

Understanding rural water supply and access in South Africa

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ABSTRACT

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Following the abolition of apartheid in South Africa in 1994, the democratically elected government made Constitutional commitments to improve former Homeland access to water in an attempt to address past racial and gender inequalities and poverty eradication. The mandate for decentralization and devolution of powers and functions to local governments has significant implications for water supply institutions and programs designed, in principle, to provide basic water to the large number of previously disadvantaged rural villages. Many remote poor rural villages in South Africa are still characterized by a disjuncture between the peoples' basic water needs and their actual access and use of the water supply. The factors involved in deciding appropriate institutional arrangements for rural water supply are contextually complex. This paper presents findings from a desktop review of decades of governmental and non-governmental documents and program reports, as well as on the ground reconnaissance and focus groups experiences in remote rural villages.

Recommendations illustrate how village-based interventions for water supply cost recovery mechanisms and facilities operation and maintenance tasks have potential to yield improved water access for sustainable livelihood enhancements and poverty reduction.

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LIST OF ACRONYMS

AWARD	Association for Water and Rural Development
CMA	Catchment Management Agency
CSO	Civil Society Organization
DWA	Department of Water Affairs
DWAF	Department of Water Affairs and Forestry
FBW	Free Basic Water
IDP	Integrated Development Plan
LOGO-WIP	Local Government – Water Information Project
MIG	Municipal Infrastructure Grant
MLM	Mutale Local Municipality
NORAD	Norwegian Agency For Development Co-operation
NWA	National Water Act
NWRS	National Water Resource Strategy
O&M	Operations and Maintenance
RDP	Reconstruction and Development Programme
RSA	Republic of South Africa
SFWS	Strategic Framework for Water Services
SWELL	Securing Water To Enhance Local Livelihoods
SWOT	Strengths Weaknesses Opportunities Threats
VDM	Vhembe District Municipality
VWC	Village Water Committee
WD-SA	The Water Dialogues – South Africa
WLRP	Water Law Review Panel
WMA	Water Management Area
WSA	Water Services Act
WSDP	Water Services Development Plan
WUA	Water User Association

1. Introduction to the Project

Action research methods of local reconnaissance and participatory inquiry in rural and underdeveloped South Africa improve clarity of whether former Homeland areas have adequate water supply and access, and if not, whether inadequacy is due, in part, to historic underdevelopment of water infrastructure (mostly groundwater) or due to lack of institutional and financial capacities to operate and maintain village-level water supply facilities, or both. The purpose of my case study was to gain understanding of the state of institutional and financial arrangements affecting water supply delivery and access in former Homelands. My study provides a desktop review of the governmental institutions and planning instruments affecting South Africa's rural water supply, as well as many non-governmental village-level water quantity, quality and livelihoods research reports. My study also draws on interview responses regarding water availability and use from my experiences with focus group sessions comprising participants from four HaMakuya villages in rural Venda, Limpopo Province, as primary sources of data.

The objective of this project was to identify interventions for cost recovery mechanisms, facilities operation and maintenance skills development, and good governance practices for rural village water committees as they develop into institutions of village-level water supply and access management. The premise of water as an asset is widely stated in action research literature. The wider policy environment is moving toward productive use of water along with village-based self-financing and cost recovery of water supply systems that support on-site operations and maintenance tasks. The policy goal is to stimulate village demand for water as an asset that contributes to productive use and, in turn, enhanced household

livelihoods and village economies. Recommended interventions for developing cost recovery and operations and maintenance tasks, as well as good governance strategies, may play a role within the many governmental and non-governmental programmatic impacts intended to contribute to South Africa's post-apartheid goals of redress of past racial and gender inequities and poverty eradication.

1.1 People-centered Approaches

The South African Department of Water Affairs recognizes the critical role of people-centered approaches to cost recovery and operation and maintenance of water supply in remote rural areas (Mvula Trust, 2011). The research of several non-governmental organizations in South Africa, such as Mvula Trust, Association for Water and Rural Development (AWARD), The Water Dialogues – South Africa (WD-SA) and Norwegian Agency for Development Co-operation (NORAD), explores the policy and implementation history of village-based water schemes in former Homelands. The research conducted by these organizations focuses on the mandate given to local municipalities (that are most often the water services providers for remote rural areas) to work with villages and their water committees in ensuring basic water access.

The cooperation between national and local government and non-governmental action research organizations (NGOs) indicates a necessary strategy for local “bottom-up” reconnaissance and participatory inquiry looking at linkages between water demand, access, infrastructure, institutions and funding to understand problems related to access and identify potential interventions.

1.2 The Study Areas

My study focuses on a desktop review of governmental documents and program reports created by the mentioned non-governmental organizations (including many other desktop sources), as well as on the ground reconnaissance and focus groups experiences in the remote rural villages of HaMakuya in the former Venda Homelands. The case study areas for the four NGOs are also typically former Homelands as well. Bushbuckridge Local Municipality in the former Lebowa, Gazakulu and KaNgwane Homelands and Chris Hani District Municipality in the former Ciskei and Transkei Homelands are two sites extensively studied by the NGOs and reviewed for this report. My study area in Venda and NGO study areas in Bushbuckridge and Chris Hani are depicted in Figure 1.

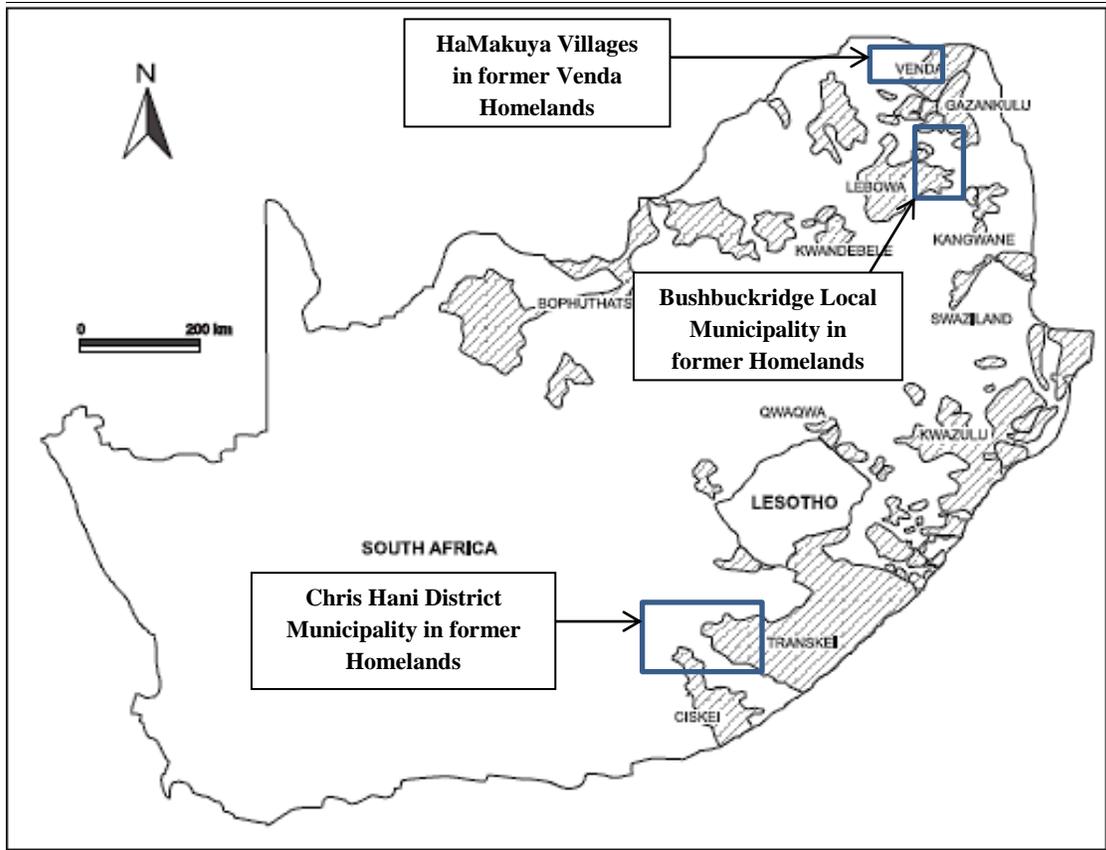


Figure 1. Pre-1994 South Africa. Homelands, with HaMakuya villages and other study areas depicted. Source: van Koppen et al., 2002.

1.3 Focus Group Methods

A one-day focus group session was conducted on 20 May 2011 in HaMakuya using mixed methods of semi-structured questionnaire and open-ended interviews followed by asset-mapping exercises. The focus groups comprised forty adult participants from the HaMakuya

villages of Guyuni, Mbuyuni, Tshianzwane and Musunda.¹

Key informants (local people with informal leadership positions) assisted in translation and in generating a purposeful sampling list of 40 focus group participants. The participants were adult men and women ranging in age from about twenty years of age to elders of their respective villages. The participants were divided into four groups, each stratified according to age and gender: older men, older women, younger men and younger women. The stratification method was intended to encourage candid conversations, given that responses may be constrained by deference to age and gender² (Eliot & Associates, 2005).

The focus group interview questionnaire (Appendix I) was designed for the purpose of creating an inventory of self-described village assets and associations with governmental and communal institutions. Topics of inquiry included assets (natural resources, social structures, human capital) that are valued and used in the villages, places where people meet to decide issues, organizations people work with to take action, and how people perceive their villages in the future. The word “asset” was often substituted with “things” during focus group discussions, because intangible assets took on different meanings for most of the participants.

After the four individual groups completed the interview and mapping sessions, the groups reconvened and a plenary of the focus groups participated in an open-ended question and

1. The name HaMakuya means the Place of Chief Makuya. Under the apartheid regime, this region was declared to be the home of all speakers of the Venda language, TshiVenda. HaMakuya is described as extremely underdeveloped in terms of infrastructure, economic activity, health, welfare and education services, and general standards of living. There are considerable challenges posed by HIV/AIDS, cholera, malaria, unreliable rainfall and drought (Lahiff, 2000).

2. The people of HaMakuya are of the Venda ancestry. The Venda are a patrilineal (kinship traced through the father) and virilocal (living with or located near a husband's father's family) people with chieftaincy institutions (Lahiff, 2000). A homogenous focus group based on both gender and age may decrease intimidations about discussing certain topics and would elicit candid discussion.

answer session for the purpose of stating what information they would like to receive from researchers and what their expectations were going forward. All individual and plenary sessions were audio-recorded and field notes were taken.

While it may have been ideal to include all villages within the HaMakuya area, this study was limited in its scope of participatory inquiry. Appendix II lists all the villages served by the Makuya Thusong governmental services center and is a reliable inventory of local villages.

1.4 Report Structure

This project report has four main sections. The first main section begins with an overview of the historical effects of apartheid water governance, the two primary democratic national water laws and the institutions currently responsible for water resources management and water supply. The next section presents a summary of several non-governmental organizations' response to weaknesses in water supply and access in rural South Africa. In the next section, the state of water and institutional arrangements affecting water supply and access for the villages of HaMakuya are quantified and described. Finally, recommendations for going forward are offered in terms of best practices and interventions for the HaMakuya village water committees as they establish themselves as viable and sustainable village-level water supply and access organizations.

2. Background to Water Supply and Access in South Africa

The apartheid era in South Africa left a legacy of poverty and stark inequities in access to all resources in the former Homelands.³ With the abolition of apartheid in 1994, the democratically elected government made commitments to provide services and improve access to resources in an attempt to address racial and gender inequalities and poverty eradication. Despite national policy and programmatic efforts to provide basic water services, many villages in South Africa's rural areas remain characterized by a disjuncture between water for livelihood needs and their actual access to the available water supply. Those households and villages with a range of assets necessary to combine with water to create income or products for exchange increase robustness of their livelihood strategies. Cooperative governance of water access suggests methods of local "bottom-up" reconnaissance and participatory inquiry looking at linkages between demand, access, and infrastructure to understand problems related to access and identify potential interventions.

2.1 Apartheid, Water Management and Homeland Poverty

The democratic election of a new national government in South Africa in 1994 marked the official end of apartheid, a governance system in which a small minority of whites dominated the political, economic, social, and environmental sectors of the country (van Koppen et al., 2002; Tewari, 2009). During apartheid, control over South Africa's water resources was

3. The policy of separate development served as a structural element for apartheid's planners, whose goal was to turn South Africa into a white republic in which black Africans did not feature as citizens. This Bantustan policy assigned every black African to a Homeland according to their ethnic identity. Ten Homelands were created, opening the way for mass forced removals. Source: <<http://www.sahistory.org.za/special-features/homelands>> Retrieved 21 December 2012.

unequally partitioned between the white National Party and the black Homelands.

The Water Act of 1956 established private rights to water by giving those who owned the land the right to the water on or near the land. In practice, this meant that whites controlled the bulk of water available in the country in the form of riparian rights granted mainly to high-volume agriculture, mining and industrial users with the relevant state department playing an overseeing role. In white-controlled agricultural regions, as much as 95 percent of water in a particular basin was used for irrigation by large-scale white farmers (an important constituency of the apartheid government) through highly subsidized scheme and dam development. Conversely, within each Homeland, the primary responsibility for management of water schemes was under the communal authorities of tribal chiefs and village headmen who would implement management over water supply, irrigation and domestic use in their own way. However, the continued domination of the white state over Homeland water schemes became evident whenever national governmental support of Homeland schemes was withdrawn and the schemes subsequently collapsed in whole or in part (Lahiff, 2000; van Koppen et al., 2002).

One of the most noticeable legacies of apartheid in South Africa is the extent of poverty and stark inequities in access to all resources in the former Homelands (van Koppen et al., 2002; Mazengia, 2005). Historically comprising no more than 13.5 percent of the total land area of South Africa, the Homelands accounted for more than 75 percent of the population (van Koppen et al., 2002). Ten Homelands were areas of settlement for what the state had identified as the country's nine main African ethnic groups (Figure 1). These highly fragmented territories were rendered economically unviable given that agriculture was systematically underdeveloped, mainly due to inequalities in access to water. Today, South

Africa is continuing to confront through democratic governance its two vastly different social and economic realities as 74 percent of the black population still resides in the former Homeland areas (van Koppen et al., 2002). The level of socioeconomic and infrastructure development in areas that were historically under white control far exceeds current state of development, especially that of water infrastructure, of areas that are within the former Homelands.

Table 1 shows the lack of progress (or worsening, in some former Homeland areas) toward improvement of poverty rates in former homelands between 1995, one year after the fall of apartheid, and 2010.

Table 1. Poverty rates in former Homelands (% of population of former homelands who are poor)		
Homeland	1995*	2010**
KwaZulu	61	65-85
NaNgwane	58	65-85
Qwa-Qwa	88	65-75
Gazankulu	69	65-75
Lebowa	83	65-75
KwaNdebele	48	65-75
Transkei	92	65-85
Bophuthatswana	67	65-85
Venda	64	65-75
Ciskei	73	65-75

* In 1995, the post-Apartheid government, together with the World Bank, undertook a study of poverty known as the Key Indicators of Poverty in South Africa. This study based its inquiries on five different poverty lines, which ranged in value from R143.20 (US\$16.33) per person per month to R391.10 (US\$44.59) per person per month in 1993 values. Source: <<http://www.polity.org.za/polity/govdocs/rdp/rural2.html>> Retrieved 25 September 2012.

** These poverty figures come from a review of the percentages of people living below the national poverty line between 2007 and 2010. Statistics South Africa and the National Treasury set the national poverty line at R460 (US\$52) per person per month adjusted to 2007 values. These figures show for the first time poverty levels calculated at the municipal level. Some rural municipalities' lines of demarcation may comprise a portion or entire former Homelands; hence the percentages are reported in ranges, depending on the location of demarcation lines. Source: <<http://www.africascope.net/content/changing-face-sa's-poverty>> Retrieved 25 September 2012.

Even though Homelands were abolished in 1998, clearly segregation and poverty persists in South Africa. It is widely accepted that the racial inequalities that exist today are a result of decades of discriminating policies practiced by the apartheid regime, which provided services such as water and sanitation, health and education to the white minority while the black population was denied access to these basic services and resources. Since 1994, the democratically elected government has made commitments to provide services and improve access to resources in an attempt to address racial inequalities and poverty eradication.

2.2 Redressing Apartheid Inequities and Poverty through New Water Law

The end of apartheid brought repeal of the system of riparian water rights, replaced with new frameworks for democratic legislative governance of water management and provision of services. In 1996, a new Constitution was ratified with the primary aims of redress of past inequities based on race and gender, and poverty eradication. The Constitution stipulates that all South Africans have a basic human “right to have access to sufficient food and water” (RSA, 1996, Chapter 2, Section 27 (1)(b)). Other principles within the Constitution that are relevant for new water law included cooperative governance among national, provincial and local levels of government, and “Batho Pele”, which means “putting people first” with the objective of high quality delivery and accessibility of all governmental services to all citizens.⁴

4. Source: Department of Public Service and Administration, South African Government Information <http://www.info.gov.za/aboutgovt/publicadmin/bathopele.htm>> Retrieved 25 September 2012.

With the abolition of the Homelands, the national government became custodian of the nation's water, and the jurisdiction of the Department of Water Affairs and Forestry (DWAF)⁵ became nationwide.

The South African Parliament enacted two laws administered by DWAF that established provisional standards for water supply and legal frameworks for water resource management: the Water Services Act of 1997 and the National Water Act of 1998, respectively. Following Reconstruction and Development Programme policy guidelines⁶, The Water Services Act established the standards of a basic water supply, positions on tariffs and cross-subsidies for cost recovery, and explicitly articulated the responsibilities of local government as water service authorities and providers.⁷

In 2001, the national government introduced a new Free Basic Water Policy committed to providing for the poor 25 liters of free water per person per day within 200 meters of the household, or about 6000 liters per household per month. Costs were recovered, in principle, by transfers of equitable share funds from national government as well as local mechanisms that cross-subsidized the costs between wealthy and poor water users within municipalities.

5. South African President Jacob Zuma announced in June 2009 that DWAF would merge with the environmental branch of the Department of Environmental Affairs and Tourism. The new departmental title is the Department of Water and Environmental Affairs. It is commonly known as the Department of Water Affairs (DWA). Source: The Water Wheel, July/August 2009.

6. The Reconstruction and Development Programme (RDP) of 1994 is a socio-economic policy framework drawn up by the African National Congress-led alliance in consultation with other key mass organizations. The RDP's short-term aim was to provide every person with adequate facilities for health by establishing a national water and sanitation program, which was to provide all households with a clean, safe water supply of 20 - 30 liters per person per day in two years and 50 - 60 liters per person per day within five years, within 200 meters of the dwelling.
<www.nelsonmandela.org/omalley/index.php/site/q/031v02039/041v02103/051v02120/061v02126.htm>

7. It became the responsibility of regional water services authorities to make arrangements for viable municipal or village-based water services providers within their areas of jurisdiction, depending on the specific water services, municipal challenges and contexts (WD-SA, 2008). At the same time, the operation and maintenance of water services infrastructure was transferred from national government to local water services authorities and/or providers.

Cooperative governance within divisions of DWAF as well as among levels of provincial, district and municipal government figured prominently in the expediency to minimize the backlog in rural water provision in the former Homelands and implement the Free Basic Water Policy. A new Rural Development Strategy, initiated by the South African president in 2001, targeted local governments to strategize development of water resources and supply (as well as other development sectors). Subsequently, Integrated Development Plans were created by local governments, which were to encompass how all services, including Free Basic Water, will be delivered.

Table 2 summarizes a broad overview of South African post-apartheid governmental doctrine, regulations, standards, policies and planning structures regarding water supply and access.

Table 2. Broad summary of post-apartheid governmental goals as pertaining to water supply and access.		
Directive	Instrument	Goals
African National Congress socio-economic policy framework	Reconstruction and Development Programme (RDP), from Freedom Charter to national government legislative program in 1994	Principles of right to access clean water; provide all households with clean safe water supply; short term: 20-30 liters per person per day within 200 meters; medium term: 50-60 liters per person per day within 200 meters; long-term: every South African with accessible water (Source: RDP Chapter 2.6)
Doctrine, Supreme law	Constitution, ratified 1996	Recognize and redress the results of past racial discrimination; establish right to access sufficient food, water, social security and social assistance for everyone; (Source: Constitution Preamble and Chapter 2 Bill of Rights)
Legal framework, Provisional institution structure, Provisional standards	Water Services Act of 1997	Confirm national government's role as custodian of nation's water resources; provision of rights of access to basic water supply; provision of water services development plans; provision of standards, norms and tariffs; provision of regulatory framework and financial assistance for water services institutions (Source: WSA Preamble)
Legal framework, Resource management institution structure, Resource management standards	National Water Act of 1998	Fundamental reform of law relating to equitable allocation of water resources and to repeal riparian rights law; framework for integrated management of all aspects of water resources; delegation of management functions and standards to regional or catchment level (Source: NWA Preamble)
Indigent policy framework and standards	Free Basic Water Policy of 2001	Poverty* alleviation measure; poor may receive the RDP standard of access to 25 liters of water per person per month within 200 meters of the household for free (Source: DWAF, 2002c)
Framework for municipal planning	Municipal Integrated Development Plans (IDP), 5 year strategic plans	Plan water services delivery consistent with Water Services Act; halve people without sustainable access to safe drinking water by 2015 (Source: Mutale IDP 2012)

*There is no commonly accepted definition of poverty in South Africa. Equitable Share of national revenue transferred to local government is based on expenditure as an indicator of poverty. Source: DWAF, 2002c.

It became immediately apparent that even after the introduction of the Free Basic Water Policy there were still problems of access to water in the former Homelands (Hemson, 2004; Muller, 2008). Extensive decentralization of powers and functions to local governments, which were burdened with weak infrastructure and poor administrative capacities, especially in the former Homelands (inherited from the apartheid era), created its own set of challenges (Table 3) for municipal water services providers in the poor rural context.

Table 3. Challenges of water services provision in the rural context (adapted from DWAF, 2003).	
Financial viability	Some water services providers may not be financially viable.
Under-investment	Poor revenue collection, rising input costs and downward pressure on retail water pricing may place water services providers under financial strain resulting in inadequate spending on maintenance and under-investment in infrastructure
Revenue management	Poor rates of user payment are critical issues for many water services providers. Physical functions of service provision separated from revenue management may hinder effective revenue management.
Financing	Considerable ongoing investment and ability to finance loans is required to expand and sustain water services infrastructure. The investment is both of a social nature (to meet basic water service provision) and an economic nature (to meet economic demands).
Lack of capacity	Particularly in rural areas, the capacity required for effective water services provision is lacking. It is important to make the best use of existing capacity.
Inefficiencies and economies of scale	The institutional framework for water services provision is fragmented, with a large variety of institutions acting as providers. The fragmentation may result in the loss of economies of scale, inability to attract and

	retain good management and technical staff and the inability to invest in the development and training of specialist skills.
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Moreover, the Free Basic Water Policy is widely criticized (van Koppen et al., 2002; Mazengia, 2005; AWARD, 2007; Mvula Trust, 2011) for exacerbating the “artificial separation of water used for domestic and productive purposes” (van Koppen et al., 2002, p. 20). Water for productive purposes, that is, water beyond “reasonable domestic use” and “small gardening not for commercial purposes” (NWA, 1998, Schedule 1) was considered water use beyond the subsidized free allocation for basic needs. The supply costs for water beyond the free allowance would have to be recovered by local municipalities, which require cost recovery mechanisms to measure the amount of water above the amount that is supplied for free. It was acknowledged by DWAF (2002c) that the administrative, operation and maintenance costs of providing free water to the former Homelands with scattered low-density villages and weak infrastructure absorbed a large portion of the equitable share transfer received by municipalities from national government. Further, poor municipalities were unable to cross-subsidize costs because they had few wealthy residents. Therefore, the villages in former Homelands are often in a poverty trap where their water systems are not improved to provide productive water access above the free basic allowance because municipalities assume that since households are unable to pay for the first 6000 liters per month of water use, improvement or maintenance of water infrastructure is unnecessary and too costly, with costs unlikely to be recovered (van Koppen et al., 2002; Mazengia, 2005).

Although the South African government has provided millions of people with new water services since the implementation of its Water Acts and Free Basic Water Policy, the weak administrative capacities and emphasis rural municipalities place on cost recovery has led to neglect of management and maintenance of aged and remote water infrastructure in the former Homelands (Mazengia, 2005) and a disjuncture between water supply for basic domestic need and water demand for productive income-generating use (Nicol, 2000; van Koppen et al., 2002; AWARD 2007; Mvula Trust, 2011). Therefore, the problems of rural access⁸ to water comprise both historical factors and less than successful modern policy implementation for water supply and access.

2.3 Linking Poverty, Ill Health and Water Access

Despite the national Water Acts and programmatic efforts to provide Free Basic Water to the former Homelands, many villages still experience little improvement to their actual access to the available water supply (WD-SA, 2008; AWARD, 2009a; Mvula Trust, 2011). The World Bank's World Development Indicators⁹ show the percentage of rural populations in

8. Inadequate and inequitable water access in the former Homelands is attributed to many, and sometimes conflicting, causal statements. The stated causes range from aging water resources infrastructure, inability to link bulk infrastructure to local reticulated water infrastructure, inappropriate and inequitable allocations of water for commercial farmers, lack of information technology, lack of financial planning and funding requirements, lack of human resource capacities, electricity cutoffs or diesel fuel shortages at pump stations to non-payment for water usage (Sources are governmental white papers and press releases, academic and civil society research reports and news media).

9. World Bank Databank Indicators are from World Health Organization and United Nations Children's Fund Joint Measurement Programme (JMP).

South Africa with improved water source¹⁰ was 73 percent in 2002 with only moderate improvement at 78 percent by 2010.

The percentage of rural populations in South Africa with improved sanitation facilities¹¹ fares worse, with World Bank Indicators showing 40 percent in 2002 and 46 percent in 2010.

Hunter et al. (2010) point out that World Bank Indicators for percentage improvements in both water source and sanitation facilities show increased coverage that has “only just matched global population growth” (p. 4).

Community poverty, ill health and water access are closely intertwined in the former Homelands areas of rural South Africa where people are deprived of the benefits of safe and nearby drinking water (Schreiner and van Koppen, 2002; Mazengia, 2005; Calow et al., 2010). The main causes of diseases and poor health in the former Homelands are primarily water-related (McDonald, 2002) and proneness to preventable water-borne diseases like cholera and arsenic-poisoning is widely recognized as a poverty dimension (Hunter et al., 2010). Households far removed from safe drinking water sources are often forced to fetch bathing and drinking water from contaminated surface water sources that are shared with livestock and wild animals. For households that do fetch water from working communal

10. Access to an improved water source refers to the percentage of the population with reasonable access to an adequate amount of water from an improved source, such as a household connection, public standpipe, borehole, protected well or spring, and rainwater collection. Unimproved sources include vendors, tanker trucks, and unprotected wells and springs. Reasonable access is defined by JMP as the availability of at least 20 liters a person a day from a source within one kilometer of the dwelling. <<http://data.worldbank.org/indicator/SH.H2O.SAFE.RU.ZS/countries/ZA?display=graph>> Retrieved 25 September 2012.

11. Access to improved sanitation facilities refers to the percentage of the population with at least adequate access to excreta disposal facilities that can effectively prevent human, animal, and insect contact with excreta. Improved facilities range from simple but protected pit latrines to flush toilets with a sewerage connection. To be effective, facilities must be correctly constructed and properly maintained. <<http://data.worldbank.org/indicator/SH.STA.ACSN.RU?display=graph>> Retrieved 25 September 2012.

taps, it is often the case that long walks to fetch and carry heavy containers of water (disproportionately the responsibility of women and girls) impact musculoskeletal health and increase the spread of infectious diseases along the pathway. Safe water fetched and stored in drums in the household may quickly become contaminated and unsafe where households do not have adequate sanitation facilities and diseases spread by way of poor hygiene practices in the home (Nicol, 2000).

Income poverty and socio-political exclusion are other dimensions of ill-being, which are directly related to water access (Schreiner and van Koppen, 2002; Calow et al., 2010).

Because water is essential to participate in revenue generating activities like small-scale crop cultivation and livestock rearing, and cottage industries like brewing and brick-making, lack of access to water contributes to the marginalization of the poor. Yet, the role domestic water access plays in supporting household livelihoods is typically missed in the compartmentalization of South Africa's water sectors, policies and institutions (Calow et al., 2010). Even though new democratic water policies require public participation and representation, the rural poor living in former Homelands are typically excluded from participating in public decision-making regarding water access due to poverty dimensions like illiteracy, language barriers, mobility and access to information (Schreiner and van Koppen, 2002).

Schreiner and van Koppen (2002) stress “the other side of the coin of the multiple relationships between water and poverty is that water resources development, management, and control can considerably contribute to poverty eradication if it boosts direct water use among the poor” (p. 970). It is widely believed, therefore, that poor peoples' well-being in

terms of health, incomes, assets, resilience, socio-political inclusion, and direction over their own lives will be improved with increased use of safe, affordable and reliable water.

In the former Homelands, the need for safe, affordable, and reliable water access is paramount and it is groundwater that normally meets these criteria for several reasons (Calow et al., 2010). Groundwater is generally cheaper to develop relative to alternatives like dams, treatment plants and reticulation systems. Aquifers offer natural protection from surface contaminations. Groundwater offers reliability of water supply and a buffer against drought. Therefore, groundwater is the only practical means of meeting rural village needs in the arid and semi-arid regions of the former Homelands (DWAF, 2004b; Calow et al., 2010). Although there is significant local variation among the former Homelands, in some areas groundwater dependence is critically high.

Given that safe, affordable and reliable groundwater plays a vital role in buffering the effects of rainfall variability and drought, as well as the lessen the likelihood of poor peoples' use of contaminated surface sources, absolute availability of groundwater in rural South Africa is not a key constraint and total depletion of available groundwater resources is rarely the main concern (DWAF, 2004b; Calow et al., 2010).¹² A more common scenario is a spiral of water insecurity as shallow groundwater sources fail (typically boreholes), additional demands are placed on remaining groundwater sources, and mechanical failures increase. Calow et al. (2010) describe the common cycle of mechanical failures in rural villages caused by

12. Regional (aquifer scale) depletion of an aquifer is rarely a problem in much of rural South Africa where hand pumps are the norm and abstraction from individual sources is very low and sources are widely dispersed. In these situations, overall abstraction rarely exceeds long-term aquifer recharge where there is greater than 250 mm rainfall per year (Calow et al., 2010). The World Bank estimates the annual rainfall for South Africa at 495 mm per year from 2007-2011. Source: <<http://data.worldbank.org/indicator/AG.LND.PRCP.MM>> Retrieved 25 September 2012. However, in South Africa, infrequent heavy rainfall events form a significant percentage of the total rainfall, which has implications for strategic water harvesting for rain-fed subsistence agriculture (Mzezewa et al., 2010).

increased stress on localized boreholes during drought: prolonged pumping throughout the day puts considerable strain on the pump mechanism, leading to breakdowns, especially if water levels in shallow boreholes are falling and pump lifts increasing. The result is commonly a rising demand on a nearby borehole and thus stress and increased probability of pump failure on that borehole.¹³ The spiral of decreased water access continues. An overall key conclusion is that access to water, not availability, is critical, particularly for poor rural households, with access determined by coverage and functionality of water infrastructure and the ability of a household to secure supply.

2.4 Water as an Asset

Access to water clearly has a direct bearing on poor rural household livelihoods beyond the satisfaction of basic needs. The demand for safe, affordable and reliable water is generated not only on the basis of health benefits but also on socio-economic benefits of food production, greater income opportunities and reduced time in fetching and securing supply (Nicol, 2000).¹⁴

Water is both part of the consumption and part of the expenditure for the poor rural household economy. Water is a consumptive good (its use for cooking, cleaning, washing and drinking contributes to sanitation and health benefits) which has costs attached that are paid for with revenue from economic activities or in time spent fetching it. Water is also a

13. Calow et al. (2010) qualify that much of the rural water supply failures in South Africa during the drought of 1991-1993 were blamed on maintenance problems exacerbated by drought rather than on regional or localized aquifer depletion.

14. Nicol (2000) notes that water is “intimately understood in economic terms in many parts of the world where huge expenditures in time and money are required to gain access. Water as an economic good is common knowledge for the poor” (Nicol, 2000, p.11).

productive asset (whether for watering animals, supplementing small garden irrigation, producing drinks for local sale, or other cottage products) that contributes to the household asset bundle. The household livelihoods cycle represents assets used in productive activities to create income which is then spent to meet household consumption needs and in turn maintain the bundle of household assets.

Availability and access to water are elements of choices and activities which form the household and village livelihoods. Those households and villages with a range of assets necessary to combine with water to create income or products for exchange increase robustness of their livelihood strategies. The opportunity cost in time commitments for household members to fetch water, which varies according to the season, is one of the major constraints to livelihoods strategies (Nicol, 2000). Availability and access barriers causing considerable time loss can include distance to water taps or reservoirs, yield, terrain and transport, queuing time and lack of income to purchase vessels and/or the water itself. The opportunity cost is lost earnings or reduced production through reduced labor time, and missed education (disproportionately borne by girl children). The negative impact on livelihood strategies can be considerable and immediate, and can also have far-reaching consequences in the longer term (such as the negative outcomes of missed education).

Nicol (2000) finds that the pattern of time consumption is more a function of water point reliability than distance from households. Further, there is a greater net benefit in time savings achieved through improving the operations and maintenance of existing water points to increase yield rather than construction of new water points and “doing water projects” (Nicol, 2000, p. 19). Gibson (2010) reports in his study of operation and maintenance costs in water schemes serving nearly 70,000 households in Chris Hani and Alfred Nzo

municipalities¹⁵, that at any given time a significant number of schemes were not working, and that many of failed schemes were not serviceable “due to relatively minor technical faults” (Gibson, 2010, p. 3). Many instances in the report illustrate the recurring reliability theme of small failures resulting in dysfunctional schemes, where often a small welding repair is the only necessary intervention to restore water supply to an entire village.

Likewise, in many of the villages in the Bushbuckridge municipality, AWARD (2007) and Water Dialogues-South Africa (WD-SA, 2008) report that repair response time (after pump breakdowns are reported to municipal officials) was from several days up to several months. Further, area maintenance managers told WD-SA researchers that delivery of parts sometimes took several months, and that part of the problem was that officials did not have funds budgeted to meet extensive repairs.

AWARD (2007, p. 1) reports regarding the Bushbuckridge villages:

“Whereas in the area access to water is not a major limiting factor, the current infrastructure and its management is. Poor design, operation and maintenance result in frequent breakdowns and unreliable supply. As a result, people curtail or delay their productive activities. But they are also affected in other aspects of their livelihoods, especially time spent on water collection. As coping strategies, they may have to go to neighboring villages to collect water, buy expensive water

15. Gibson reports findings from an analysis of financial data collected from a 9-year support program by Maluti GSM Consulting Engineers working with village-based organizations to provide water supply services to two municipalities, Chris Hani and Alfred Nzo, in the former Homelands Ciskei and Transkei. Gibson describes both Chris Hani and Alfred Nzo as “characterized by scattered rural settlements where people depend largely on wage remittances, social grants, and, to a decreasing extent, subsistence agriculture for their livelihoods” (Gibson, 2010, p. 4). The main finding was “characterized by a large proportion of operational interruptions resulting from the failure of an item of mechanical or electrical equipment” (Gibson, 2010, p. 11).

from private vendors or store water at the household level. The poorest and most vulnerable lack the assets to deal with these stresses.”

The livelihoods emphasis focuses on how villages might participate in their water supply by improving the operation and maintenance of village-level water access through simple financing mechanisms and capacities to purchase supplies of spare parts and make repairs. The objective is to ensure that potable water is supplied affordably and reliably through sustainable initiatives where villages have a stake in their own supply development. The central strand is the link between water as an economic asset used productively toward improved livelihoods and various implications for poverty reduction, not the least of which is the household’s motivation to participate in village-wide efforts to pay for water use above their free basic water allowance.¹⁶

The wider policy environment has moved toward village-based self-financing and cost recovery¹⁷ of water supply systems operation and maintenance (Nicol, 2000). This approach requires a greater quantity and quality of local knowledge of households and their livelihood strategies, as well as the continuity of water supply, with inputs structured to accommodate multiple disciplines (including technical, political, economic, social, ecological and

16. Nicol (2000) warns of the importance of understanding the knowledge environments at the village level because not all livelihoods, particularly those of the rural poor, are conducive to operating a demand-based system. The impact on the livelihoods of the poor being fully responsible for operations and maintenance of their water systems is still not universally explicit. The link between water and livelihoods at the household level is acknowledged, but the capacity to improve demand for water above the free basic water allowance and implications for village-level financing are not. The demand for water at the household level is finely balanced between the success and non-success of particular livelihood strategies.

17. Operation and maintenance cost recovery at the village level generally implies the financial costs (system operation and maintenance supplies and labor, and technical and administrative skills development) recovered with community funds. When costs are paid in volunteered labor, recovery is payment in kind. In kind payment is considered to contribute more toward system sustainability than when all costs must be recovered in cash (Cardone and Fonseca, 2003)

anthropological) (Nicol, 2000). It is best implemented with a mode of “bottom-up” (Schreiner and van Koppen, 2002, p. 973) local reconnaissance aimed at not only informing the poor living in the former Homelands but also assessing their water demands for livelihood strategies and assisting with spontaneous initiatives for village-based water committees that effectively represent local interests and capacities for operation and maintenance and cost recovery necessary to keep village water initiatives sustainable.

2.5 Cooperative Governance and the Livelihoods Perspective

The logic of sustainable initiatives for village-based operation and maintenance tasks and cost recovery mechanisms assumes the following pathway (adapted from Nicol, 2000):

- The village initiates and makes informed choices about water service reliability options and how much water is demanded;
- The village contributes to investment costs relative to the level and reliability of service and has significant control over how funds are managed;
- National government has a facilitative role, sets clear national policies and strategies (including National Water Act, Water Services Act, and Free Basic Water Policy, among others) and creates an enabling environment for all participating groups;
- The village (or its representative legal body, such as a village water committee) is responsible for operation, maintenance and sustaining the facilities, and participating in technical skills and administrative capacities development;

- Village and household capacity is appropriately strengthened, and awareness is raised to stimulate water demand for household livelihood strategies, which in turn improve household asset bundles.

The premise of water as an asset for sustainable livelihoods is widely stated (Nicol, 2000; Schreiner and van Koppen, 2002; AWARD 2007; WD-SA, 2008; Mvula Trust, 2011): there is an overwhelming problem of water access for the rural poor in South Africa, and that support for water supply reliability at the village-level can contribute to improved household livelihoods within poor villages, and in doing so, make a real contribution to poverty reduction. When the poor are able to pay a given percentage of their income for water above the free basic allowance, most households typically do¹⁸, and are willing to finance the costs needed to maintain the mechanical reliability of their water schemes.

Further, if operations and maintenance of water supply are to be decentralized, cooperative governance between DWA, local government and other implementing agencies, non-governmental and civil society groups is necessary to ensure that the villages have enough funds and technical and administrative skills to handle the tasks.¹⁹ The nature of the cooperation between government, non-government and village engagement changes: the

18. Nicol (2000) finds that income is only one among several determinants of willingness to pay for improved water, and that differences in characteristics (quality, cost, reliability) between improved and alternative sources of supply are important, as are socio-economic characteristics of the household and attitudes toward government policy.

19. The national government is committed to the active involvement of NGOs and civil society in the provision of sustainable and affordable water services, in research and other related activities. One area of active involvement is in engaging capacitated village-based water committees to manage water services at the local level (DWAF, 2003).

objective for water supply development for achieving homogeneous per capita coverage gives way to water demand for increasing household water-use productivity, which in turn, reinforces livelihood strategies and village-level capacity to create necessary funds to sustain a heterogeneous demand-based community (Nicol, 2000). Cooperative governance of water access suggests a strategy for local “bottom-up” reconnaissance and participatory inquiry looking at linkages between demand, access, and infrastructure to understand problems related to access and identify potential interventions.

3. Local Reconnaissance in Practice

DWAF (2003, p. 24) stated in its Strategic Framework for Water Services:

“...a vibrant and durable democracy needs a strong civil society. Government is committed to promoting the active involvement of civil society in the provision of sustainable and affordable water services, in research and in other related activities.”

Civil society in this context is the network of non-government organizations (NGOs) and institutions that mediate between the citizen and government (Andersson, 1995).²⁰ South African NGOs are well-placed in poor rural areas where villages often take the initiative to

20. The civil society sector is often called the non-profit sector in that it excludes business organizations since they operate and are funded differently from non-profit organizations (Mvula Trust, 2011).

form water committees²¹ with the purpose of strengthening a people-centered approach to operation and maintenance of their water supply facilities (Mvula Trust, 2011a).

In most villages, water committees are organized because water schemes are remote and linked to the municipality only by poor quality roads. Many NGOs promote and support the peoples' organized efforts to legally constitute village water committees as a water services provider and integrate their water initiatives within the local government (DWAF, 2004b; WD-SA, 2008; AWARD, 2009a; Mvula Trust, 2011).

3.1 NGOs and Local Reconnaissance Models

There are many local government-village-NGO partnerships in South Africa that facilitate and strengthen village water committee participation and the peoples' sense of ownership in their water schemes operation and maintenance. The partnerships are supported by these common objectives regarding the establishment of village water committees (Mvula Trust, 2011a):

- Enabling of village water committees to better perform relevant functions in water services delivery;

21. Village water committees are not the same as Ward Committees, which are official municipal structures. The roles of the village water committee are often blurred with that of the village Community Development Forum; they both have links to local government through the Ward Committee.

- Increasing awareness, particularly among water services authorities, of the capabilities of the village water committees to perform services relevant to their functions;
- Encouraging the growth of village water committees by way of inclusion in collaborative forums and other processes to play meaningful roles in the development of the water supply sector.

Table 4 describes four NGOs that work collaboratively among themselves and with government in efforts to catalyze the emergence and meaningful involvement of viable village water committees.

Table 4. Four civil society organizations (NGOs) in South Africa that support the viability of rural village water committees.		
Organization	Research areas (rural)	Main program(s) or reports/ Research methods
<i>Mvula Trust</i> – established in 1993; South Africa’s leading community-driven water and sanitation NGO.	Rural areas of Eastern Cape, Free State, Kwa-Zulu-Natal, Limpopo, Mpumalanga, and North West Provinces.	Wide range of water, sanitation and governance programs, reports and diaries/ “People-centered” participatory case studies and policy analysis methods.
<i>AWARD</i> – Association for Water and Rural Development; established in 1998; has two key program themes: catchment management, and village livelihoods and water supply.	Sand River Catchment, Mpumalanga Province, particularly Bushbuckridge Local Municipality.	SWELL – Securing Water to Enhance Local Livelihoods Programme and LOGO-WIP- Local Government Water Information Project/ Methods of participatory inquiry, project

		implementation and policy evaluation.
<i>WD-SA – The Water Dialogues-South Africa</i> ; established in 2005; promotes a wide range of stakeholder discussion, including municipal and private sector water service providers, unions and NGOs.	Bushbuckridge Local Municipality, Mpumalanga Province; Chris Hani District Municipality, Eastern Cape Province.	Eight water services institution typology-focused case studies (reports- some not in rural areas)/ Municipal and financial-sector data; participatory community-based research methods.
<i>NORAD-Assisted Programme – Norwegian Agency for Development Co-operation</i> established in 1997; is a series of rural groundwater research programs in collaboration with DWA, Council for Scientific and Industrial Research, Council for Geoscience, Mvula Trust and Geological Survey of Norway.	Various rural water and sanitation schemes in Eastern Cape, KwaZulu-Natal and Limpopo Provinces.	“Sustainability Best Practices Guidelines for Rural Water Services” (report)/ Methods of observations, measurements, existing records and photographic data; interviews and questionnaires involving village water committees, Ward Councilors, and traditional leaders.

All four of these NGOs are involved in case study and action research and programs for intervention (and water services infrastructure refurbishment projects, as is the case for AWARD) that employ multi-stakeholder participatory methods of inquiry, knowledge exchange and learning in order to:

- Analyze the critical factors that determine the current and future state of water and sanitation schemes, and
- Improve the delivery and access of water and sanitation services in the poor rural areas of South Africa.

There are numerous configurations, capacities and ages of rural water supply and sanitation schemes that are confounded by contextual variations (geographical, social, political, economic, demographic, managerial, institutional, communication levels) that could lead to an abundance of thematic analyses and recommendations (DWAF, 2004b). The efforts of these four NGOs, however, address the results of a number of situations in former Homelands (AWARD, 2007; AWARD, 2009a), including:

- Water supply infrastructure and facilities may not exist;
- Where infrastructure does exist, it may not supply enough water to meet all the peoples' demands;
- Where infrastructure does exist, it may not be accessible to all the people;
- Where infrastructure does exist, it may provide an erratic supply.

The reasons for these situations are manifold, but many can be traced back to two factors:

- Inadequately informed planning (affecting the current and future state of water infrastructure and facilities) and
- Ineffective institutional arrangements and poor operation and maintenance of the infrastructure and facilities (affecting water access) (DWAF, 2004b; WD-SA, 2008; AWARD, 2009a; Mvula Trust, 2011).

Therefore, the four NGOs' case study action research models are generally focused into two broad thematic categories, perhaps differentially weighted depending on the NGO:

- The current state of water and sanitation services, and

- Institutional arrangements, performances and capacities affecting water access.²²

There is consensus among the reports of the four NGOs regarding the need to strengthen village water committee participation and the peoples' sense of ownership in community water schemes operation and maintenance. In cases where a water services authority is responsible for eradicating water services backlogs in villages spread out over large rural districts, there are pressures to meet national backlog targets²³ (Mvula Trust, 2011). This pressure often results in an emphasis on the delivery of the infrastructure for water services and less emphasis given to the maintenance of the systems. The infrastructure often falls into disrepair (WD-SA, 2008, AWARD, 2009a; Mvula Trust, 2011). Among the four NGOs, recommendations were unanimous in the establishment and capacitating of village water committees and village-based water system operation and management teams that would work in partnership with relevant local government institutions.²⁴

22. Based on project implementation experiences in Bushbuckridge Local Municipality, AWARD determined that municipal planning processes and documents and levels of community capacity to understand and assume some responsibility for operation and maintenance of facilities were so poor that AWARD decided to break projects into two parts, separating social capacity building from technical refurbishment projects because of the former's impact on the sustainability of the latter (AWARD, 2009a).

23. Meeting the backlog in water and sanitation services for the rural population of South Africa is a political, financial and institutional challenge. Furthermore, calculations for achieving backlog statistics assume that the backlog is relatively fixed, and with steady progress, can be reduced in time. Despite considerable investment in rural water services delivery the indications are that the backlog of people who are underserved at the RDP level is growing, an indication of how delayed delivery succumbs to the pressures of population increase (Hemson, 2004).

24. The Mvula Trust is particularly concerned about sustaining the functionality of village water committees. They are rethinking strategies to support local efforts in decentralized operations and maintenance without over-bureaucratizing the systems or undermining local initiatives (Mvula Trust, 2011).

3.2 Detailed Examples of Thematic Inquiry

Key to the broader NGO methodological approach is to spend at least one year in undertaking detailed participatory assessments from which an inception report can inform the details of further research, implementation, capacity building and evaluation that is required over the following four to five years²⁵ (AWARD, 2007; AWARD, 2009a; WD-SA, 2008, Mvula Trust, 2011). Research may be conducted at four different levels (AWARD, 2007):

- The household level, to understand the livelihood contexts of different households;
- The village level, as this is the level where water services are normally organized;
- The broader institutional context, which includes municipal services planning and delivery;
- The catchment, which is the context in which water resources are managed²⁶.

25. AWARD's SWELL (Securing Water to Enhance Local Livelihoods) Programme is the most robust of the four NGOs. It combines two frameworks for participatory assessment. The RIDA framework assesses water resources, infrastructure, demand and access. The Sustainable Livelihoods framework assesses at the household level the role of water in peoples' livelihoods. The requirement for both domestic and productive needs is therefore a key assessment when determining how access to water enables or hinders livelihood activities (AWARD, 2007).

26. AWARD is only one out of the four NGOs mentioned that conducts participatory research at all four levels. A key conclusion from AWARD's work at the catchment level is that inadequate infrastructure and governing institutions are generally more of a limiting factor to the peoples' access to water than the resource itself (AWARD, 2007).

For the purposes of understanding water supply and access in the poor rural context, and reviewing the options, appropriateness and opportunities to establish and develop the capacity of village water committees as operation and maintenance teams, the focus of the following examples of inquiry in Table 4 is narrowed toward the above mentioned broad thematic categories:

- The current state of water and sanitation services, and
- Institutional arrangements, performances and capacities affecting water access.

A desktop review of literature, governmental documents and program reports may provide a broad understanding of the governmental planning processes and the water and sanitation schemes in place (where digitized schematics are available). On-site participatory inquiries may include a combination of individual interviews with municipal officials, members of DWA who work locally, staff that work with water and sanitation services, participatory village workshops, focus groups and household surveys²⁷ (AWARD, 2007, AWARD, 2009a, WD-SA, 2008). Methods of inquiry are designed to make villagers central actors in the processes of analyzing their water and sanitation access, including weaknesses and asset-building opportunities surrounding their water systems (AWARD, 2009a).

27. AWARD conducts household surveys in their livelihoods assessment program. All NGOs caution that there can be vast differences between villages within a single ward in terms of installed water services infrastructure and what is actually functioning, both in situations of bulk supply and street level reticulation networks. “The mix of infrastructure and their functioning make it difficult to define the implications for overall water access, in terms of commonly used indicators such as average supply in liters per person per day and down-time of services, etc.” (AWARD, 2009b)

Table 5 shows examples of desktop reviews and participatory inquiry regarding the state of water and sanitation supply and access, and institutional arrangements for services delivery.

Table 5. Examples of thematic desktop review and participatory inquiry regarding the state of water and sanitation services, and institutional arrangements for services delivery (adapted from WD-SA, 2008; AWARD, 2007; AWARD, 2009a; AWARD, 2009b).		
Desktop review	Activity	Questions
Water and sanitation schemes (where available)	Obtain supply schematics and volumes/develop reticulation network model Obtain geo-hydrological surveys Obtain borehole mapping Obtain standpipes, water tanks or reservoir, household connections mapping	What is the amount of bulk supply from dams? What is the capacity of treatment plant(s)? Age of pipelines and reticulation systems? What are the facilities for sanitation? Are sanitation systems a threat to groundwater (boreholes downstream from systems)? Are there recent/reliable surface and groundwater quality assessments?
Planning frameworks	Obtain and assess district and local municipality Integrated Development Plans (IDPs) Obtain and assess water services authority Water Service Development Plan (WSDP)	Is there an organogram/responsible party in name? Are there SWOT/ budget analyses? Are IDPs and WSDP updated with community review processes? Are there comprehensive sections in IDPs on water resources, availability, demands (advised by the WSDP)? Are there comprehensive sections in the WSDP on funding, quality, quantity and users and usages, indigent

		policy?
Participatory inquiries	Activity	Questions
Water services	Assess actual household demographics and demand	<p>Number of people in home? Amount of water to meet FBW? Amount of water to meet FBW and productive uses? (75 lcd above FBW) (AWARD, 2009a) How many different ways is water accessed? How much time is spent for each method? Is water purchased from vendors? How much is spent on water? How is water productively used (for livelihoods)? Is there a VIP toilet for the home?</p>
	Assess actual surface water	<p>How many/capacity of storage facilities? Pipe suitability? Number of household taps? Number of livestock watering points?</p>
	Assess actual groundwater	<p>Number of equipped boreholes? Number of communal taps? Diesel or electricity operated? Pump rate and yield? Borehole damages/blockages? Service level capabilities- communal or household supply?</p>
	Couple demographics and demand to current services provision	<p>Does the system always supply water? Is there enough pressure from taps? Does quality change? How breakdowns are reported? Who from village gets involved? Response time for reported</p>

		<p>broken tap/pump? How long without water?</p>
Institutional arrangements	Water committees	<p>Register of volunteers' capacities/interests? Operations and Maintenance schedule/log? Responsible authority as pump operator and for O&M? Communication between pump operators and technical teams? Maintenance response time? Emergency measures? Security/theft measures? Water quality testing? Borehole diesel or electricity payment procedure?</p>
	Traditional leaders	<p>Do traditional leaders play a productive role in rule-making/conflict resolution, vandalism/theft monitoring?</p>
	Community development forums and ward committees	<p>How often are meetings with water committees held? Attendance records? Are youth and women represented? Are O&M decision-making powers clearly delegated to water committees? How are village water services monitored and reported? How are service development activities planned? Are there a user complaint/cut-off/dysfunction (vandalism and theft)/O&M logs?</p>
	Water services providers and water services authority	<p>How are MIG funding/ assets transfer (from DWA) monitored/evaluated? How are private sector infrastructure tenders monitored and evaluated? Are there cost recovery plans? Are water plans/projects</p>

		developed in isolation or integrated into municipal sector/IDP plans? Are there IDP and WSDP steering committees? Are there capacitated technical departments?
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AWARD makes note that even though research groups may identify in advance the areas in which to focus literature reviews and participatory inquiry, options should be left open to invite all relevant local government institutions and community structures to collectively identify further areas of research (AWARD, 2009a).

3.3 Conclusions and Recommendations from NGO Case Studies and Program Reports

It is not always clear what are the actual states of water infrastructure supply and access, institutional and financial arrangements, performances and capacities affecting water delivery in a particular village without local “bottom up” reconnaissance. The livelihoods approach emphasizes reconnaissance to gain insight into the role of current and potential household use of water as an asset in peoples’ livelihood strategies, and how such strategies are shaped by safe, affordable and reliable water access. To encourage household water use for income-producing purposes, and to ensure that villages can be engaged in self-financing their development, emphasis is paid to the role of water within wider household livelihood strategies and cooperative networks with local government and NGOs. Lessons learned from NGO report conclusions and recommendations inform feasibility and sustainability evaluations for village-based cost recovery and operation and maintenance initiatives in

former Homelands, where there is more often reliance on a cash economy and uncertainty regarding ability to pay for water use above the free basic water allowance, and where municipal planning, budgeting and cooperation is weak.

The primary conclusions from the NGO case studies and reports revolve around seven thematic areas. These include: 1) Challenges in obtaining information about infrastructure; 2) Impacts of inadequate maintenance and repair; 3) Lack of planning and budgeting for operation and maintenance (O&M); 4) Lack of cost recovery; 5) Lack of institutional capacity to deliver mandated water and sanitation services; 6) Over-bureaucratizing institutional arrangements; and 7) Lack of representation for women. Recommendations that are consolidated into four targeted intervention strategies follow the seven thematic areas. For this project, in section 5 of this report, I focus on developing strategies for two of the targeted interventions: cost recovery systems and on-site facilities O&M. I complement these two task interventions by recommending strategies for good governance and community involvement.

1. Challenges in obtaining information about infrastructure —

Two of the four NGOs' reports are case studies conducted exclusively in the Bushbuckridge Local Municipality in Mpumalanga Province (AWARD and WD-SA). Mvula Trust and DWA's NORAD-Assisted Programme conducted case studies in three or more provinces, including Chris Hani District Municipality in Eastern Cape Province. However, all four NGOs' case study reports generally include summary statements about the various time-consuming challenges of obtaining reliable information about water infrastructure, mostly

because information is not well managed or utilized (DWAF, 2004b; WD-SA, 2008; AWARD, 2009a; Mvula Trust, 2011). AWARD reports that there is not enough information from the municipality or former DWA technical teams about the construction of previously installed boreholes to efficiently repair them. AWARD concluded that municipal officials do not spend enough time in the villages to keep up-to-date with infrastructure problems. The result is that many minor problems left unaddressed (such as pumps falling down into boreholes) become major problems due to lack of record-keeping on refurbishment materials and no one of authority to follow up on borehole failures (AWARD, 2009a).

2. Impacts of inadequate maintenance and repairs—

WD-SA reports maintenance and repair response times in Bushbuckridge ranging from several days to several months (WD-SA, 2008). When water is scarce many village members either go long distances to fetch water and do washing in the Sabie River or they access water with known human pathogens from local dams built for livestock watering. The Mpumalanga Provincial Health Services has raised formal concerns echoed in international policy forums regarding water-related diseases and health issues.²⁸ The people of Bushbuckridge stated that when they inform their community development forum and/or ward councilor they generally do not get a response about what is being done to improve the situation.

28. Diarrheal diseases are the second most common contributor to the disease burden in developing countries, mostly affecting young children. Poor-quality drinking water is an important risk factor. Other health issues include the impact on musculoskeletal health due to the need to collect and transport water, much of which is carried by woman and children. Long walks needed to collect water are known to increase the spread of certain infectious diseases (Hunter et al., 2010).

3. Lack of planning and budgeting for operation and maintenance (O&M)—

AWARD reports a lack of baseline data for planning in terms of “water resources, infrastructure, and water user demands and entitlements” (FBW) in Bushbuckridge (AWARD, 2009b, p. 58). No comprehensive water quality management plan is in place in Bushbuckridge. AWARD also reports that planning instruments, such as IDPs and the WSDP are not functioning tools. The majority of the funding received by the Bushbuckridge Local Municipality goes into infrastructure development; there is no obvious budget allocated for O&M of infrastructure.

Mvula Trust reports that in O.R. Tambo and Vhembe District Municipalities, village water committees and community-based water service providers were institutional arrangements that were not effectively integrated into municipal IDPs. It was concluded that the municipalities and village water committees did not have a strong relationship and the VWCs “felt they were not regarded as equals” (Mvula Trust, 2011). In some cases, Mvula Trust reports that VWCs were perceived as threats to the local officials, as the VWCs are often more skilled in their O&M roles.

4. Lack of cost recovery—

Most members of poor rural areas are not charged for the water they receive (DWAF, 2004b; WD-SA, 2008; AWARD, 2009b). This means that those that are entitled to FBW (if they actually receive sufficient amounts of water) do not contribute to the cost recovery on rural water supply and sanitation schemes. In the course of implementing the FBW policy, it has been difficult to meter and monitor the use of water over and above the FBW level of 25 liters per person per day. The amount of billable water often leads to no billing at all, mainly

because the costs of installing, operating, maintaining and collections of effective metering systems at rural water supply and sanitation schemes are widely regarded by municipalities as prohibitive (DWAF, 2004b).

5. Lack of institutional capacity to deliver mandated water and sanitation services —

Action research and interventions in poor rural communities need to be constantly responsive to the rural context (AWARD, 2009a). Community-focused improvements to infrastructure and facilities, and to rapidly devolving institutional arrangements, generally have to be done in parallel with capacity building, both at the village and municipal levels, in order to enhance understanding of how complex water resource and supply systems work. The NORAD-Assisted Programme report states that under-capacitated institutional arrangements in the context of rural water and sanitation schemes are challenged by a “varying, changing and evolving...state of flux” (DWAF, 2004b,p. 10).

6. Over-bureaucratizing institutional arrangements—

Any changes to institutional arrangements that are implemented that could fundamentally change those arrangements in place would “appear to be side-stepping the real causes of the problems identified with inadequate water services” (WD-SA, 2008, p. 27). Over-bureaucratized governmental institutional arrangements for poor rural areas of South Africa might not work in the same way as arrangements in larger urban municipalities with a large economic base. The NORAD-Assisted Programme analysis reveals that the case of devolved control of O&M to village water committees coupled with a “good sense of community ownership...tends to be an institutional arrangement reflecting the better-run scheme” (DWAF, 2004b, p. 11).

7. Lack of representation for women—

Women are disproportionately affected by the lack of ability to water access in South Africa, due to their traditional role as caretakers of households and villages (WD-SA, 2008). It is typical in rural villages that women manage the provision of water in the household (DWAF, 2004b). In some cases, “block committees” are formed, mostly headed by women, to address problems with O&M for all the standpipe taps in a given village area (Mvula Trust, 2011). The women are also responsible for water point hygiene and replacement of broken taps. However, women tend to be under-represented in executive positions (and in some cases, even as members) in village water committees (DWAF, 2004b). It is also reported that youth representation (under the age of thirty) in VWCs is, in some cases, non-existent.

Recommendations—

From the four NGO case study reports, the overall recommendations for accurate identification of the causes of inadequate water access (attributed to two main factors, state of water access and institutional arrangements, as stated above) and strategies to improve water delivery may be consolidated to include the following targets (WD-SA, 2008; DWAF, 2004b):

- Developing and implementing municipal water services development and management plans facilitated through community participation that include performance monitoring and accountability mechanisms;
- Integrating municipal and village knowledge about successes and failures of water services institutions and building cooperative teams;

- Implementing financial accounting and cost recovery systems that assist municipalities and villages in improving services;
- Implementing on-site facilities O&M plans executed by village water committees to ensure village access to safe, affordable and reliable water.

Lessons learned from local reconnaissance report conclusions and recommendations inform and become a major focus for sequencing interventions going forward that clarify how the above targets are met for the poor rural villages in their specific contexts, and whether the broader Constitutional goals of redress of past racial inequalities and poverty eradication are attainable through the contributions of improved water supply and access.

As mentioned, for this project, I concentrate on the second two of the four targets: cost recovery systems and on-site facilities O&M, with complementary strategies for good governance and community involvement. I recommend interventions for, at the least, the four HaMakuya villages in the focus group study, and potentially more villages in the area. After reporting, in section 4 of this report, local reconnaissance regarding the current state of water supply and access, and institutional arrangements affecting water supply and access locally in HaMakuya and in the greater region, I offer the above stated recommendations and interventions going forward, including:

- How to legally constitute a village water committee (a prerequisite requirement),
- How to strategize cost recovery systems, including water metering and collections mechanisms and
- How to implement O&M planning and tasks.

4. Water Supply and Access in HaMakuya Villages

The Mutale Local Municipality Integrated Development Plan states that there is a “huge water and sanitation backlog in the area” (Mutale IDP, 2012, p. 35). Without conducting local reconnaissance and participatory inquiry it is not clear whether the rural and underdeveloped HaMakuya villages in Mutale Local Municipality (Figure 2) have inadequate water access due to historic underdevelopment of water infrastructure (mostly groundwater) or lack of institutional and financial capacities to operate and maintain rural water supply facilities, or both. The purpose of my case study was to gain understanding of the state of water supply and institutional arrangements affecting water delivery and access in former Homelands. My study provides a desktop review of the institutions and planning instruments affecting water supply in Mutale Local Municipality (MLM), as well as a non-governmental village-level water quantity and quality research report conducted in the area. My study also draws on responses regarding water availability from focus group sessions comprising participants from four HaMakuya villages as primary sources of data.

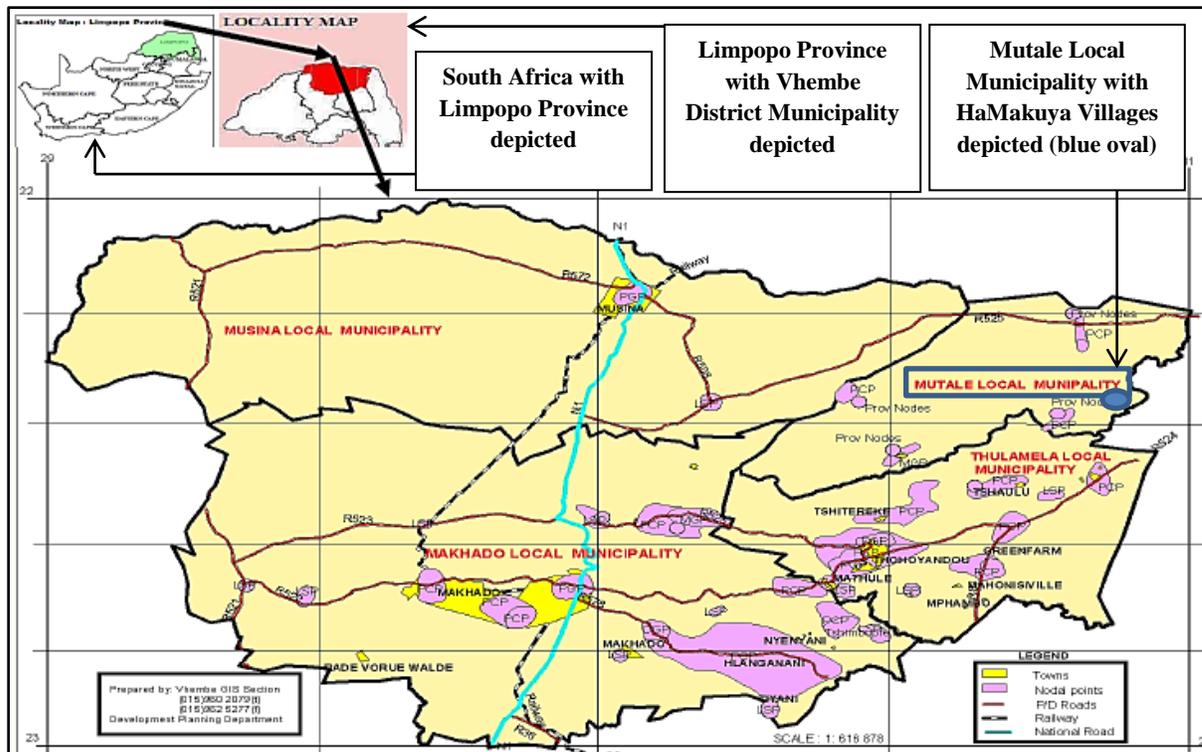


Figure 2. The four local municipalities within Vhembe District Municipality, with Mutale Local Municipality and area of HaMakuya villages depicted (blue oval).
Source: Vhembe IDP, 2012.

My study of the four HaMakuya villages is contextually significant in that the institutional arrangements established in 2007 of MLM²⁹ as water services provider and the greater Vhembe District Municipality (VDM) in 2001 as water services authority appear to be stable (Mutale IDP, 2012). These stable institutional arrangements in MLM and VDM present a different picture than in Bushbuckridge, which has undergone several changes in water services authority and water services providers (AWARD, 2007; WD-SA, 2008).

29. Year 2007/2008 is the earliest version of the MLM water services provider business plan obtained from a desktop review. Therefore, the date of 2007 as the establishment of MLM as water services provider may need verification. The Vhembe IDP 2012 states that VDM was established as the area water services authority in 2001 (stated in the IDP reiterative introduction to the water resource development and demand management section).

In Bushbuckridge, there has been a “continual upheaval of institutional arrangements” resulting from ongoing administrative and demarcation changes attributed to the Bushbuckridge district’s lack of an effective transition plan for devolution of responsibility for water services provision and transfer of assets to the local level (WD-SA, 2008, p. 23).

Despite apparent stable institutional arrangements in MLM, approximately 26% of its 131,781 residents “do not have access to clean potable water” (Mutale IDP, 2012, p. 37).

The 26% without access to water are likely disproportionately clustered in the poor rural villages. The VDM IDP states that in MLM 70,614 people (54%) receive water amounts below RDP standards of 25 liters per person per day within 200 meters of the dwelling.

As an example of weaknesses in water planning instruments, the VDM WSDP released February 2012 discloses the state of water services planning in the area (Vhembe WSDP 2012):

- The Vhembe District Municipality, as water services authority, does not have a strategy to meet the national 2015 target date to achieve at least a basic level of water and sanitation service for all;
- The Vhembe District Municipality does not have a Water Conservation Demand Management Plan, nor does it apply through its IDP funds for the plan.

In the VDM Water Services Development Plan, it is stated that there are 358 projects in place with a total allocated budget of R4835 million (US\$582 million) to address water services issues and requirements. However, the document states in its Strategic Oversight of Operation and Maintenance section (Vhembe WSDP 2012, p. vi):

There is ‘below minimum requirement’ or zero compliance of staff, external resources, spare parts, tools and equipment, budget, available operation manuals, asset register, as-built information, record keeping, quality control and reporting.

Finding causal relationships that explain why inadequate water provision remains in the poor rural areas of MLM, and explicitly in the study area comprising four HaMakuya villages, is beyond the level of the initial reconnaissance experience in my study. The purpose of my HaMakuya study is to provide information leading to an understanding of the state inadequate water delivery in the four villages of HaMakuya, and to review the municipal institutional arrangements that are in place. Recommendations going forward for the four villages include the options and opportunities to establish and develop the capacity of village water committees as alternative institutions for village-level cost recovery and on-site facilities O&M.

4.1 Contextual Overview of Study Villages

Guyuni, Mbuyuni, Tshianzwane and Musunda villages of HaMakuya (-22.63 South, 30.83 East, elevation 525 meters) are located in Ward 13 of the MLM in the northeastern corner of Limpopo Province (near the South African borders with Zimbabwe and Mozambique), about 70 km north of Thohoyandou and adjacent to the western border of Kruger National Park. Makuya is one of seven tribal authorities that own most of the land in MLM (Mutale IDP, 2012). The MLM is one of four local municipalities in VDM (Figure 2).

The residents of the four villages live largely in mud rondavals (Figure 3) with thatch roofs, generally without electricity³⁰, tarred roads, or public transport. The people of these villages rely mainly on rain fed agriculture for their livelihoods, supplemented by various combinations of migrant remittances, local wage employment, state pensions, and small-scale trading in fresh produce, beer, and other goods in local shops (Lahiff, 2000). The potential for large-scale farming is low in HaMakuya, given the rocky terrain, shallow soils, poor rainfall and distance from markets. Agriculture is mainly centered on the production of maize (“mealies”) and sorghum for domestic consumption. Vegetables such as spinach (“moroho”), sweet potatoes, tomatoes, watermelons and pumpkins are grown in garden plots next to peoples’ homes and watered mainly by hand.

30. Guyuni received electricity in 2012 according to the Mutale Local Municipality Mid-Year Report 2011-2012. In the HaMakuya area, three boreholes were completed and another three were drilled. Three previously drilled boreholes are now dry (Mutale Mid-Year Report, 2011-2012).



Figure 3. HaMakuya rondevals. Source: author.

Aridity is high across much of the upper reaches of the Limpopo Province (Sullivan and Sibanda, 2010). The area receives only about 500 mm (approximately 20 inches) of rainfall per year. About 87% of the annual rainfall occurs during an intense rainy season (between October and March) (Mutale IDP, 2012). The majority of runoff in surface streams occurs in short-lived peaks. Long, severe droughts, exacerbated by high evapotranspiration, occur every 10 to 20 years.

Focus group participants described their villages as farming villages (not mining towns) where people raise crops, cattle, goats for trade and as a source of food for the home, and use

donkey carts for transport of water and traded goods. They described a time when fountains (river springs) provided ample water, but that now there is a lack of reliable rain. When the cattle (one person stated perhaps an overabundance of cattle for available land) eat all the grass, the land is barren and erodes. They said there is a noticeable loss of trees. They described their main challenge to be the lack of rain and adequate water and that they must go far distances to fetch water. They said that the children of the villages spend so much time fetching water that they often miss school.

Older man responds to inquiry about making a list of things about the villages that are important and talking about them.

I'm thinking that as a group, we are all coming from different villages, but we are all the same. There is farming in every village...In fact, I'm born here. We are on my roots. We are all farmers, these are not mining towns. According to the history, even now, it started with farms. I'm not working, but still survives. Why? Because I am a farmer, I can sell goats, eat them. So because we are the farmers, only problem is water. We must try to share our mind so we can try to make the land be rich. Our fathers teach us, but we fail to take the message to the children, we can't teach children, for to fetch water from far, so children must go for water and miss school. They fail to go to school because we must fetch water. Our main problem is the water. If we find the water, our land will be rich. We cannot talk about the electricity because when I was born electricity is not here. The main problem is the water.

HaMakuya, 20 May 2011.

4.2 The Current State of Water

Information regarding water and sanitation services in MLM was obtained from the IDP documents from MLM and VDM, as well as VDM WSDP, and what little current research on the villages of HaMakuya is available from desktop review.

4.2.1 Water Sources within Vhembe District Municipality

The entire Vhembe district has a limited supply of both ground and surface water resources. The water schemes that are currently in place are old and were intended to serve a smaller population. The low population density makes it difficult and costly to improve levels of water service delivery. Presently 90% of the Vhembe district population reside in rural areas and do not have access to potable water piped into the home (Vhembe draft IDP, 2012-2017).

4.2.2 Water Sources within Mutale Local Municipality

The major source of bulk supplied surface water for MLM is from two dams – the Nwanedi and Lupepe (twin dams), located near the western edge of the Vhembe District. A secondary source of surface water is the Mutale Reticulation Water Scheme, which extracts water from the Mutale River. Records on the amount of water extracted are not available. Water supplied to the bulk pipeline is metered only at the command reservoir. In most of the villages connected to the Mutale scheme, the usage and loss is not accounted for and there are no cost recovery methods in place. Groundwater accessed by boreholes is a valuable source of water for MLM (Mutale IDP, 2012); however, borehole yields and groundwater

quantity and quality monitoring are concerns for the municipality and rural areas. Table 6 summarizes the water sources available within the Mutale Local Municipality.

Table 6. The state of water sources within Mutale Local Municipality (Mutale IDP, 2012).		
Source		
Surface Water	Groundwater	Number
Nwanedi Lupepe Dam- Twin dams at the confluence of the Nwanedi and Lupepe Rivers near the western edge of the Vhembe District; the district supplies treated water through a bulk line to local municipalities.	Boreholes- Groundwater wells drilled down to access aquifers; where a borehole is located near a village, it is connected directly to the water reticulation network.	44 with electric engines 43 with diesel engines 128 with hand pumps
Mutale River Abstraction- Mutale Local Municipality Reticulation Water Scheme abstracts, treats and supplies water through a reticulation network for smaller villages (Mutale River is not dammed); records of abstraction and water usage in villages are not available.	Reservoirs- Located adjacent to the bulk supply pipeline; connected by a short small diameter pipeline.	41 concrete 14 steel 55 plastic tanks
	Treatment Plant	1 plant on the Mutale River with a capacity of 13.05 million liters per day.
	Free Basic Water- Local municipality has 5 tankers that supply water once per week to villages that do not have stand pipes or where water sources are dry.	6000 liters per month per household; local municipality invoices the district the monthly free basic water expenditure.
IDP states “new dams are needed at Mutale”.	IDP requests to add contracted tankers for free basic water delivery.	IDP reports high maintenance of diesel engines, high engine theft and vandalism rate and electric cut-offs at boreholes; leaking and unclean reservoirs; bursting of aged plastic tanks.

In ‘deep rural’ areas, such as the four study villages, the people access water from fountains (natural or hand-dug springs in the tributaries of the Mutale River) and untreated groundwater from boreholes connected to a piped network with communal standpipes or a system storage reservoirs (Rietveld et al., 2009; Mutale IDP, 2012). Many people must travel considerable distances to fetch water from a working tap. The Mutale IDP reports that O&M as well as refurbishment needs for household and yard tap connections are “immense” (Mutale IDP 2012, p. 35).

4.2.3 The Mutale River

The Mutale River, about 20 km west of the villages of HaMakuya, lies almost entirely in the Luvuvhu/Letaba Water Management Area, and is undammed. The river originates close to Lake Fundudzi, which is historically sacred to the Venda people. The river flows northeast for approximately 120 km until it joins the Luvuvhu River just inside Kruger National Park. The naturally occurring surface water resources in the greater WMA region are fully utilized with little opportunity for additional development. The one exception is the Mutale River sub-catchment.³¹

Focus group participants said that historically the people of HaMakuya lived along the banks of the Mutale River. They said that in 1958 the government drilled boreholes for access to groundwater and the people moved away from the Mutale River. They said there was a river

31. Source: DWA Water Resource Situation Assessment, Luvuvhu/Mutale Sub-Area. <<http://www.dwaf.gov.za/Projects/Luvuvhu/WRSA.aspx>>

tributary that flowed near Musunda, even during a drought. Now, that river is dry. They said that most of the boreholes in their villages have stopped producing water and they do not have enough water.

<p>Older man responds to inquiry about accessing water.</p> <p><i>Before in time, all people they were sitting places along the Mutale River. In 1958, the government decided to drill boreholes, so people moved away from the river...Yes, the boreholes are gone, we have no water...They were supposed to make another hole, but government still has not done this. There is only one here, why? The people were born here; they want to make another family here. I have children, mine, they like these roots here and want to stay here.</i></p>
<p>Older woman responds to inquiry about why the Mutale River is important.</p> <p><i>We, we go to river to wash the clothes, animal drink water from river. Washing, drinking, animal drinking from river...And go fetch water for cooking. For drinking.</i></p>
<p>Plenary member responds to inquiry about why people think the Mutale River water is contaminated today.</p> <p><i>People throw trash, put anything inside of the water. That's why. We share even baboons, when we share with baboons same water from the river, so we need purification when it comes to human consumption... The government forbids us to drink that water, but they don't come and solve our problems.</i></p> <p>HaMakuya 20 May 2011</p>

4.2.4 Technical Assessment of Mutale Local Municipality Boreholes

Groundwater from boreholes is an important source of water in rural areas of MLM, yet borehole yields and groundwater monitoring are two problems faced by MLM (Mutale IDP, 2012). Figures 4 and 5 show borehole distribution in MLM. The villages of Guyuni,

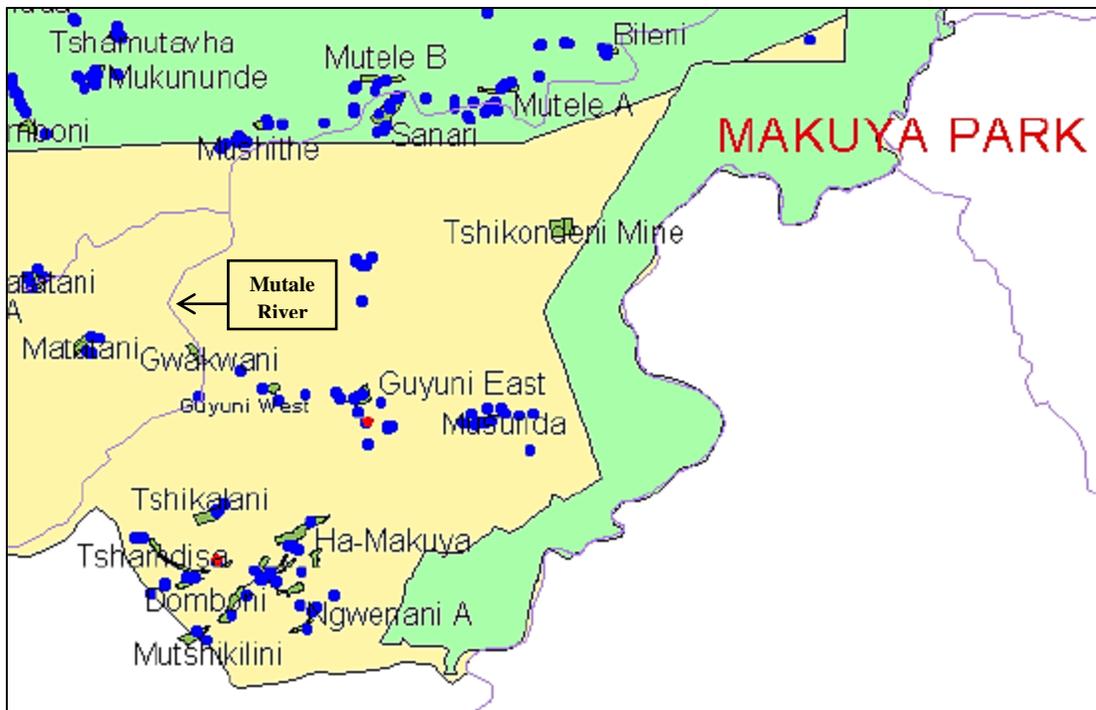


Figure 5. Figure 4 enlarged, showing borehole distribution near Guyuni West, Guyuni East and Masunda, (Mbyuni and Tshianzwane are near but not depicted). Source: Mutale IDP 2012.

A technical assessment of borehole groundwater systems in Mutale Local Municipality was conducted in October 2007 (Rietveld et al., 2009). The assessment provided a “snapshot” of fifteen villages (coded with letters A-O; thus the names of the villages are unknown). The assessment was based on four criteria – availability (adequacy of source in terms of quantity³² and quality), capacity (adequacy of storage and distribution to supply water to the demands of the village), continuity (consistency of supply without interruption), and condition (status of serviceability of facility components, such as pipes, pumps, reservoirs, standpipes, etc.). Despite the fact that the assessment was a one-time engagement, it

32. Availability failure is quantified as the percentage of time that the borehole drops below the point of extraction, and checking whether the storage reservoir for the borehole is sufficient for the demand and for how long. (Rietveld et al., 2009).

provides insight into the state of the borehole groundwater sources of the fifteen villages. In general, it was concluded that the functioning of the borehole systems was poor, including:

- Availability of drinking water was a problem due to poorly constructed boreholes; an overall conclusion was that the investment made into construction of the boreholes bears no benefit until they become operational;
- In most cases, the capacity of the installed infrastructure was good, although storage was limited in some villages;
- Continuity was often interrupted by disputes about fuel payments for pump motors as well as delays in maintenance and repair of the pumps; often repairs took a month or more resulting in a total failure of the system during that period;
- Condition was compromised by taps that were frequently damaged and which required regular replacement.

The focus group participants said that there are eleven boreholes in the area of the four villages and that only one was currently operational due to pumps not working or because the boreholes are believed to be dry. They said there were a lot of dry boreholes in Musunda and that the one functioning borehole in the area was in Musunda. The borehole storage tank in Guyuni was dry at the time of the focus group sessions (it is not clear for how long). The people said there is a problem with not knowing which boreholes have adequate water and how long they will supply water. The people said that they believe the Mutale River, not groundwater from boreholes, is a better source of water for the villages because the boreholes are always giving them problems. They said they would like the government to dam the Mutale River and build a treatment plant to supply the reservoirs within the villages of HaMakuya.

Plenary member response to inquiry about discussing water at the places where people meet or gather.

Everybody... in Makuya town hall they talk about water. You go anywhere, they talk about water. But, ah, the problem is the government make borehole for water, they don't make a lot of boreholes, we don't know which one with a lot of water, they just make eleven, [inaudible] system of taps [inaudible] water in all the boreholes, that is a problem... I think the problem is with making new boreholes, and how many times I can go, and how many boreholes we have, and how big an area of water [inaudible]... There is only one borehole.

HaMakuya, 20 May 2011

4.2.5 Household Access to Water

A large percentage of households in MLM have access to different sources of water; however, it is not certain whether many households have “access to a secure source of water suitable for human consumption” (Mutale IDP, 2012,p. 37).

Table 7 categorizes the types of water accessed by the households in MLM. There are 1798 households in Ward 13, the ward of the HaMakuya villages. The breakdown for the 1798 households within HaMakuya is not available.

Table 7. Number of households with access to water in Mutale Local Municipality (Mutale IDP, 2012).	
Piped water inside the dwelling	3077
Piped water inside the yard	2586
Piped water from access point outside the yard	12,607
Borehole	458
Spring	835
Small dam or pool	unknown
River or stream	1489

Focus group participants said that women in Musunda take water from the borehole and pump it into a reservoir, which is an earthen dam that was built to water livestock. The women divide the water among the people. When the tap pump is not working, water is still available at the dam. Apparently, the borehole does not have a pipeline to a storage tank and water at the dam is used both by livestock and for human consumption. They said they also go to the river (presumably tributaries of the Mutale River) to fetch water from springs at the river. They said they share the river with baboons and that people throw trash in the river, but if pumped water from the Mutale River is purified they will not have problems with it and it will be fit for human consumption. They said they drink the water from the river and that they do not get sick because it is flowing, even though they said the municipal government forbids them to drink water from the river. It is not clear if the people who fetch water from the river springs for household use actually purify the water every time in any way before drinking it, as they said they do not boil the water before drinking it. Figures 6 and 7 depict a typical borehole communal tap and wheelbarrow with 25 liter drum used to fetch water, respectively.

Older woman responds to inquiry about the importance of the village dam.

Eh, it is important for, for when we go and fetch water...this dam. She has borehole. And this dam is the reservoir for borehole. She takes the water from borehole and pour it at the dam, and divide it out to people, use tap for, for getting water, and there are small dam, like river, for she, when water is not running, she still have dam, for animals...for drinking animals. [Facilitator: But you said she takes the water... for other people in the village?]Yes. She have dam to for reservoir, to keep water...for drinking people.

HaMakuya 20 May 2011



Figure 6. Typical borehole communal standpipe.
Source: SallyKneidel.com



Figure 7. Typical wheelbarrow and 25 liter drum for fetching water.
Source: SallyKneidel.com

4.2.6 Access to Free Basic Water

The DWA reports in its FBW database in April 2012, that 20,898 out of 29,011 MLM households (72%) receive free basic water.³³ All of the villages receiving water supply from boreholes using diesel and electric engines are regarded beneficiaries of FBW (Mutale IDP, 2012).

The VDM is responsible for ensuring that free basic water and sanitation is provided to all indigent households (earning less than R1500 [US\$178]) per month). All village households that are considered indigent and are connected to a working reticulation scheme will get 6000

33. Source: <http://www.dwaf.gov.za/search.aspx>. The DWA states there are 29,011 households in MLM.

liters per month as FBW (Mutale IDP, 2012). The MLM has five tankers that supply water once per week to villages that do not have stand pipes or where water sources are dry.

However, the Vhembe IDP reports that in the MLM 70,614 people receive free basic water that is below RDP standards of 25 liters per person per day (Vhembe IDP, 2012). This means that most of the MLM households that are unable to pay for water and sanitation services and are entitled to FBW are actually receiving inadequate services.

Focus group participants did not discuss the FBW policy or whether or not their households received FBW entitled provisions.

4.3 Institutional Arrangements Affecting Water Services Delivery for the Villages of HaMakuya

Figure 8 shows the institutional arrangements for governmental and traditional leadership structures for the villages in HaMakuya. Arrows represent lines of communication.

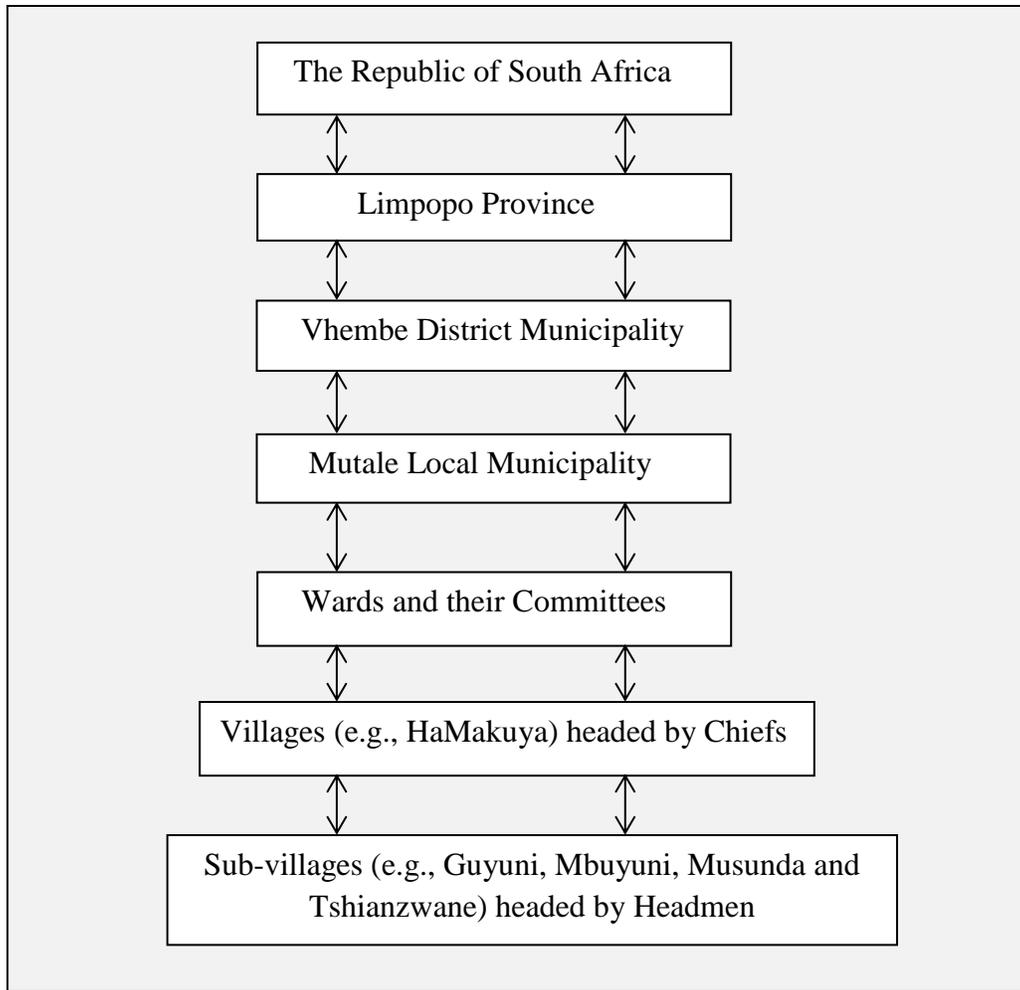


Figure 8. Governmental and traditional leadership structures in HaMakuya

4.3.1 Vhembe District Municipality Institutional Capacities and Planning

The Vhembe District Municipality (VDM) is the water services authority in the region. It transfers the function of water service provision to the MLM. In the VDM IDP 2012, the number one district priority and target (for the infrastructure cluster) is to cut in half the backlog of “people without sustainable access to safe drinking water by 2015” (Vhembe IDP, 2012, p. 9).

The February 2012 WSDP provides a comprehensive list of 358 projects (not all budgeted) with a total funds in budget of R4835 million (US\$582 million) to address the “water services issues and requirements” (Vhembe WSDP, 2012, p. viii). The WSDP lists MLM and Mutale Reticulation Water Scheme as having projects for household sanitation (not budgeted), purification works upgrade (budgeted) and proposed water meters (budgeted) (Vhembe WSDP, 2012). However, the WSDP states the planning and budgeting is not sufficient to eradicate the overall backlog in water and sanitation services.

The WSDP states the following critical developments and associated factors that impact the state of water services in the VDM for the immediate future (Vhembe WSDP, 2012):

- 60% of households have water below acceptable standards, that means their water supply has infrastructure, O&M and water resource needs;
- 81% of household sanitation facilities have infrastructure and O&M needs;
- The northern and southeastern areas of VDM do not have a long term solution for adequate water resources (HaMakuya lies in the far mid-eastern area of VDM);
- Large water-fed sewer sanitation schemes are not possible due to lack of volumes of water resources to support such a system;
- VDM relies heavily on grant funding for capital works and subsidies for operational aspects and water and sanitation entitlements (FBW); cost recovery occurs only in urban and peri-urban areas;
- Inadequate funding and staffing capacity results in water service providers (such as MLM) unable to make meaningful contributions to strategic development planning;

- There is a growing backlog in refurbishment of existing infrastructure; the replacement and O&M to extend the life of ages infrastructure is not adequately addressed due to tremendous overall budget and capacity shortages.

The above critical developments and factors are likely clustered in the poor rural areas of the district.

The VDM does not have a Water Conservation and Demand Management Plan. There is a great need for the implementation of water demand and conservation management projects (Vhembe IDP, 2012). Water loss through spillages in the VDM is estimated at 20% (36 million liters per day) of total production from all water produced with the district's schemes.

The Vhembe IDP 2012 states that water loss is impacted by (Vhembe IDP, 2012):

- The lack of cost recovery for water services;
- Insufficient bulk meters to monitor the system;
- Lack of control over the communal street stand pipes by the villages;
- Insufficient personnel to monitor project implementation;
- Illegal connections, bursting of plastic storage tanks and damages and theft of facilities and parts.

The Vhembe WSDP states that “information on infrastructure does not exist even though it is a critical aspect of water resources...operation and maintenance is not done efficiently due to lack of staffing, capacity and financial resources” (Vhembe WSDP, 2012, p. 14-15). The Vhembe WSDP also states that “basic water demand management can easily be implemented by flow management to village reservoirs...uncontrolled water use is a problem and political

intervention is required to assist the technical section to be able to implement measures” (Vhembe WSDP, 2012, p. 20).

It should also be noted that the VDM WDSP does not have a system to record customer service complaints. It is advised in the WDSP that the VDM give urgent attention to this aspect of service delivery for water and sanitation.

4.3.2 Mutale Local Municipality Institutional Capacities and Planning

The Vhembe IDP 2012 lists the strengths and weaknesses of the MLM as a water services provider in Table 8.

Table 8. Strengths and weaknesses of Mutale Local Municipality capacity as water services provider (adapted from Vhembe IDP, 2012).	
<p>Strengths:</p> <ul style="list-style-type: none"> An approved municipal organogram Political stability Established Ward Committees Mechanisms for public participation Approved budget and IDP Register of assets Water Service Level Agreement with VDM in place 	<p>Weaknesses:</p> <ul style="list-style-type: none"> Aging water infrastructure No cost recovery system in place Lack of O&M water infrastructure plan Lack of monitoring and metering of water system Unauthorized water usage Inadequate water infrastructure in remote rural areas

In the MLM, a lack of O&M infrastructure plan is a major concern. There are a high number of people who are considered indigent (Mutale IDP, 2012). Although there over 200 boreholes in the MLM, there are also maintenance issues, electricity cut-offs, and theft of manhole covers, padlocks, diesel engines and electric engine cables (Vhembe IDP, 2012).

The MLM is continuing to implement a strategy of connecting 1000 households per year and charging for water usage for the sake of cost recovery and O&M. However, the MLM IDP also states that there is a goal to connect 100 indigent households every year.

4.3.3 Traditional Tribal Leadership and Ward Committees

Historically, the main function of the traditional leaders regarding water resources was as guarantors of communal access to river tributaries and springs (Lahiff, 2000). Until recently this was largely a symbolic function with little practical need to regulate water use.

However, Nare et al. (2011) describe the influences of institutional water resources planning impacting traditional leadership, and the shifting role of the Chiefs toward managing demands for water and solving water-related disputes in the villages.

The traditional leaders, as heads of the villages, hold meetings at the leaders' *kraals* where various development issues are discussed. These village-level meetings provide a place where the people may discuss issues and complaints about water before they are passed on to the Ward Committees. The MLM Mayor and Traditional Leaders forum is established to promote good relationships between the municipality and the villages (Mutale IDP, 2012).

Focus group participants said that when they meet at their leader's *kraal* they get important communication about events occurring in South Africa and other information, such as job openings and issues "about law", acquiring "space" and settling general grievances among themselves. The older men and women especially showed deference to traditional leadership regarding "permission" to act on certain issues.

The Ward is the lowest level of planning for a local municipality; Ward Committee members participate annually in the municipal IDP planning process (Vhembe IDP, 2012). The Ward Committee comprises elected representatives from each village and is chaired by a councilor. The Ward Committee through the councilor forms a direct link between the villages and the MLM (Nare et al., 2011; Vhembe IDP, 2012).

The Mutale IDP reports political challenges faced by their local municipality's Good Governance and Public Participation program. Through the engagements with ward councilors, ward committee members, and community development workers, the following issues were identified as having a potential for negatively affecting their working relationship (Mutale IDP, 2012):

- Lack of understanding and clarity of roles and responsibilities;
- Different literacy levels and general understanding of local government between ward committees, ward councilors and community development workers;
- Poor coordination of ward committee and community meetings;
- Lack of commitment on some of the ward committee members and support staff;
- Unreliable reports and/or attendance registers;

- The fact that community development workers operate in local municipalities and report at the Provincial level.

4.3.4 Village Water Committees in HaMakuya

The focus group participants said there are water committees from different villages in HaMakuya, and that the committees are willing to work with researchers to obtain information to help solve the water problems in the villages. They said that they (it is not clear if they mean the water committee) report water problems to the DWA office in the Makuya Thusong Service Centre, and they sometimes get a response in good time. They said that if a tap is leaking they should order the necessary parts for basic O&M in advance so that the person that will fix it will come as soon as possible.

Younger man responds to inquiry about how people get important things done.
--

<i>.... the problem with water needs to get reported to the Department of Water Affairs at Makuya. [Facilitator: Is it a big problem in Mbuyuni? The water, is it often not working?] Yeah...the pump is not functioning.</i>

Younger woman responds to inquiry about how people get important things done.
--

<i>...for instance it is a problem of water. They report the problem to the Department of Water Affairs...It is the authority [inaudible] so they can fix the problem. [Facilitator: Does the problem get fixed when it is reported?] It depends on what kind of problem. [Facilitator: Is there water now...did you report the water problem? How long?] No [water now]. No, it does not take a long time. The problem is with the machines. They are not good...the pumps.</i>
--

Plenary member responds to inquiry about what group the village works with regarding water access. Prior to the inquiry, the plenary stated water access was the most important problem in their area.

There are some water committees from different villages. Those people are those who can work with you to solve problem like this. [Facilitator: Does every village have a water committee?]

Yes. I think that those people can, ah, work with you on coming to the water crisis.

HaMakuya 20 May 2011

There is little information obtained through literature review on village water committees in the villages of HaMakuya. It is not clear whether the village water committee communicates with or has representation at the established Mutale Water User Association, which has a much wider jurisdiction (Appendix III), or whether the water committees function similar to a separate WUA, which is to coordinate water management activities at the scheme, tributary or sub-catchment (in this case, the Mutale River) level (Faysse, 2004).

Three of the NGOs mentioned above, Mvula Trust, the NORAD-Assisted Programme and AWARD, provide field research reports on village water committee management of water supply and O&M activities. The NGOs' recommendations for community participation in providing assistance to governmental institutions with water services implementation will follow in section 5 of this report.

4.4 Conclusions

It is evident that the villages of HaMakuya face significant and urgent challenges with regard to access of safe, affordable and reliable water needed for the enhancement and sustainability of their livelihoods. Challenges include historic under-development of water infrastructure,

under-capacitated and under-funded municipal water institutions, and no real working O&M or cost recovery systems (legally constituted or ad-hoc) for tariffs collection above free basic allowances or even collections for minor facilities repair. As for the four HaMakuya villages in my study, one out of eleven boreholes in the area produce water, the women of the villages fetch and distribute water for domestic consumption from the Mutale River (or its tributaries) or the borehole-supplied small dam used for livestock watering, and village water committees do exist but people still rely on DWA officials from outside the villages for borehole pump repairs. Cost recovery for, at the least, tap and pump repair and O&M functions in the villages are two practical and urgent areas that are parallel processes for improving water access in the immediate term and potentially improving livelihoods and contributing to poverty reduction in the long term (AWARD, 2009a). From study findings, I conclude it is likely that whenever an institutional arrangement is decided upon to create functioning systems for cost recovery and O&M teams at the village level, many of the challenges will be addressed.

The stable institutional arrangements of the Vhembe District Municipality (water services authority) and Mutale Local Municipality (water services provider) appear to be a more functional political situation for decision-making and facilities investments than what is occurring in the Bushbuckridge Local Municipality. Therefore, the feasibility of legally constituting effective and efficient village water committees in the HaMakuya villages to work in collaboration with the Mutale Municipality may be real and appropriate. Next steps going forward after constituting viable village water committees are a) strategizing for cost recovery, including metering, billing and collections, b) sourcing O&M mechanical and technical support, and c) building good communication and trust among village residents.

5. Recommendations Going Forward for the Village Water Committees of HaMakuya

The NORAD-Assisted Programme developed by DWAF³⁴ published a comprehensive Toolkit for Water Services aimed at enhancing DWAF and municipal water institutions, as well as implementing sustainable rural groundwater schemes and technologies. Number 7.1 in the toolkit is Sustainability Best Practices Guidelines for Rural Water Services (DWAF, 2004b). Drawn from the best practices and interventions in this toolkit, the field experiences of Mvula Trust, AWARD and Gibson (2010), as well as my study focus group interviews, I conclude with recommendations for best practices going forward for the village water committees of HaMakuya.

For the HaMakuya village water committees to become legal entities and contract with the Mutale Local Municipality for O&M responsibilities and functions, the committees must create their Constitutions (DWAF, 2004b). The Constitution outlines responsibilities, operational and legal frameworks and accountability, and rules of governance of the committees. The particular rules governing the actual O&M functions of each village water scheme are outlined in the individual service agreements with MLM. To ensure good governance, establishing a community participatory process will be critical in forming an effective committee and in creating the Constitution. Mvula Trust (2011) warns that development of many committees focuses only on water project “hardware” (pumps, taps,

34. The NORAD- Assisted Programme for the Sustainable Development of Groundwater Sources collaborated with DWAF under the Community Water and Sanitation Programme in South Africa from 2000-2004 (DWAF, 2004b) .

supply lines). When developing committee rosters, HaMakuya villages should also focus on management and finance tasks, as these skills are critical inputs for sustainable committees.

A model constitution is available from DWAF (DWAF, 2004b).

It is essential that the HaMakuya committees conduct (or obtain) a survey of the water supply facilities in the respective villages under their jurisdiction (AWARD, 2009a). The primary objective is to generate informational logs to eventually determine water supply requirements for a fully capacitated and operational village water supply scheme as well as to estimate costs of improvements and technological skills development needed for O&M (Gibson, 2010). All boreholes (both functioning and non-functioning), water tanks and reservoirs, standpipes, and household connections (and reticulation networks, if any) should be identified and assessed for possible rehabilitation. Water quality and borehole yield tests may also be conducted.

5.1 General Areas of Concern and Best Practices for Interventions

Once the HaMakuya village water committees become legally constituted, there are three general and common areas of concern regarding the current and future state of community involvement and sustainability of committees. They are:

- Cost recovery and financial accounting, including metering, billing and collections,
- Institutional arrangements and skills development for O&M,
- Good governance, communication, trust-building, and representation of women and youth in the establishment and functions of committees.

5.1.1 Cost Recovery and Financial Accounting

Problem—

There is no cost recovery on the remote rural water supply schemes in Vhembe district-wide. Rural schemes are not deemed sustainable if there is no collection of funds to support O&M functions, major repairs and administrative costs (DWAF, 2004b).

DWAF Toolkit Intervention for HaMakuya VWCs and Constituents—

Educational programs within the villages of HaMakuya will highlight and explain the costs associated with accessing, pumping, treating, storing, piping, metering, controlling, maintaining and protecting the water resources. Educational solutions such as posters may show a breakdown of expenses and assist those who cannot read or don't trust a billing statement. For example, if a flat rate of R5 was charged, a poster would show pictures relating that R2 went to O&M staff, R1 went for diesel, R1 went for repairs, and R1 went for committee staff and administration (Mvula Trust, 2011).

Problem—

Difficulties in monitoring the use of water over the entitled free basic water level makes it difficult to quantify the amount that is billable. Water use above basic allowances is critical for income-producing activities that contribute to enhanced livelihoods and reduced poverty.

DWAF Toolkit Intervention for HaMakuya VWCs—

Meters or other gauges of consumption are a critical component of cost recovery. Efforts should be made to install monitoring and metering systems at rural schemes in HaMakuya.³⁵ Support by the Ward Councilor in acquisition for funds is imperative. If meter costs exceed recovery, subsidies should be investigated (funded out of taxes, grants, etc.) Localized or tap-level billing and collection (with special consideration for household income cycles and those that need to pay more frequently in smaller amounts) should be considered, with collections paid to the village-level committee (Mvula Trust, 2011). Auditing would be performed by the MLM.

5.1.2 Institutional Arrangements and Skills Development for O&M of Rural Water Schemes

There are often institutional gaps relating to the configurations of authority and responsibility for O&M of the rural water schemes (DWAF, 2004b). Configurations may range from a more centralized authority at the municipal level (often distant and separated from villages by poor roads) to localized village-level arrangements for O&M. However, it is unreasonable to expect every rural village committee in HaMakuya to have equipment expertise (such as welding skills) (Gibson, 2010). Without interventions for skills development, small failures may result in water scheme dysfunctions village-wide.

35. WD-SA (2008) notes that regarding plans for household meters in one of its study villages, residents had mixed feelings about meters as some feel it was reducing their access to water while others feel it would be easier to monitor use and that infrastructure might be better maintained if the village were paying for water above their free basic water allowances.

Problem—

Municipalities as water services providers, such as MLM, are generally not knowledgeable about what is happening in the water schemes of remote rural villages on a daily basis. Events, situations, community complaints, conflicts unique to rural water schemes are difficult to monitor and respond to from a distance (DWAF, 2004b; WD-SA, 2008).

DWAF Toolkit Intervention for HaMakuya VWCs—

Management of O&M tends to work best at the grass roots level (DWAF, 2004b; AWARD, 2009a; Mvula Trust, 2011). HaMakuya committees acting as O&M managers may be an institutional arrangement reflecting a better managed scheme. The MLM, as water services provider, should consider contracting O&M functions and water quality monitoring activities at the most localized level and consider such options as HaMakuya VWCs. Committees often collect money at households rapidly to resolve problems like a broken tap or pipe, rather than wait for a distant agency to repair the break. The committees may serve as direct lines of communication and regular reporting of measures the village should take if water quality drops below standards (Mvula Trust, 2011). The HaMakuya villages may also consider a multi-village approach for committees with exemplary management skills, and consider new approaches beyond volunteerism as a strategy to retain well-trained managers (Mvula Trust, 2011).

Problem—

There are limited technical capacities, time and finances to train every HaMakuya village to operate and maintain a water scheme at the village level (Gibson, 2010; Mvula Trust, 2011).

The costs of technical support represent a large proportion of the overall costs of operation and maintenance.

DWAF Toolkit Interventions for HaMakuya VWCs—

The technical nature of water schemes is becoming more sophisticated, creating a need for greater technical expertise (often not found even in local municipalities) (Gibson, 2010). The lesson taken from this is HaMakuya committees carefully consider the most appropriate technology for a given village, and continually reassess in scheme expansion planning. High levels of initiative and commitment are critical to sustain technical functions of O&M. Here again, the HaMakuya villages may consider a multi-village approach for committees with exemplary technical skills, and consider new approaches beyond volunteerism as a strategy to retain well-trained technicians.

5.1.3 Community Involvement and Representation of Women and Youth

The rural water schemes reviewed by the NORAD-Assisted Programme generally had poor or non-existent representation of women in the VWCs (DWAF, 2004b) and in O&M functions (Mvula Trust, 2011). It is typical in South Africa that women traditionally manage the provision of water in the household. From the focus group sessions in HaMakuya, it was found that women and children fetch most of the household water, and that women manage the tap at the borehole in Musunda. Mvula Trust states that many O&M functions in the villages did not meet the needs of the women as custodians of household water (Mvula Trust, 2011).

Problem—

Women and youth may not have a good sense of ownership of their water supply scheme. The involvement of women and youth in O&M functions may be non-existent once the construction of a new borehole, for example, is completed, even though women are often “tap coordinators” (Mvula Trust, 2011).

DWA Toolkit Intervention for VWCs and Constituents—

Women and adult youth of HaMakuya should hold memberships and executive positions in their village water committees. Ideally, executive positions should be filled in a transparent and fair democratic electoral process so that accountability to village constituents is maintained and those previously disaffected by poor representation are included. Youth should be mentored and trained for future contributions in management and leadership functions, such as the choice of technology and materials, collections and accounting, dealing with defaulters who will not pay, handling complaints and conflict resolutions.

5.2 Conclusions

External administered, under-capacitated and under-funded operation and maintenance systems in most of South Africa’s remote rural former Homelands have not fulfilled the safe, affordable and reliable water requirements that are needed to redress apartheid race and gender inequities and reduce historical poverty. Water services are often disrupted, maintenance is poor, response times to problems tend to be long, and people often walk long distances to fetch contaminated water. In the HaMakuya villages, as a common example, water use is not accounted for and there is no cost recovery. Cost recovery and operation and

maintenance systems managed by legally constituted water committees, with appropriate women and youth representation, allow for managing larger, more technical, issues at the scheme level, beyond simply a broken tap. By devolving water access responsibilities to a village water committee, the burden on a remote municipal agency to keep the scheme running diminishes, preventive maintenance improves, repairs occur in a timely process, and the scheme operating costs to the households will likely decline. Greater attention is paid to the role of water as an asset within household livelihood strategies. The national objective for water supply development and achieving homogeneous per capita coverage gives way to long-term poverty reduction outcomes precipitated by increased water demand for household productivity. This, in turn, reinforces livelihood strategies and village-level capacity to create economies to sustain a heterogeneous demand-based community.

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APPENDIX I

The Focus Group Questionnaire and Plenary Discussion Questions

Focus group questionnaire:

1. If a new person comes to your village, what would you tell them that you are proud of about your village?
2. What are the things that are most valued within your village? (What the village values and needs is the key here. (The idea here is to get to assets in the village but this is a perception question).
3. They may identify some natural resources. They may identify some social structures. **ONLY** if they mention, probe further. Separate into groups. Use their words based on what they have mentioned.
 - a. Why are these natural resources most valuable to you? Name the things they have identified so far. Use their words as much as possible. E.g. “You suggested that water and fire wood were important. Why are these most valuable to your village?”
 - b. Why are these social structures most valuable to you? Name the things they have identified so far. Use their words as much as possible. E.g. “You suggested that the tavern and church were important. Why are these most valuable to your village?”
4. What are the things that are most used within the village? (The idea here again is to get to assets but in terms of actual behavior, rather than perception).
5. They may identify some natural resources. They may identify some social structures. **ONLY** if they mention, probe further. Separate into groups. Use their words based on what they have mentioned.
 - a. Why are these natural resources most used in your village? Name the things they have identified so far. Use their words as much as possible. E.g. “You suggested that water and fire wood were important. Why are these most valuable to your village?”
 - b. Why are these social structures most used in your village? Name the things they have identified so far. Use their words as much as possible. E.g. “You suggested that the tavern and church were important. Why are these most valuable to your village?”

6. How do you take action to get things done in your village? (We are trying to get at organization through this question).
7. If firewood was not mentioned: Is firewood important in the village? How? Why?
8. If water was not mentioned: Is water important in the village? How? Why?
9. If social structures not mentioned: Where are the places where people gather with others in the village? Probe specifically about: Law, spirituality, fun, education. How are those important to the village? How? Why?
10. Do you think these things that are important in the village now will be here when (future) children of the village grow up? Why? Why not?
11. We have talked about many things that are valuable to the village. What can be done to make sure these remain here in the future?
12. Of the things we have talked about, what can make your village stronger?

Plenary discussion questions:

1. Previous studies have found several challenges faced by your village. Are these still the challenges faced by your village? If not, what are the challenges? If so, what are the most important ones?
2. How can you use the strengths you have talked about to deal with these challenges?
3. As scientists, we also want to help you. We have some expertise in some of the areas we have talked about today (firewood, water, etc...). Scientists know things about how the climate is changing. We can help plan for agriculture better. We can offer similar knowledge from elsewhere. Information sharing. Access to tools. Networking. Information systems. Maps. What kind of science could we do to help you strengthen the things that work well in your community? What kind of knowledge can we help you with?

APPENDIX II

Villages served by Makuya Thusong Service Centre*:	
<ol style="list-style-type: none"> 1. Tswera village 2. Tshitavha village 3. Hahunguwi village 4. Sambandou village 5. Mabunde village 6. Vhurivhuri village 7. Khavhambe village 8. Mutshikilini village 9. Maholoni village 10. Nwiini village 11. Fhandani village 12. Lamvi village 	<ol style="list-style-type: none"> 13. Gondeni village 14. Gotha village 15. Tshambuka village 16. Domboni village 17. Tshikalani village 18. Mbuyuni village 19. Musunda village 20. Guyuni village 21. Tshianzwane village 22. Sanari village 23. Mukoma village 24. Nkotswi village
<p>* It is not clear whether all 24 villages fall within the jurisdiction of the Chieftaincy of HaMakuya.</p>	

Source: Makuya Thusong Service Centre (government services), Greater Mutale Municipality, Vhembe District, Makuya Village, Masisi-Makomve Road, Mutale, 0970. <http://www.thusong.gov.za/provincial_maps/limpopo/makuya.htm>

APPENDIX III

Establishment of Mutale Water User Association on 24 March 2006, showing area of jurisdiction.

52 No. 28630

GOVERNMENT GAZETTE, 24 MARCH 2006

No. 263

24 March 2006

DEPARTMENT OF WATER AFFAIRS AND FORESTRY

ESTABLISHMENT OF THE MUTALE WATER USER ASSOCIATION, DIVISION/MAGISTERIAL DISTRICTS OF MUTALE, PROVINCE OF THE LIMPOPO, WATER MANAGEMENT AREA NUMBER 2

I, Elias Seani Mbedzi, Executive Manager: Institutional Oversight, hereby in terms of section 92(1) of the National Water Act, 1998 (Act No 36 of 1998), declare that-

- (a) the Mutale Water User Association is established;
- (b) the Association's name is the Mutale Water User Association;
- (c) the area of operation of the Mutale Water User Association includes all properties in respect of which any person is entitled to use water (surface and underground water) by virtue of entitlements in terms of section 22(1) of the Act as follows:

- (i) The main catchment of Mutale river start from Thononda and Tshiheni villages and the forestry where from Mutale and its upper most tributaries originates including Lake Fundudzi down along Mutale river from Fundudzi lake down up to the confluence of Mutale and Luvuvhu river which is at Mavhilani.

Southern border start at Tshatshingo and include areas like Tshiombo and Makonde.
Northern border start at Shakadza and include areas like Mbodi River, Tshivhongweni Mountains, Tshipise, Ha-Mamanevzhe, Tshenzhelani, Masisi down to Kruger National Park.

Eastern border start at Sambandou and include areas like Makuya, Tshikondeni confluence of Mutale and Luvuvhu River.

Western border start at Tshiheni and include areas like Thononda, Khakhu, Dzimauli, Thengwe and Tshikundamalema.

- (ii) any other water resource situated outside the area described in paragraph (i) above, which water resource and accompanying area the Department of Water Affairs and Forestry or the responsible authority may require the Association to control,

which is situated in Water Management Area number 2 in the Province of the Limpopo; and

the constitution of the Mutale Water User Association has been approved.


ELIAS SEANI MBEDEZI
EXECUTIVE MANAGER: INSTITUTIONAL OVERSIGHT
17/02/06

APPENDIX IV

North Carolina State University Institutional Review Board Decision Letter

8 April 2011

Paula,

I would like to thank you, Melissa, and David for taking the time to come to the IRB to discuss your current project. As you know the main thrust of the conversation was to make a decision about the intent for your project. After much discussion it was agreed upon by all that your project is being done, at this time, to satisfy the requirements of the NR 595 study abroad course. Although you had reported a dual intent for this project (in A.1. of your IRB submission) which includes the satisfaction of a Master's project requirement, further discussion concluded that you do not have your proposal for the Master's project formulated at this time. With this said, the decision for the need for IRB review was based upon the use of data for the NR 595 course at this time.

It was agreed upon that the current intent for this project (and the use of the data collected) is to satisfy a course requirement and this makes you eligible for a waiver of IRB application. I have added the IRB guidelines below regarding this waiver for your peruse. Please also note that if you do decide to use some of this data for use in your Master's project, I can work with you on this at a later date.

On a broader note to address the needs of the other students in the NR 595 course it was determined that Dr. McHale's work with these students through the use of human subjects in South Africa is intended purely for educational purposes and there are no specific plans to use data collected outside of the classroom, at this time. The IRB determination for these study activities are consistent with Paula Cothren's individual project and a waiver of IRB application is also applicable. Dr. McHale was informed that if the intent of study activities changes in the future than IRB application may be warranted.

Thanks and please let me know if you have any questions or further needs.

WAIVER OF IRB APPLICATION FOR CLASS PROJECTS

Specifically, class-assigned projects using humans as subjects for "purely educational purposes" do not meet the criteria in the federal definition of research. "Purely for educational purposes," means that the class-assigned activities are conducted for pedagogical reasons only, and data from the activities or results of the activities are not intended to be used outside of the class. In these cases, classroom projects are not considered "research" under the federal regulations [45 CFR 46.102 (d)] that govern the use of human subjects in research and do not qualify for IRB review.

Instructors who implement class-assigned projects are responsible for overseeing the class projects undertaken by their students and ensuring that ethical principles are adhered to in the conduct of those activities.

The following are some general guidelines for class-assigned projects that are not considered human subject research and do not require IRB approval:

1. Data obtained from the project are not intended to be used outside of the class, for example in publications, presentations at professional meetings, applications for funding, or used in independent/honors/thesis/dissertation research (including activities preparatory to such research, i.e. pilot data). Typically, projects that are intended for use outside of the class would have been planned with a particular purpose already in mind. If class-assigned projects yield unexpected results that warrant further investigation or analysis in preparation for use outside the class setting, IRB approval for such activities may be sought and granted.
2. The IRB recommends that class projects do not involve vulnerable populations. This includes minors (under 18), prisoners, pregnant women, employees in organizational research, or persons lacking the capacity to give informed consent.
3. The IRB recommends that class projects do not expose human subjects to more than minimal risk or involve sensitive topics (see below).

Sensitive Topics -The following topics are considered sensitive topics for class project activities:

- sexual orientation, sexual behaviors or attitudes regarding sexual conduct, practices of contraception incest, rape, sexual molestation, abortion and/or pregnancy
- substance use and/or abuse including, but not limited to, alcohol, marijuana, steroids, amphetamines, narcotics and any prescription medication legally or illegally obtained
- questions regarding mental health (e.g., suicide, depression, obsessive compulsive behaviors including, but not limited to, gambling, smoking, eating, etc.)
- traumatic experiences of an individual, including war or combat experiences of veterans

4. It is very important for instructors to remember, model and teach that the voluntary participation of individuals without any coercion or pressure is a pivotal element of any successful research (or quasi-research) project.

If you have any questions concerning these guidelines please contact me.

Carol Mickelson, IRB Coordinator

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