain detailed information based on experiences they have as local people around the issue of water provisioning at Mbulwane, which helped the researcher to hunt detailed facts and further investigation around the matter, concerned (McNamara, 1999).

### **4.3 Findings of the study**

This section presents the data collected from the respondents, it covers analysis as well as discussions of the findings presented in their sub-categories that is a description of water provision, challenges, causes of challenges and possible solution to the problem with quotations of what respondents said where necessary. Please note that the findings of this study were firstly analysed and discussed then finally, possible solutions to the analysis and discussions of the findings were discussed at the end. The findings connect to the research questions that guided the study. The aim of this study was to look at the challenges of water provisioning facing the community in the area of Mbulwane and the possible solution to address the matter. The interviews were conducted guided by interview schedules (Appendix A, B, and C).

## **Water provisioning in Mbulwane**

### **Data collected to address sub-question 1**

#### **What is water provisioning?**

The aim of the first sub-question was to describe water provisioning and the current situation pertaining to the provisioning of water in Mbulwane area. The participants' response is presented and compared to the literature in this section.

#### **Data collected through literature**

In Chapter two Moe and Rheingans (2006) defined water provisioning as a method for service delivery in development, which plays a major role in poverty reduction and in humanizing the lives of the poor and marginalized. However, the (United Nation, 2000) pointed out that provision of water for consumption is hindered by various factors of water that results in water shortages such as water contamination, environmental effects, human behaviour, agricultural practice and other factors that impacts negatively to the quality of water. Although the water provisioning is in the centre of the state since the years of democracy (Debbané and Keil, 2004), dealing with water service delivery to cover the imbalance of the past is still a challenge which needs special attention; For example, over 20 million South Africans lack access to water and sanitation. This is contrary to the social justice and fairness theory adopted in this study because it infers a ceaseless hardship of the privilege to water, as the essential need shown in the constitution (Keck and Sikkink, 1998). Based on the findings from the theories in this study, it is also not fair that people do not have access to water resources for survival. (Tisdell, 2003) because it is a fundamental requirement for survival, however, this is a right, which has not yet been realised. This lies to the government measure to realise this right of access to water for all. This is in line with the findings of the study by (Brownlie and Goodwin, 2010). And the findings on the study by (Mehta *et al.*, 2014).on the human right theory presented in the study, the provision of access to clean water has become a human right internationally and nationally with an intention to have established water quality guidelines for potable water supplies, thereby defining standards for management processes to meet (Grady *et al.*, 2014).

The consideration of water as a human right contained in General Comment 15 of Committee on Economic, Social and Cultural Rights of 2002 is one of the major elements, which enforce

government to protect this right (Scanlon, 2004). Regrettably, clean water for all is a goal that has not yet been fully realized, in which according to social justice theory it is not fair. Water provision is one of the present and future increasing pressure throughout the globe that requires the most urgent interventions at international level, it is estimated that about 80 per cent of the world's population is vulnerable to water shortage (Vörösmarty et. al., 2010). According to Lick (1998), the provision of water is highly considered as the most important resource for survival. However, based on the findings from this study, human right and social justice theories have not been addressed. The study by Kusi et al. (2015) pointed out that in 2006 Sub- Saharan Africa suffered the most with an estimated 800 million population living in Africa, 300 million live in the water-stressed environment. Furthermore, the findings presented at the 2012 conference about water insufficiency in Africa estimated that about 75 million to 250 million would be living in water stress environment by 2030 (Kusi et al., 2015).

### **Data collected through interviews**

The participants in the study were not asked directly the question of defining water provisioning in an attempt to address sub-question 1 however, the researcher in the study asked the respondent about awareness of water provisioning. The respondent automatically addressed sub-question 1 *what is water provisioning*. In addition, described the current situation of water provisioning in Mbulwane as well as subquestion 2 *the main challenges in water provisioning in Mbulwane area in the uMvoti municipality*? The asked question aimed to obtain a deep understanding of water provisioning in the area of study.

*"Water tank supplies us with water only once or twice a month if we lucky enough and if not it does not come even once furthermore, we have drought in this area which resulted to poor or no water from the boreholes, tap water, Grey town water dam and other water sources more especially in dry seasons such as winter. The rivers which make the water tank driver be unable to collect the water from the river due to lack of water and contamination in the rivers, even to those with tap water in their section of the area they do not get water every day maybe three times or nothing per month" (Appendix C).*

These findings contrast with the theory of social justice and fairness theory presented in this study. Findings by McDonald et al. (2010) reveal that social justice means equal access to safe and clean water furthermore. They reiterated that no matter what human right of access to water

should be realised, it does not mean that due to water shortages, environmental problems or poor water infrastructure people must not drink water, however, this requires the state accountability to provide adequate water for all (Langford, 2005).

This is also witnessed in response to the question of water provisioning challenges by another interviewee.

*“Drought due to seasonal, water pollution and insufficient rainfall also exacerbate water problem” and “Currently, there is only three water tank allocated for fourteen wards due to financial constraints which is the reason for the area being not well served or provided with water (Annexure A1)”*

The findings from this study reveal the difficulties faced by the Mbulwane community to access safe water because of water shortages and unpredictable water sources. This study found that for many households, there is no option but to rely on the alternative sources of water that are not safe, however, this means that to those who do not have an alternative source they are at high risk of not getting water at all. This information gave a detailed nature of water provision in Mbulwane, the experiences, the meaning attached to water provision in Mbulwane thus, contribute to the knowledge of the current situation for water provisioning in the area, and the meaning attached to that. This also addresses the gap to be closed in the near future. Therefore, the objective one presented in chapter 1 as, *to describe water provision* has been addressed in the above discussion. It also helped the researcher to learn more and get a deep understanding and knowledge for the researcher in the study to carefully think about the possible solution to the problem.

The information gathered from the literature was in line with the responses made by the respondents in the study in which lack of water provisioning was due to various factors such as water contamination was identified. The above-mentioned factors confirm that water provisioning to the people is of a serious concern affected by various factors that need special attention. Thus, the sub – question1 presented in chapter 1 as, *what is water provisioning* was addressed in the above discussion. The confirmation that Mbulwane is experiencing a serious problem in water provisioning was provided. Moreover, the country as a whole has a major concern on this issue of water provisioning (Debbané and Keil, 2004).

## **Challenges of water provisioning in Mbulwane**

### **Data collected to address sub-question 2**

*What are the main challenges of water provisioning in Mbulwane area in uMvoti municipality?*

The second sub-question intended to ascertain the fundamental challenges of water provisioning in Mbulwane area that affects water quality and availability. The sign of acknowledging the challenges of water provisioning in Mbulwane area is necessary to adopt an approach relevant to guarantee sustainability in respect of water consumption now and in future.

### **Data collected through literature**

Chapter 2 on the study by Hamdy, Ragab, and Scarascia (2003), Kummu et.al. (2010) and Forouzani and Karami (2010), revealed that worldwide populace is faced with a vast growing rise in water scarcity around the globe. Likewise, the study by Falkenmark (1989) presented in chapter two also finds the same problem suggested in three African countries in East Africa, North Africa and South Africa where the water shortage is reaching shocking dimension. The literature by Gordon et al. (2013) results also pointed to West Africa where access to water reveals the water resources vulnerability in Ghana by means of the case study (Gordon et.al, 2013). The study by Vörösmarty, Douglas, Green, and Revenga, (2005) presented in the literature also confirmed the literature in the study by Gordon et.al (2013) that about 64% of Africans depend on water resources that are inadequate and highly inconstant. From this, it is evident that all states move into a progressively worsening situation where water scarcity for consumption and needs are increasing. However, the study by Langford (2005) finds that the most affected people are the rural population in which most affected people are 80 % yet more than 1 billion people experience water shortages. Ohlsson (1995a), results in his study mentioned that in South Africa water scarcity hinders peace and harmony towards the smooth flow of social development policy track in the context of the developing countries capacity thus; intimidate the social wellbeing of the Southern Africans Ohlsson (1995a).

The study by Schewe et al. (2014) presented in chapter two of the study believes that climate change was one of the other major causes of water provision challenges. Schwete et al. (2014) projected °C of the global warming (Almost 2.7 °C above preindustrial) which is said to increase approximately 15% of the population which will results in more decrease of water due to more people living under absolute water scarcity (<500 m<sup>3</sup> per capita per year) by another 40% (Gleick, 1998). Thus, it is evident from this that climate change in the developing world is

increasing, leading to growing demands for water resources and, unfortunately, to more pollution that effectively reduces the availability of water to meet human needs. In contrast to the above-mentioned findings in the year 2011, Kenya finds poor management of water supply as a major cause of water provisioning challenges (Gleick, 1998). According to Marshall (2011), attendance of water management in Kenya, demand for financing, improvement, and administration of water resources have been an issue due to population growth and increasing demand of agriculture for the growing population.

### **Data collected through interviews**

The interviewee was asked the question about who collects water and how often they went to the source. The aim was to allow the researcher to gather information on the current situation and challenges in terms of water quality, quantity accessibility and reliability of water provisioning at Mbulwane. Please see interview schedule attaches as Annexure A3.

*"It's very hard for me as a women and to the children more particularly girl child to fetch water since 90 per cent of the area here at Mbulwane are without running water", "The ten per cent have taps, however, some taps in my area have water and some don't so I walk alone and it is very far. Customarily, we as females are the ones fetch water with children carrying 25 litres at about 2 to kilometres so; really it's very hard for us." It is worse during the dry season because we walk all over the place, no water! If one is lucky enough she will find unsafe water (Annexure A3).*

Another respondent response to the question about *who collects water and how often do they have to go to the source* said that

*"It is difficult for the women and girls because they are the one who is traditionally bound to fetch water, therefore, they walk a long distance of about 30 minutes to one hour fetching some water from the river, lakes or boreholes since men are traditionally not expected to perform housework" (Appendix C).*

Another question raised was in relation to the major factors contributing to water provisioning problems. This question was directed at gaining an insight into the other factors influencing water quality and quantity in Mbulwane.

*"The water infrastructure in Mbulwane is in the poor state. This includes faults & leaks of taps and boreholes that have been reported to the municipality but no solution to the problem, droughts caused by insufficient rainfall also exacerbate the level of water provisioning challenges"( Annexure A2).*

*"Irresponsible behaviour from the public is also a real problem in which the local people are doing washing next to clean water for drinking, vandalising of available infrastructure such as taps and Jojo tank theft and also that they do not attend local meetings that address them about water management" ( Annexure A2).*

These above-mentioned problems correspond to the problems found in the study by Falkenmark (1989) in which the same problem was suggested in three African countries in East Africa, North Africa and South Africa in which the Water shortage was reaching a shocking dimension. In 2003, Hamdy, Ragab, and Scarascia (2003), Kummu et.al, revealed the same problem in the study. (2010) and Forouzani and Karami (2010) that the worldwide populace faced with a vast growing rise in water scarcity. In 2013, Gordon et al.'s (2013) result also pointed West Africa where access to water revealed the water resources vulnerability in Ghana by means of the case study (Gordon et al. 2013). From this, a continuous movement of all states into a progressive worse situation is evident where water scarcity for consumption and needs are increasing. However, the study by Langford (2005) finds that the most affected people are the rural population with 80 % affected yet more than 1 billion people experience water shortages.

The results indicate that the issue of water scarcity in Mbulwane does not deal with the social structures of inequalities. This shows that some of the people are neglected and not paid attention to which is against fairness and justice theory. Furthermore, gender stereotype is promoted in Mbulwane an issue that affects negatively to the wellbeing of the people. The findings also revealed that marginalised women and children endure most of the water scarcity; they walk long distances to fetch unsafe water and spend more time while carrying heavy water containers. This brings a call for the theoretical framework of the study of social justice and fairness theory to be applied to cover the imbalances of the past. Mbulwane portrays a considerably gendered society where the access to water reflects historical problems of gender inequality thus, the issue of water scarcity really do not solve this kind of problem but instead, it makes it worse. The provision of clean water is, therefore, the focus in Mbulwane area. However, the results show that if rainwater could be stored, it could be used during the dry season allowing less time spent collecting water and more time on increasing food production and income-generating activities.

This study provides detailed information on the challenges faced by the rural people in Mbulwane area more particularly women and children due to water scarcity. This information helps the researcher to obtain detailed information about the challenges of water provisioning in Mbulwane area thus relevant to the study in that it makes objective number 3 *to describe the challenges in water provision* of the study to be realised. Furthermore, the information presented in the above discussion helped the researcher to learn more about challenges influencing water service delivery in Mbulwane and therefore answer the main aim of the study, which is *to explore the challenges that influence the delivery of water services in the rural community at Mbulwane area in uMvoti Municipality*. Thus, objective 4 of the study presented to *describe the challenges in water provision* in chapter 1 are addressed. Furthermore, this study also answered the research question 3 of the study presented in chapter 1 *as what are the main challenges in water provisioning in Mbulwane area in the uMvoti municipality?*

In terms of water service delivery, the state and decision makers have to provide fair share and the above discussion implies lack of justice and fairness presented as the social justice and fairness theory by Folger and Cropanzano (2001) in chapter one of the study. The implication of this theory in the study is engaging in good actions, which in this case do not apply. In terms of Social Justice and Fairness theory when the authorities fail to provide clean and safe water to the people, this means that they have to engage in good actions. It also suggests that any unfairness must be addressed through corrective measures, which take into account human right of access to clean water contained in General Comment 15 of Committee on Economic, Social and Cultural Rights of 2002. This means that government enforcement of clean and safe water for all (Scanlon, 2004). This discussion answered the research question number three of the study, which is *what could be done to ensure adequate water provisioning?*

This is relevant to the study because it has achieved its aim of the study, which is to *explore water scarcity challenges that influence the delivery of water services in the rural community at Mbulwane area in uMvoti Municipality*. Furthermore, this study has achieved its third objective by providing more information which described the challenges that influence the delivery of water services in the rural community in Mbulwane area. Therefore, by mentioning water scarcity, water contamination; high costs associated with maintaining the source for water, and the technical challenges in finding sources that are enough to serve the population in need.

The poor government has been blamed however, there are other factors that contribute to water scarcity such as seasonal rain, which causes drought thus, and climate change has been a major

factor to the issue of water scarcity. The findings show that one cannot point a finger to the government about this issue but climate change is definitely an issue.

Another respondent's response to the interview question on the *environmental challenges and climate change in water provisioning in the uMvoti area* (Annexure A1) challenged the research participant to identify the causes of water provisioning challenges revealed that:

*"There are only three water tanks to service fourteen wards under uMvoti municipality which makes the service very poor. (Annexure A1)*

*"On the other hand, the District is currently constructing the Craigie burn Dam pipeline which will service these areas since the Lake Merthley. This dam is the main water source for uMvoti municipality has limited capacity to supply water to uMvoti municipal areas including Mbulwane area in the future as it level has dropped due to droughts and insufficient rainfall due to three dry winters where there has been no rain". (Annexure A1)*

Inline to the above discussion, the findings from the study by Mackintosh and Colvin (2003) see the failure in the community water schemes to provide adequate quality drinking water to the users as a matter of concern, which persists to occur as it has happened in the past in more than a few areas of Southern Africa. This is supported by using an example of 1991 in an investigation of the entire Transkei ruling party water-supply schemes where only 10% of the water supply scheme in Transkei were found functional for the provision of acceptable quality and quantity of water (Ravenscroft and Cain (1997) cited by Mackintosh and Colvin (2003)). The rural water supply schemes were very poor in such a way that not all boreholes with wind pumps in Transkei were useful; functional schemes depended on hand pumps and springs. Many of the earlier 'homeland' regions remain a legacy of inadequate provision schemes. This might also be the case in the rural area of Mbulwane where people fetch water from the contaminated wells due to poor structures, poor maintenance or preservation of water for consumption.

## **Data collected to address sub-question 2**

### **Causes of water provisioning challenges in Mbulwane**

The aim of this sub-question is to describe the causes of water provisioning challenges in Mbulwane area in order to identify the possible solutions to the problem. This was an appropriate question to recognize to ensure a sustainable solution to the existing problem of water.

### **Population Growth, climate change, Water Contamination, and Human Behaviour and Poor Governance**

The study by Miller (2006) presented in chapter two of the study postulated that climate change is a global challenge and South Africa is not excluded from this. Climate change affects availability through droughts, which limits the rain and live drought in most dry land (Miller; 2006). A report on the Government of Kenya (2001 cited from Marshall, 2011), presented in chapter 2 confirm that climate change is a global challenge which limits water availability and lives in the country with dry land which in turn limits water provisioning due to water scarcity.

Furthermore, the study by Marshall (2011) presented in chapter two of the study proposed that Kenya experienced floods due to climate change with heavy rain in various regions of Kenya. The Maximum portions of Kenya consisted of two rainy periods in the year that was March to May (long rains) and October to November (short rains). According to a report of the Government of Kenya (2001) cited by Marshall, (2011), in addition to annual local floods, the nation-state also suffered serious floods in 1961 and in 1997/1998. Likewise, the situation is growing more and more despite mitigating factors to eliminate the status quo. In 2006 the water scarcity due to droughts caused by insufficient rainfall was also a problem which was not only a local problem however it emanated from the climate change which also existed in an international level and that put pressure on the water shortage that South Africa is experiencing (Miller, 2006).

Moreover, the literature by United Nations (2000), Hamdy, Ragab, and Scarascia-Mugnozza (2003) and Moe and Rheingans (2006), presented in chapter two of the study also revealed that more people increase more demand for water resource more particularly in Sub-Saharan Africa. In some instances, increase opportunities for illegal connections of water pipelines that result in water leakages that worsen pollution in water (United Nations, 2000). For example in (2006), Northern Africa experienced a high level of population growth due to urbanisation which then accelerated the water demand as a result, this caused a converse relationship in development and poverty reduction and also propelled the improvement of funds at a limited available fund (Tropp, and Jagerskog, 2006). Likewise, in East Africa the findings also revealed that the results on the study by Marshall (2011) correspond with results of the study by Tropp, and Jagerskog

(2006) in Northern Africa by revealing that due to an increase in population growth in Kenya, there was an additional adverse influence on the right to safe water for all. According to the World Bank (2010) cited by Marshall (2011), approximately 23 million of the inhabitants in 1990 were residing in Kenya however, in 2008 the population increased to almost 40 million people because of migration. Consequently, there was a lesser amount of accessible water available. Furthermore, Olifants, Inkomati, Thukela, Mvoti, and Gouritz were phased with water stress as the demand for water persist to exist due to population growth and industrial development furthermore, the demand for water is projected to grow due to an increase in the population growth, economies grow and the change in lifestyle propelled by advanced developed individual wealth. This will increase pressure on water resources as economic activity motivates water demand straight through agricultural irrigation or indirectly through the production of electric power (Schröter, 2013).

### **Data collected from the interviews**

The respondents were asked about *the environmental challenges in water provisioning* (appendix C). This was intended to gather information that would help to understand the environmental impact on human life and in water supply in terms of water service provision. The interviewee response was that:

*“Population growth contributes heavily to shape water requirements in this sector, it rises faster than the available water infrastructure which turns out to be a challenge to the limited available infrastructure yet the municipality is experiencing financial constraints to satisfy water infrastructure needs. People end up connecting their own unprofessional water pipe, which ends up leaking, and dirty which pollutes water. Currently, there is only three-water tank allocated for fourteen wards due to financial constraints, which is the reason for the area being not well served or provided with water. Some wards do not have infrastructure service delivery such as schools, electricity, tar roads, clinics and transport thus more people come to this ward and relocate for more civilised benefits” (Appendix C).*

Another interviewee witnessed this during an interview question on *what were the major factors contributing to the water problem, which* was allocated to identify the causes of water provisioning challenges at Mbulwane area. In response to the interview question, she said:

*“The problem is that water use has been growing at more than the available water resource due to an increase in the population which also contributed to water provision challenges, according to the Census 2016 data clearly indicated that the population has generally increased at Mbulwane area with the population of 10608, compared to 7026 as per Census 2011 data. This clarifies a growth rate of 358 per annum for the period between 2001 and 2011 yet there is not enough funds available to satisfy water infrastructure needs”(Appendix C).*

Furthermore,

*“The leakages and broken taps in the community because some of the local people do not take care of the available infrastructure sometimes they still and break them, The municipality complain of financial constraints in response to the reported leakages and vandalised water infrastructure Drought due to seasonal and insufficient rainfall also exacerbate water problem” (Appendix A).*

Evidence obtained from the literature is in line with the data collected from the respondents in the study revealed that more people within the area mean more demand for water resource availability. The study by United Nations (2000), Ragab and Scarascia-Mugnozza (2003), Hamdy, Moe and Rheingans (2006) and Tropp, and Jagerskog (2006), Marshall (2011), revealed that if it means that due to various reasons people increase more and more than the water available water provisioning becomes lesser and lesser until they finish. Moreover, this study shows a continuous increase in population year after year since the year 2000 up to 2011 the findings reveal an increase in population reported in the literature. This means that with the population expected to continue increasing in the near future, we will continue to see water quality and provisioning challenges if we do not take action now against this matter. This might be the case in Mbulwane because the findings also reveal a continuous increase of the population (*Appendix B*) at a shortage of water infrastructure available to satisfy the water demand. These are natural phenomena due to environmental problems, however, there should be some other means, the government should make a plan because, in terms of social justice and fairness theory adopted in this study, it is not fair that people do not have means to drink water and do not have water for consumption

Thus, sub-question two presented in chapter 1 as what are the main challenges in water provisioning in Mbulwane area in the uMvoti municipality were addressed in the above discussion. Therefore, the above discussion is relevant to this study.

Moreover, the information gathered from the literature were in line with the responses made by the respondents in the study in which lack of water provisioning due to various factors such as, population growth, water contamination, financial constraints were identified. The above-mentioned factors confirm that water provisioning to the people is of a serious concern affected by various factors that need special attention. Thus, the sub – question1 presented in chapter one as, *what is water provisioning?*, was also addressed in the above discussion. It was evident that Mbulwane experiences serious problems in water provisioning. Moreover, the country as a whole has a major concern in this issue of water provisioning (Debbané and Keil, 2004).

The findings revealed that there is a direct determinant of increases in water demand for domestic uses at limited resources available to satisfy the increasing demand due increase in population at economic or financial constraints. The findings show that an increase in population due to various lifestyles contributes towards water provisioning challenges. Furthermore, poor economic and financial constraints also hinder water provisioning. The above information helps the researcher in the study to learn more about the causes of water provisioning so that a sustainable solution to the problem is addressed. Thus, this discussion is relevant to the study since it addresses the second objective of the study, which *describes the causes of water shortages*.

### **Data collected to address sub-question 3**

*What could be done to ensure adequate water provisioning?*

The second sub-question intended to come out with an innovative sustainable solution to water problem faced by Mbulwane community. This sub-question was more appropriate to this study in order to allow for local level solutions to accept the shared responsibility by adopting sustainable practices.

### **Data collected from the literature**

The study by Kahinda, Taigbenu, and Boroto (2007) presented in chapter two of the study suggested the use of Domestic Rainwater Harvesting (DRH) as a means to mitigate water provisioning challenges. It stated that it offers water straight to communities and that a numerous amount of small-scale productive activities is likely to benefit from this kind of water even in rural and peri-urban areas that predictable machinery cannot supply. The study revealed the

benefit of using this proposed approach of DRH for effective quality and availability of water supply. Furthermore, it was revealed that DRH system offers water straight to communities and allows social well – being to the people through the provision of adequate water to the people (Kahinda, Taigbenu, and Boroto, 2007). The interview question asked whether *there was anything that could be done to fix the problem of water shortages in Mbulwane* (Annexure A2) and challenged the respondent to come up with possible solutions to the water problem. The interviewee response to the interview question was:

*“The government must give clean and safe water to everyone; they should give us water and ensure that they allocate enough funds to the municipality to ensure that we get clean water from under the ground through water taps, water pipes, and boreholes. Another thing is that World vision donated two water tanks to the community however, these are not enough for the whole community; therefore, the municipality should provide more to us so that we rely on them when there is no water in the river. Furthermore, the local people need to be given skills and jobs to install water pipes and boreholes so that if they break we do not wait for the municipal official to sort out the problem but do it by ourselves”.* (Appendix B)

This interview question *is there anything that can be done to fix the problem of water shortages in Mbulwane* (appendix B) challenged the respondent to come up with possible solutions to the water problem. The interviewee response to the interview question was:

*“The government must give clean and safe water to everyone; they should give us water and ensure that they allocate enough funds to the municipality to ensure that we get clean water from under the ground through water taps, water pipes, and boreholes. Another thing is that World vision donated two water tanks to the community however, these are not enough for the whole community; therefore, the municipality should provide more to us so that we rely on them when there is no water in the river. Furthermore, the local people need to be given skills and jobs to install water pipes and boreholes so that if they break we do not wait for the municipal official to sort out the problem but do it by ourselves”.* (Appendix B)

A study by the UNISEF (2000) criticized sources of water such as unprotected well, unprotected spring, vendor provider water, bottle water/ water provided from tanker trucks and employed the definition of ‘improved ’source to mean water supply from household connection, public standpipes, borehole, protected well, protected spring or rainwater collection. But in many case

studies by Tropp, and Jagerskog (2006), Marshall (2011), United Nations (2000), Hamdy, Ragab and Scarascia-Mugnozza (2003) and Moe and Rheingans (2006), there are various reasons people increase more and more than the water available until water provisioning becomes lesser and lesser. People, they have no choice but to choose alternative sources of water available, which might be the reason why some people in Mbulwane use an unprotected source of water such as rivers, streams and lakes for water consumption.

Another study by Mackintosh and Colvin (2003) presented in chapter two of the study suggested the use of groundwater to ensure sustainable water provisioning. The study postulated that groundwater is vital since there is no contamination; therefore, it provides safe and clean water to the people more particularly to the rural people.

### **Data collected from the interviews**

This interview question *is there anything that can be done to fix the problem of water shortages in Mbulwane* (appendix B) challenged the respondent to come up with possible solutions to the water problem. The interviewee response to the interview question was:

*“The government must give clean and safe water to everyone; they should give us water and ensure that they allocate enough funds to the municipality to ensure that we get clean water from under the ground through water taps, water pipes, and boreholes. Another thing is that World vision donated two water tanks to the community however, these are not enough for the whole community; therefore, the municipality should provide more to us so that we rely on them when there is no water in the river. Furthermore, the local people need to be given skills and jobs to install water pipes and boreholes so that if they break we do not wait for the municipal official to sort out the problem but do it by ourselves”* (Appendix B).

The findings on the study by Kahinda, Taigbenu, and Boroto (2007) revealed that in South Africa, the suggested measure or solution to water provisioning challenge was a Domestic Rainwater Harvesting (DRWH). It was postulated that it offers water straight to communities and allows social well – being to the people through the provision of adequate water. The challenge is there for the state, hydrogeologists and water utilisation engineers to guarantee maintainable high-quality drinking-water delivery. This can also be a useful measure in other areas with a limited water supply such as Mbulwane.

The information provided in the discussion above helped to understand a number of productive activities and innovative measures to ensure that future generations can benefit them fully. This information was relevant to this study because it addressed sub – question number three of the study as *what could be done water provisioning*. What could be done to ensure adequate water provisioning? *And objective number four of the study as to explain to ensure adequate what could be done to ensure adequate water provision as well as the main question of the study presented in chapter one as what could be done to reduce challenges to water provisioning in Mbulwane Area?* Furthermore, the results of the findings brought forward measures such as getting innovative equipment and pipelines to draw water such as water tanks and borehole innovation. The reason for all these innovations is to ensure equal distribution of water.

The Municipality must show commitment and accountability to resolve the water problem. Furthermore, the state has to assign an adequate amount of funds and resources to the water infrastructure and ensure that those affected are at the centre of their development. What has been found in this research is similar to the study by the UNICEF (2000) and study by Mackintosh and Colvin (2003) which employed the definition of ‘improved "source to mean water supply from the household connection, public standpipes, borehole, and protected well, protected spring or rainwater collection. Sources of water such as unprotected well, unprotected spring, vendor provider water, bottle water/ water provided from tanker trucks, their ratings are "not of a better-quality" thus reliance on other water sources were not incorporated. Thus, this can also be a useful measure in other areas with a limited water supply such as Mbulwane.

This interview question *is there anything that can be done to fix the problem of water shortages in Mbulwane* challenged the respondent to come up with possible solutions to the water problem. The interviewee response to the interview question was that

*“The government must give clean and safe water to everyone; they should give us water and ensure that they allocate enough funds to the municipality to ensure that we get clean water from under the ground through water taps, water pipes, and boreholes. Another thing is that World vision donated two water tanks to the community however, these are not enough for the whole community; therefore, the municipality should provide more to us so that we rely on them when there is no water in the river. Furthermore, the local people need to be given skills and jobs to install water pipes and boreholes so that if they break we do not wait for the municipal official to sort out the problem but do it by ourselves.”*

#### **4.4 Conclusion**

This chapter provided findings on water provisioning challenges in Mbulwane area of uMvoti Municipality. The analysis of water provisioning challenges ascertained that indeed the people of this community faced a huge problem due to the scarcity and limited water for survival. Findings revealed that the challenges of water provisioning in Mbulwane area is due to water scarcity, population growth, human behaviour, poor governance, water contamination and climate change which is against the theory of fairness and social justice adopted in this study.

Furthermore, the findings from the literature and from the interviews revealed that drought, due to seasonal and insufficient rainfall also exacerbate water problem. This shows that water shortage persists. Furthermore, findings also revealed that improving water sources and water infrastructure, Domestic Rainwater Harvesting (DRWH), Groundwater Utilization and community empowerment is seen as corrective measures to resolve the problem.

## **Chapter 5: Conclusion and Recommendation**

### **5.1 Introduction**

The main focus of the chapter is to discuss conclusion and recommendation based on the literature review in chapter two and information presented in chapter 4 of the study. This relates to a qualitative data presented in chapter four of the study to the literature review presented in chapter two addressed the main research question what could be done to reduce challenges to water provisioning in Mbulwane Area? And Sub-questions of the study what is water provisioning? What are the main challenges in water provisioning in Mbulwane area in the uMvoti municipality? Does this also include what could be done to ensure adequate water provisioning? While addressing these research questions I managed to define water provisioning as an approach for development, which plays a major role in poverty reduction and in humanizing the lives of the poor and marginalized (Mukheibir, 2010). According to Moe and Rheingans (2006), water provisioning is an essential element for survival. However, the World Health Organization (WHO) believes that monitoring progress on access to the provision of water and sanitation services are not consistently applied (World Health Organization, 2014).

### **5.2 Conclusion**

The findings were drawn from chapter two of the literature review and discussed in chapter four of the study. These findings were that there are poor water reliability and accessibility in Mbulwane area, there is water scarcity because of population growth, human behaviour, poor governance, water contamination and climate change. These are the major causes of water provisioning challenges in Mbulwane. Findings revealed that there is a need to improve water sources and water infrastructure; Domestic Rainwater Harvesting (DRWH), groundwater utilization and community empowerment were the possible solutions of water provisioning in Mbulwane area.

#### **Current Situation of Water Provisioning - Poor water reliability and accessibility in Mbulwane as the current situation of water provisioning**

Findings from the participants revealed that water provisioning only takes place once a month or twice a month and sometimes it does not provide water at all Furthermore, this study found that there is contamination of the water that results to poor water accessibility and that these sources are far less accessible as a results. It was also found that the users are not fully satisfied with their water supply system. This means that measures to fight against all these identified

issues should be implemented to enhance the quality, quantity, reliability, and accessibility of water. Moreover, Monitoring is recommended on the functionality of the existing and already installed community water system and where necessary money should be invested to sustain the available water system rather than installing the new one with the limited resources available to serve another purpose. Maintaining a good supply of water, keeping that water clean from pollution will reduce the cost. The findings of this study revealed that by not having a better distribution infrastructure, one that reduces water leakages, the quantity of water could not be expected to increase.

### **Challenges of Water Provisioning - Water scarcity as the challenges of water provisioning in Mbulwane area**

In line with the facts from the literature argued above it was found that water scarcity is of a serious concern that hinders water provisioning in Mbulwane and for that, inequality and ill-being resulted. The responses from the interviewees also revealed that the community members in Mbulwane are faced with water scarcity problems, which hinder water quality and availability, furthermore, the effect of gender stereotype was also revealed due to water scarcity. It was also found that women and children bear the burden of water scarcity but the rural people are the most affected people in this issue. The discussion is relevant as it addressed the second sub-question *what are the main challenges in water provisioning in Mbulwane area in uMvoti municipality*. This included the third objective of the study *to describe the challenges in water provision*.

### **Climate change, Population Growth, Human Behaviour and Water Contamination**

The findings revealed that human activities from pollution to overpopulation are driving at the earth's temperature and fundamentally, changing the world around us. Warmer temperatures also make the weather extreme, which in turn causes droughts. These changes in weather cause water challenges in that it reduces water supply, which affects negatively to the quality and availability of water for provision. It was also found that there is a continuous increase in the population in which failure to take corrective measures now to resolve the matter implies a continuous water quality and availability challenges that exacerbate water-provisioning challenges. This information enabled the researcher to understand the cause and effect of climate change and come out with a relevant solution to the problem. Thus, this discussion was relevant to the study because it addressed objective number two of the study: *to describe the causes of water shortages*.

## **Poor Governance**

Furthermore, the findings revealed that as a result of poor governance, there is less satisfaction of the basic needs of everyone in the community. Some section of Mbulwane has no running water and people who are without clean running water need to be dependent on an alternative source of water where they have to walk a long distance to fetch unsafe alternative sources of water such as rivers, lakes, and wells. The research also revealed that physically, this is not an easy task, women and children take primary responsibility for collecting water and their burden is high, they walk between two to ten kilometres a day carrying up to 25 litres on their heads. During a bad drought, they have to walk up to twenty kilometres looking for water in their areas and when they get water, the water they find is unclean and a threat to health. Moreover, fetching the water is a time-consuming task in which the burden remains with females the most due to gender inequity, which persists to exist in the area.

## **Water Contamination**

Other findings revealed that water contamination is one of the challenges, the municipality does not feel responsible for maintaining water infrastructure with commonly reported incidents of water leakages and pipes damages that results into water contamination through muddy drinking water. Moreover, some of the local people owing to lack of responsibility cause ecological complications. These problems include messing up of water with mud, soap etcetera, blocking of water pipes and poor attendance at public meetings. Droughts were also reported as a major cause of water provisioning because of seasonal and insufficient rainfall due to climate change.

## **4. Possible Solution to water provisioning challenges**

### **Domestic Rain Water Harvesting (DRH)**

Findings revealed that the local people at Mbulwane are threatened by local water shortages and inequitable access to water. The growing population and new lifestyle increase more demand for water and at the same time, there is limited water available to satisfy water demand. Thus, strong government measures or strategies such as Domestic Water Harvesting to store and distribute water to local people in times of crisis to help vulnerable communities in times of droughts and problems that might occur is recommended to deal with the issue concerned. Thus, findings revealed that the utilization of household water collecting could enable take to the weight of the brought together water supply to take care of the expanding water demand.

## **Ground Water Utilisation**

The findings reveal that groundwater is the most important source of fresh water on earth and it remains a hidden resource. The findings revealed that Mbulwane often has insufficient water to use below the ground; this is due to climate change, which then exacerbates the level of drought, as well as population growth, which continues to grow in times of limited water resources available. The results also revealed that with the draughts there is less surface water, which then leads more people to depend on groundwater for water consumption. Thus the significant concern is the acknowledgement of water scarcity in Mbulwane which requires careful management to enable provision of basic water services and equitable. Proper management of groundwater, in African countries, can ensure that it benefits many generations to come.

## **Community Empowerment**

The results show that, for the community members to be effective, they have to be empowered and ensure their involvement in water governance. In this regard, the local community members have to be assisted to participate fully in the process, which will make them manage the limited, and scarce water resources effectively use them equitably and in a sustainable manner. Furthermore, if water infrastructure such as community water tanks and Jojo tanks can be made available through government support to the community rainwater could be stored, it could be used during the dry seasons of droughts allowing for more water available to the community. This information is important in the study because it provides the researcher with possible solutions to be implemented to mitigate the water problem. Thus, this discussion is relevant to the study because it answers the main research question of *what could be done to reduce challenges to water provisioning in Mbulwane Area*.

## **5.3 Recommendations**

Based on the findings of the study, the water situation in Mbulwane is very poor. It is on this basis that the study recommends the following for all and sundry: local people, municipality, and government at large:

### **Improved dispersion of infrastructure**

Actions to combat against all these distinguished issues ought to be actualized to upgrade the quality, amount, dependability and availability of water. In addition, Monitoring is suggested on the usefulness of the current and right now introduced network water framework and where

fundamental cash ought to be contributed to maintaining the accessible water framework as opposed to introducing the better and brighter one with the restricted assets accessible to fill another need. Keeping up a decent supply of water, keeping that water clean from contamination will lessen the cost. Findings of the study highlight that by not having a superior dissemination framework, one that decreases water spillages, the amount of water cannot be relied upon to increment.

### **Concrete government approaches**

Concrete government approaches on methodologies, for example, residential rainwater keeping to store and conveyance of water to the community is recommended in case of emergency to help powerless people in times of dry seasons and issues that may happen in worldwide markets are suggested. Furthermore, close creation frameworks in which poor neighbourhood networks depend on should be supported and reinforced. In any case, none of this would be conceivable should solid and proactive government directions and approaches that should be embraced fail to receive different measures/procedures that were previously proposed and received by a number of people in times of droughts.

### **Local Rain Water Harvesting (DRWH)**

Solid government measures or methodologies, for example, Domestic Water Harvesting to store and disseminate water to the community in times of emergency is recommended. This is necessary to help defenceless people in the midst of dry seasons.

### **Community empowerment**

In order to take care of the issue of water shortage, as women are the defenceless people, their inclusion in basic leadership is exceptionally required. Training women on their rights with the goal that they know how to fight against any injustice and for their rights will help them to go far towards enabling them and their community members later on. Community knowledge is imperative. There is in this manner the need to manage shameful acts of injustice that socially, financially and substantially minimized females through regulations, which aim to diminish imbalance and enhance prosperity. It was demonstrated from the findings that sexual orientation is performed in terms of water it thus makes sense that there is a need for change in how young men and young women are raised so they can all participate in gender-neutral activities.

## **Public participation**

The water problem is a collective issue that requires a collective solution to the problem. Thus, shared reasoning that will train individuals about the significance of water conservation, raising awareness enlightening community, agriculturists and businesses regarding the hugeness of water saving condition and sheltering them from contamination is recommended. This could assemble a superior associated and engaged society, which empowers straightforwardness and trust in the quest for collective objectives. The growing populace and a new way of life increment more interest in water provisions and more resources to deliver. This implies that if the nation is not taking care of this in future this will require more water assets. Thus, it is recommended that public organizations, common society, and local gatherings must meet up and work in tandem with each other.

## **Environmental Change**

It is recommended that people should maintain natural resources for living and future generations. Industries should use less water and recycle in order to maintain groundwater levels.

## **Ground Water Utilisation**

Groundwater strategies are recommended in the study concerned, the focus is on supplying water mainly for household use in remote rural areas such as Mbulwane area, where levels of water services are often unacceptable, as well as in other situations where groundwater can contribute to the reliability of supply for domestic. The results show that achieving this goal will require major investment inadequate infrastructure, the protection, and restoration of water-related ecosystems such as in order to mitigate water scarcity.

## **5.4 Chapter summary**

This study discussed the challenges of water provisioning in Mbulwane area at the uMvoti municipality, the research found out that the water situation in Mbulwane area is very poor. The community members experience poor water quality and quantity in which water is scarce and limited due to poor infrastructure, population growth and human behaviour which is irresponsible, blocking of water pipes, water leakages, owing to lack of responsibilities.

Seasonal and insufficient rainfall also exacerbates poor water quality and quantity due to climate change. It is on this basis that the study recommended community empowerment; improved distribution of infrastructure, concrete government approaches public participation as well as environmental change mitigating factors. The researcher believes that these recommendations could improve the water situation in Mbulwane area.

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