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A Global Overview of Potable Water Resources Availability and Accessibility In Southern Africa

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ABSTRACT
This paper argues that there is sufficient freshwater in the world for everyone's essential personal and domestic needs. However, lack of distribution networks and working systems to extract groundwater or harvest rainwater; exclusion from these services or facilities; inequitable allocation of water resources; and pollution, limit people's access to sufficient clean water. In rural areas, many people collect water of dubious quality from unprotected wells, often a great distance from their homes, deterring them from collecting sufficient water. Toilets are often seen as unnecessary or unaffordable. In urban areas, low-income groups often lack access to adequate water supply and sanitation. Piped water supplies and sewers seldom cover informal areas. Water stress and scarcity are symptoms of sub-standard governance of public and natural resources. Lack of basic services is often because of mismanagement, corrupt and apathetic officials and financial limitations. Water shortages and increasing pollution are socially and politically induced challenges. The water crisis is increasingly about how we, as individuals, and as part of a collective society, govern the access to and control over water resources.
Key words: potable water, availability, accessibility, governance, corruption, mismanagement

1. INTRODUCTION
This paper is mainly an overview of potable water supply governance in southern Africa based on both theoretical literature review and empirical evidence. However, it is difficult, if not impossible to discuss water supply issues without touching on its cousin, sanitation. In fact they are two sides of the same coin and heavily affect each other. The methodology used was largely qualitative research based on documentary analysis and personal observation.

2. WHAT IS POTABLE WATER?
Potable water is a common pool natural resource for which everyone is responsible. The commodity is highly delicate and vulnerable to pollution and contamination. As such it has to be handled with a high degree of care. The Oxford advanced learner's dictionary (1995) defines water as, 'a liquid without colour, smell or taste that falls as rain, is in lakes, rivers, seas, and is used for drinking, washing'. Therefore, if water starts smelling and showing colour it means it is contaminated and no longer qualifies to be water in its pure and natural sense.

According to Cap-Net (2009), 97% of global water is sea water and therefore not suitable for human consumption, 87% of the 3% usable fresh water is inaccessible to man. This means man only has approximately 1% of global water available for consumption and utilisation. Water exists naturally in different forms and locations. It exists in the air, on the surface, below the ground and in the oceans.

For Cap-Net (2009) fresh water is not only vital for human survival, health and dignity, but is also fundamental and indispensable for development. Human life, animals, vegetation, the ecosystem, agriculture and many other things, all depend on water. Gorbachev (quoted in Law, 2005: 7) believes, 'All life is dependent on water to survive'. The paradox, however, is that although water is essential to life and seen as a symbol of purification and replenishment in many religions and cultures, it can also spread disease, breed mosquitoes, cause floods, and so forth. A good fresh water decision can improve the lives of everyone in a community, boost the economy and safeguard the natural environment. A poor fresh water decision can wreak havoc on nature, exacerbate poverty and disease, and create conflict.

3. AVAILABILITY OF POTABLE WATER SUPPLY
Fresh water is found above and below the earth's surface. Below the surface, fresh water is found in the form of underground springs, rivers and lakes, while above ground, freshwater sources include lakes, streams and rivers. The way humankind interacts with, and uses water, impact on all these sources of water, causing them to become depleted (Redelinghuys, 2008).

3.1 The Global Overview

According to COHRE, AAAS, SDC and UN-HABITAT (2008: xix):

> There is sufficient clean freshwater in the world for everyone's essential personal and domestic needs. However, lack of distribution networks and working systems to extract groundwater or harvest rainwater; exclusion from these services or facilities; inequitable allocation of water resources; and pollution limit people's access to sufficient clean water. In some cases excessive extraction and contamination of groundwater limit domestic use and threaten long-term use.

COHRE, AAAS, SDC and UN-HABITAT (2008) further report that in rural areas many people collect water of dubious quality from unprotected wells often at a great distance from their homes, deterring them from collecting sufficient quantities. Toilets are often seen as unnecessary or unaffordable. In urban areas, low-income groups often lack access to adequate water supply and sanitation. Piped water supplies and sewers seldom cover informal areas. This means that people living in these areas access water from a variety of generally inadequate water supply options, such as wells built close to latrines or from small-scale water providers, such as door-to-door water vendors, whose water supplies may not be of good quality.

COHRE, AAAS, SDC and UN-HABITAT (2008) posit that sanitation in most countries is severely neglected by both governments and households. The number of toilets per inhabitant is generally inadequate, with no guarantee that they are hygienic to use. Because of the lack of sanitation, many people use plastic bags, streets or other unhygienic places for defecation. The lack of access to water and sanitation has a severe effect on human health, exacerbates poverty and undermines economic development. In most cases water and sanitation policies and programmes exclude marginalised groups and areas such as informal settlements and arid areas.

The foregoing shows that generally speaking, the main challenge to water provision is neither water stress nor the scarcity of water. The major problem is the governance of potable water supply and the attitude of the relevant authorities. Water stress and scarcity are symptoms of the overall poor governance of public and natural resources (COHRE, AAAS, SDC and UN-HABITAT, 2008). Water shortages and increasing pollution are to a large extent socially and politically induced challenges. These challenges are issues that can be addressed by changes in water demand and use and through increased awareness, education and water policy reforms (UNESCO, 2006). The current global water crisis is thus increasingly about how people, as individuals, and as part of a collective society, govern the access to and control over water resources and their benefits. COHRE, AAAS, SDC and UN-HABITAT (2008: 9) outline the current global levels of lack of access to water and sanitation under four subheadings as follows:

Exclusion of particular groups:

- in planning and political terms, poor people are excluded from decision-making, and their needs are seldom prioritised;
- resources are used to fund large-scale projects, such as dam construction, rather than lower cost alternatives, such as rainwater harvesting which are more likely to reach the majority of people in rural areas who have no access to water and sanitation services;
- in some situations, unpopular minorities are excluded from access to water and sanitation for political reasons;
- deprived urban areas, remote rural areas, semi-arid and arid areas are frequently neglected or intentionally excluded from government programmes for infrastructure development and maintenance; and
- there is a lack of culturally sensitive and pro-poor policies for the allocation of water resources between the different sectors of water use, and also within these sectors.

Insufficient allocation of resources:

- there is insufficient recognition by governments and international organisations that access to safe water and sanitation services has a positive impact on other development objectives: water and sanitation, generally do not receive the priority they deserve in national budgets and in allocations by international donors; and
- although the principle of cost recovery should not become a barrier to access to safe water by poor people, this consideration is insufficiently addressed when it comes to setting tariff structures for water services.

Changing social and environmental contexts:

- urbanisation is ongoing at a significant rate, dramatically increasing the populations of urban informal settlements;
- increasing levels of human and animal waste, agricultural run-off and industrial waste are polluting water sources in many countries; and
- levels of drought are being exacerbated by alterations in weather patterns due to climate change and by desertification due to poor farming practices..

Changes in management and ownership of water supply and services:

- shifts in land use and ownership are reducing or limiting access to previously available water sources: agricultural land on the edges of cities or towns is increasingly being used for housing or industrial purposes, often leading to contamination of existing wells or traditional water sources:
- management of water supply and sewerage services has been delegated to private corporations in some countries, primarily in larger cities, leading to higher tariffs; and
- decentralisation policies in many countries are transferring responsibility for water and sanitation from the national to the regional or local (municipal) level, but the necessary capacity and finances are often not transferred to the newly responsible units, making it difficult for them to manage services adequately.

For Ashton, *et al* (2001), all countries face severe and growing challenges in the management of water resources because of several reasons: the population continues to grow; water supplies continue to dwindle because of the resource depletion and pollution; and demand is rising fast because of rapid industrialisation, and so forth. The gloomy picture is well summarised by the rate at which water is being depleted in the world as illustrated in the following observations captured from world water development reports (2006, 2009):

- prominent rivers like the Colorado River in the USA, the Yangtze in China, the Indus in Pakistan, the Ganges in India, and the Nile in Egypt are drying up;
- the Aral Sea in Central Asia was the fourth largest lake in 1960 but by 1970 it had shrunk to 10% of its original size;
- the five great lakes of the USA and Canada; Erie, Huron, Michigan, Ontario and Superior are shrinking at an alarming pace;
- lake Chad has shrunk by 95% since the 1960s and may disappear entirely;
- water withdrawals have increased more than twice as fast as population growth; and
- two million tones per day of human waste are deposited in freshwater courses.

These developments, coupled with rapid population growth, urbanisation and industrialisation translated to a general global water scarcity and water stress. Countries are considered 'water stressed' when the number of people per million cubic meters of water supply exceeds 600 and 'water scarcity' arises when the number reaches 1000 per million cubic meters (Rothert and Macy, 1999). In fact, urbanisation has led to deterioration in the quality of water in streams and lakes near urban centres (COHRE, AAAS, SDC, UN-HABITAT, 2008). Water supply in many countries is falling behind the demand of a growing population, especially in Africa.

3.2 The African Overview

The problem in most of Africa is lack of development, mobilisation and effective utilisation of available resources due to several factors: mismanagement and corruption by authorities, the lack of appropriate institutions, bureaucratic inertia and a shortage of new investments in building human capacity and physical infrastructure, and many others. As observed by Boroto (2006), freshwater resources of the southern African region are enormous, averaging some 1,400 billion cubic metres a year. The continent is endowed with enough natural resources (however unevenly spread) to meet the requirements of all its people, but the resources are still inaccessible because they are still to be mobilised and developed. Due to climatic factors and the level of water resources development, water is unevenly distributed in time and space in the region. There is a high degree of seasonal variation in rainfall and stream flows, even in a single country. Water is generally not available in places of highest water demand. For example, there are abundant water resources in the DRC, the northern parts of Zambia and Angola, but these are also areas of least water demand. Highest water demands are in southern and south-western parts of the region like South Africa, Namibia and Botswana. This high variability in availability of water resources has led to localised deficits in water (Boroto, 2006).

There is also the issue of global climate change which is immediately and severely felt in the poorest and most

vulnerable countries which do not have the means or resources to adapt to the changes in their natural environment (Kwabena, 2009). Africa is particularly hard hit in terms of low level of food security, poor fresh water management and extreme weather phenomena such as droughts, floods and cyclones. Yet Africa contributes very little to global warming, which is affecting the ozone layer and thereby the global climate.

As far as utilisation of resources is concerned, potable water included, Africa suffers from economic disability. According to Kwabena (2009) the amount of water withdrawn in Africa for agriculture, domestic water supply and industry amounts to only 3.8% of the internal renewable water resources. This is also a reflection of the low level of water resources development. Per capita water withdrawal in Africa is the lowest of any region in the world (Kwabena, 2009). He further notes that only 7% of Africa's hydropower has been developed and there is a growing gap in electrification. There are strong regional disparities, though. Access to electricity is above 97% in north Africa; 47% in southern Africa; 29% in west Africa; 10% in east Africa; and less than 10% in central Africa and island states. Kwabena (2009) further claims that outside of west Africa, only the richest 20% of households have electricity. Yet there is growing demand for electricity, and the gap in its supply is widening.

4. THE MAIN FORMS OF RESIDENTIAL COMMUNITIES AND THEIR POTABLE WATER SUPPLY CHALLENGES IN SOUTHERN AFRICA

The three main forms of residential communities in southern Africa include rural/communal, peri-urban, and urban residential communities. Rural/communal areas are further divided into pure rural (former Tribal Trust Lands in Zimbabwe), farm workers compounds and growth points. Urban centres are also further divided into low and high density suburbs, and mining compounds. The provision of potable water in these different areas also differs as determined by their financial and economic muscle. Although provision of fresh water in urban centres is far better when compared with the other residential, areas it is the low density suburbs that get the lion's share of this potable water provision (COHRE, AAAS, SDC and UN-HABITAT, 2008).

4.1 The Case of Rural and Communal Areas

As a result of increased demand for water services in urban areas, rural areas have often been disadvantaged in terms of access to fresh water (Redelinghuys, 2008).

Wahaj, *et al* (2007) report that most of the world's 1.2 billion poor people, two thirds of whom are women, live in water scarce countries and do not have access to safe and reliable supplies of water for productive and domestic uses. Van Wijk-Sijbesma (2001) argues that women do not only collect water for use in the home and for productive purposes. As domestic managers and decision-makers, they influence the use of domestic water services. The female household-head determines which water sources will be used for the collection of drinking and cooking water and which for other purposes such as bathing and the washing of clothes. She also decides how much water will be collected for each of these purposes. Thus, if women decide not to use an improved water service because it is not adjusted to their needs, obviously the service will not contribute to the improvement of public health in that community. In rural communities, women's concepts of water quality are based especially on sensory perceptions such as clearness, colour, taste, and flow, as well as on safety from contamination, poisoning, and sorcery (Van Wijk-Sijbesma, 2001).

Because Africa is largely based on peasant agriculture, rural farmers (mostly women) are the most vulnerable to climate change. The greatest impact of climate change upon Africa's rural poor is the effect the weather has on food production. The majority of African farmers are already producing at levels well below achievable yields due to a basket of input challenges, of which access to water is but one.

4.2 Potable Water Supply in the Peri-Urban Communities of Southern Africa

Peri-urban residential settlements are those on the outskirts of urban areas. Usually this group is worse off even when compared to rural communities because of its informal status. Whereas the urban community falls under the jurisdiction of urban municipalities and rural communities are part of demarcated rural district councils, the peri-urban residents have no formal authority that sees to their service provision. According to Allen, Dávila and Hofmann (2004) the peri-urban interface is the location of a mixed population which often disproportionately comprises poor households. Many of the localities in these areas are in transition from being predominantly rural to acquiring urban features. This process is often accompanied by substantial pressures for land and water due to volumes of pollution generated by higher concentrations of population and industries/enterprises.

Peri-urban areas generally lie outside the established coverage of formal water supply and sanitation systems of urban areas. Water supply and sanitation are characterised by a high diversity of practices, many of which could be characterised as informal. As put forward by Allen, Dávila and Hofmann (2004), these practices are at best overlooked and at worst resisted by the set of regulations, policies and resources that structure and support the formal system. Examples are lack of consideration of the role played by the informal private sector (such as push-cart vendors) in any policy attempts to reshape current water supply and sanitation systems.

As put forward by UNESCO (2006), improving and extending provision for potable water and sanitation services in peri-urban, slums and squatter settlements presents any formal service provider with difficulties. These include the uncertainty of which an individual in a particular dwelling (be it a house, apartment or shack) takes responsibility for ensuring that payments are made. The matter becomes even more fraught with difficulty if there are multiple families, tenants and sub-tenants living there. For most informal settlements, there is uncertainty about who actually owns the land and the lack of official maps showing plot boundaries, roads and paths (without which it is impossible to design and lay piped systems) is yet another problem. Often there is no register of households and no official addresses assigned to dwellings. Furthermore, many informal settlements have sites and site lay-outs for which it is difficult to provide piped services. They may be on difficult terrain (such as steep slopes and waterlogged sites) and the lack of public roads and footpaths alongside or under which a piped system could be installed, is hurdle to overcome. In some settlement areas, especially those near mining activity, geological formations like the dolomite in South Africa's East and West Rand may lead to sinkholes and pollution of groundwater aquifers. All these add to the difficulty of providing water services to peri-urban communities.

Despite the gap between supply and demand for housing, Zimbabwean cities remain largely immune to the explosive growth of slums and squatter settlements that are characteristic of most African cities (UN-HABITAT, 2001). In 2003 it was reported that only 3.4 % of the urban population lived in slums, a figure lower than that for industrialised nations where about 6.2% of the population lived in squalid slum conditions (UN-HABITAT, 2003). This unique scenario in Zimbabwe is probably because there are stringent building bylaws and standards, and there is limited access to public land because most of the land surrounding cities is privately owned agricultural land. The acquisition of peri-urban farms during Zimbabwe's fast track land reform programme in 2000 provided one of the first opportunities for the urban poor to occupy land in the vicinity of cities and establish slum pockets. Unable to squat on public land, low-income urban dwellers resorted to backyard extensions of legal dwellings. These extensions proliferated as a form of affordable rental housing. By 2004, backyard tenancy had become a dominant source of housing for the urban poor. In Mutare, for example, there were 34 000 backyard extensions compared to 27 000 approved dwellings. In Victoria Falls, extensions comprised 64% of the housing stock (UN-HABITAT, 2006).

Zambia is one of the most highly urbanised countries in sub-Saharan Africa. The rate of urbanisation is, however, not matched with infrastructure development because of unplanned, informal settlements/peri-urban areas. The city of Lusaka has 33 peri-urban areas that account for over 60% of the city's population. Water supply services are mainly from piped water supplied from the local area or the main city system by the responsible local authority. Community schemes facilitated by NGOs distribute public taps and those in yards. Private shallow wells, rivers and lakes are also used for basic water supply. The status of potable water supply is very poor and the same can be said of the population.

In South Africa, large informal settlements have mushroomed around many of the large cities such as Johannesburg, Tshwane, Durban and Cape Town (UNESCO, 2006). This growth has been fuelled by the stream of migrants and economic refugees from neighbouring countries.

4.3 An Overview of Potable Water Supply in Urban Communities.

Whereas water is naturally a common pool and public resource, in the urban community it tends to lose some of the attributes of a common pool resource (Straub, 2009). Instead of it remaining a community resource drawn from a village stream, river, well or tap, potable water is in most cases brought to the homestead and paid for.

According to UNESCO (2006) there are several common-sense reasons why urban areas should be better served than rural areas. The first is that urban areas provide significant economies of scale and proximity for the delivery of piped water and provision for good-quality sanitation and drainage. So unit costs are lower. The second is that many cities have a more prosperous economic base than rural areas, providing higher average incomes for large sections of

the population and greater possibilities for governments or private utilities to raise revenues for such provision. The third reason is that urban areas concentrate not only on people and enterprises but also on their wastes.

When infrastructure and services are lacking, urban areas are among the world's most life-threatening environments (WHO, 1999). A good example is the Harare cholera pandemic of 2008-2009.

Van Vuuren (2010:27) observes, 'Urban residents remain much more fortunate than their rural counterparts. About 57 million people living in Africa's cities have no access to improved water sources compared to the estimated 284 million unserved people living in rural areas'.

As put forward by Beukman (2002), in southern African urban centres, services are provided either through tankers, public standpipes (common in Angola, Lesotho and South Africa), and yard and private house connections through reticulation networks. Even though the majority of the urban populations are served, interrupted flows, temporary water shortages and generally poor levels of service are common in many towns and cities. Part of the problem is that the infrastructure is either old (Lusaka), destroyed (Maputo) or just poorly maintained (Zimbabwe).

Generally, national governments sell to bulk suppliers who then supply local authorities. Municipalities are responsible for managing water services as far as the end consumer is concerned. In South Africa, the local authority level is further complicated by distinctions between all the water services bodies – including Water Services Authorities (WSAs), Water Services Providers (WSPs), Water Boards and Water Services Committees (DWAF, 2001). An additional complication is that legislation has defined different categories of municipalities and local authorities that meet the requirements for being a WSA or a WSP.
According to Beukman (2002), apart from the confusing legislative requirements, there is tremendous inefficiency of water use in urban areas. Potable water is scarce and supplying and treating it is costly. Yet, urban residents, industries, local authorities and politicians allow huge financial losses in water provision. A good example is that of the city of Mutare in Zimbabwe. The city receives its water from two nearby dams and the Pungwe River. Leaking pipes, broken water metres, lack of data and no budget for basic maintenance were all given as explanations for the 52% of the water use that was unaccounted for (Gumbo and Van der Zaag, 2001; as captured in Beukman, 2002). Beukman (2002) observes that lack of awareness and short-lived comfort may explain consumer apathy. Lack of data collection/monitoring and neglecting to translate data to useful management information in a user-friendly system, are additional explanations. Inadequate technical and financial capacity may explain why basic maintenance is often not undertaken. But why, one may ask, are millions of US dollars actively sought by local politicians to fund more water wastage? Gumbo and Van der Zaag (2001) clearly illustrate the politics behind costly supply schemes. This case and others like it favour elaborate short-term, solutions. The price of inefficiency and unsustainable management of supplies that the people of Mutare will have to pay in the future will only become apparent much later. (Beukman, 2002).

In short, although urban potable water supply is steps ahead of peri-urban and rural potable water supply in southern Africa, much is still to be done to ensure effective and efficient service delivery in the region.

4.4 Potable Water Supply Challenges in southern Africa

4.4.1 Water availability

According to Ashton, *et al* (2001), southern Africa receives considerably less rainfall during any given annual cycle than their equatorial neighbours. These drier areas also experience greater variability in annual rainfalls and generally have more extreme air temperatures and higher rates of evaporation. In combination, these features reduce surface water flows in rivers and streams, and provide little recharge to ground water. On average, flows in the rivers draining the southern areas of Africa comprise less than 10% of the mean annual rainfall (Ashton, *et al,* 2001). They further observe that across Africa, the geometric (spatial) average annual rainfall amounts to some 650mm, which almost 24% is less than the world average annual rainfall of 860 mm.

4.4.2 Mining activities

Southern Africa is rich in minerals. According to Ashton, *et al* (2001), the surface effects of underground mining are mostly associated with localised subsidence, sinkholes, rock bursts and earth tremors, whilst roof collapse of shallow underground pillar coal mine seams may promote spontaneous combustion in the residual coal. Some of the older coal workings in the Witbank area of South Africa have continued to burn for many years and have resulted in

unplanned surface collapse as well as ground and surface water contamination through acidification and salinization of local aquifers and streams (Ashton, *et al,* 2001). Further environmental effects associated with coal dump and fires in current Zambian and Zimbabwean coal workings include sulphur dioxide emissions and associated acid rain.

Mining operations often have several negative hydrogeological impacts, including changes to the local (and sometimes regional) groundwater dynamics, in terms of both the quality and quantity of water, and its flow direction.

The locations of many southern African mining operations in or close to dolomite formations is often of particular concern to urban populations who rely on these dolomitic water resources for regular and emergency water supplies (Ashton, *et al.* 2001). Most of the changes in groundwater quantity that are attributed to mining are linked to dewatering activities, where the mines extract large volumes of good quality water to ensure safe and economical mining operations. The environmental effects of dewatering include lowering of water tables, the formation of sinkholes and localised subsidence (Ashton, *et al,* 2001).

Ashton, *et al* (2001) further observe that mining and milling processes result in the release of environmental pollutants like acid rock drainage where the exposure of reactive ores to oxygen, water and bacteria leads to the formation of deleterious leachates that have significant environmental impacts. Sulphide minerals oxidise to acidic sulphate solutions with low pH values and high sulphate and total dissolved salt concentrations. Potential sources of acid mine drainage include surface runoff from open cast mining areas, seepage from leach ponds, runoff from residue dumps or ore stockpiles and drainage from underground workings (Ashton, *et al,* 2001). The following mining sources generate a diversity of contaminants that have been shown to have adverse effects of varying intensity on surface waters, groundwater, aquatic plants, surface water biota and submerged sediments in southern Africa: underground stopes; surface rock and sand dumps; slimes dams and delivery pipelines; coal discard dumps; coal fines; rehabilitated opencast pits; Plant areas; and Explosives residues (Ashton, *et al,* 2001)

4.4.3 Governance and management

As already argued, the problem of potable water supplies discussed above is not simply a scarcity or water stress issue. As put forward by Savenije (1998: 1), thirst, is not a problem of water scarcity per se:

> It is a problem of water management. There is enough water, virtually everywhere in the world, to provide people with their basic water needs: drinking, cooking and personal hygiene. Shortage of water for primary purposes (essentially household water) is much more a problem of lifestyles and poor management than of water availability. As a result of the 'sanitary revolution' of the Victorian age, drinking water is mainly used to convey our waste over large distances to places where we then try to separate the water from the waste.

UNESCO (2006) concurs. It argues that a basic insight, which has not yet garnered enough attention, is that the insufficiency of potable water supply and sanitation is primarily driven by inefficient services delivery rather than by water shortages. This is often due to mismanagement, corruption, lack of basic geohydrological water management knowledge and expertise, lack of appropriate institutions, bureaucratic inertia and a shortage of new investments in building human capacity, as well as physical infrastructure. Water shortages and increasing pollution are to a large extent socially and politically induced challenges. The water crisis is thus increasingly about how people, as individuals, and as part of a collective society, govern the access to and control over water resources and their benefits.

According to Mwangi (2008), there are a number of institutional, technical, economic, social and environmental factors which, to one degree or another, constrain effective management of the region's water resources. These include weak legal and regulatory framework; inadequate institutional capacity of national water authorities, and regional or river basin organisations; weak policy framework for sustainable development of national water resources; poor information acquisition, management and dissemination systems; low levels of awareness, education and training with respect to economic, social, environmental and political issues related to water resources development and management; lack of effective public participation by all stakeholders particularly women and the poor; and infrastructure is inadequate and unable to meet the growing demand for service. Mwangi (2008) argues that it is significant that while Africa's difficult hydrology and vulnerability to natural disasters contribute to water scarcity, it is human action, or inaction, that presents the greatest challenge in harnessing the existing water resources to improve the livelihoods of the majority of Africans. Mwangi (2008: 13) further quotes the 2006 human

development report that argues 'the scarcity at the heart of the global water crisis is rooted in power, poverty and inequality, not in physical availability'.

SADC (2005: 8) outlines the challenges to water governance in the region as follows:

- the mismatch between water availability and demand because areas of highest water demand happen to be in the water scarce semi-arid zones of the region, posing a challenge in terms of the allocation of available water resources to various users, particularly with respect to transboundary water resources;
- the high variability of available water resources, which impacts on reliability;
- shared watercourses which cut across political jurisdictions and cover several countries with different socio-economic conditions and complex water rights serve as a potential source of conflict unless managed in a coordinated, integrated and equitable manner;
- the widespread poverty is a serious challenge in the region;
- weak inter-sectoral linkages hamper comprehensive and integrated development;
- low access to safe drinking water and adequate sanitation, primarily as a result of inadequate infrastructure, and poor operation and maintenance of facilities;
- weak policy linkages at regional and national levels, particularly weak implementation mechanisms at national level, mean that plans at regional level do not have an effective impact at national level;
- poorly developed formal dispute resolution mechanisms; and
- the prevalence of HIV/AIDS brings challenges for the capacity, sensitivity and requirements of water resources management in the region.

In conclusion, therefore, the problems of potable water supply and sanitation today and tomorrow are as much a consequence of poor governance as they are of absolute scarcity. If people do not find ways of preserving the precious common pool resource, they may wake up to find the world dry and uninhabitable. Despite more than 40 years of worldwide development of agency projects and programmes, there are still not enough drinking water services to provide all people with at least a minimum quantity of safe drinking water (UNESCO, 2006). Service access is least available to poor populations who are most vulnerable to the negative consequences of insufficient and poor drinking water in southern Africa (Van Vuuren, 2010).

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