ALLOCATION AND USE OF WATER FOR DOMESTIC AND PRODUCTIVE PURPOSES: AN EXPLORATORY STUDY FROM THE LETABA RIVER CATCHMENT

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KEY WORDS

Water allocation

Water collection

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Water management institutions

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Water allocation reform

Water scarcity

Right to water

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ABSTRACT

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In this thesis, I explore the allocation and use of water for productive and domestic purposes in the village of Siyandhani in the Klein Letaba sub-area, and how the allocation and use is being affected by new water resource management and water services provision legislation and policies in the context of water reform. This problem is worth studying because access to water for domestic and productive purposes is a critical dimension of poverty alleviation.

The study focuses in particular on the extent to which policy objectives of greater equity in resource allocation and poverty alleviation are being achieved at local level with the following specific objectives: to establish water resources availability in Letaba/Shingwedzi sub-region, specifically surface and groundwater and examine water uses by different sectors (e.g. agriculture, industry, domestic, forestry etc.,); to explore the dynamics of existing formal and informal institutions for water resources management and water services provision and the relationship between and among them; to investigate the practice of allocation and use of domestic water; to investigate the practice of allocation and use of irrigation water.

The study concludes that there is a problem of water scarcity in the study area and that the water scarcity is caused by the growth in the population, specifically in the Giyani area; these problems are exacerbated by financial and institutional obstacles within local institutions of governance. The water scarcity is not, therefore, natural but anthropogenic in nature.

The water scarcity is not felt by all sectors, however: some farmers have access to water for irrigation, while many others face great challenges in their farming activities.

Overall, people in Siyandhani and surrounding villages surrounding villages in the Letaba Catchment do not have access to water because of human action, hence the use of the concept of manufactured scarcity. The lack of access to water, it is argued, leads to the violation of the human right to water. This study concludes that water reform, which is widely seen as a priority for South Africa, has not yet reached the villages of the Klein Letaba.

February 2009

DECLARATION

I declare that *Allocation and Use of Water for Domestic and Productive Purposes: An Exploratory Study from the Letaba River Catchment* is my own work. All other sources, used or quoted, have been indicated and acknowledged by means of complete references. This thesis has not been submitted for a degree at another university.

THOKOZILE GLENDA MASANGU

February 2009

Signature:

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ACRONYMS

B4E	Block 4 E
BWR	Basic Water Requirement
CASP	Comprehensive Agricultural Support Programme
CBD	Central Business District
CMA	Catchment Management Agencies
CMF	Catchment Management Forum
CWSS	Community Water Supply and Sanitation
DoA	Department of Agriculture
DM	District Municipality
DPLG	Department of Provincial and Local Government
DWAF	Department of Water Affairs and Forestry
FBW	Free Basic Water
GDAF	Gazankulu Department of Agriculture and Forestry
GGM	Greater Giyani Municipality
Ha	Hectares
HDIs	Historically Disadvantaged Individuals
ICESCR	International Covenant on Economic, Social and Cultural Rights
IDP	Integrated Development Plan
KNP	Kruger National Park
LDA	Limpopo Department of Agriculture
LM	Local Municipality
lpcd	litres per capita per day
MDM	Mopani District Municipality
MIG	Municipal Infrastructure Grant
MLC	Middle Letaba Canal

MLIS	Middle Letaba Irrigation Scheme
MLRWS	Middle Letaba Regional Water Scheme
NWA	National Water Act
NWP	National Water Policy
NWRS	National Water Resource Strategy
RDP	Reconstruction and Development Programme
RESIS	Revitalization of Smallholder Irrigation Scheme (RESIS)
RSA	Republic of South Africa
S.A	South Africa
SALGA	South African Local Government Association
SFA	Siyandhani Farmers Association
SFWS	Strategic Framework for Water Services
StatsSA	Statistics South Africa
TA	Tribal Authority
UN	United Nations
UNDP	United Nations Development programme
WHO	World Health Organization
WMA	Water Management Area
WMI	Water Management Institution
WSA	Water Services Act
WSDP	Water Services Development Plan
WSP	Water Service Provider
WUAs	Water Users' Associations

CHAPTER 1: INTRODUCTION

1.1 Background to the water sector in South Africa

South Africa is a water-scarce country with a history of deep inequities in the distribution of land, water and other resources. Recent estimates of fresh water resources indicate that South Africa faces growing water scarcity and is projected to experience severe water scarcity by 2025. The poor people of South Africa often have limited or restricted access to natural, physical or financial resources. Amongst these is water, in terms of both quality and quantity (DWAF, 1994). In 2006, the South African population of around 42 million people had just over 1,200 kilolitres of fresh water available for each person per year (Thompson, 2006).

The total surface area of South Africa is 1,220,813 km^2 (StatsSA, 2006a). Land distribution is highly unequal: in 1994, the minority white population owned approximately 87% of the land, while the majority black population owned held only 13% of the land under a variety of tenure forms, most notably communal tenure (Lahiff 2000; Seetal and Quibell, 2005; Hall, 2004). The recently repealed Water Act (Act 54 of 1956), which was based on Roman-Dutch riparian rights principle, gave access to water to those who owned land rights.

Inequalities in access to water are even greater than those for land: 95% of water for irrigation is used by (overwhelmingly white) large-scale commercial farmers, while black farmers (most of them very small scale) have access to only 5% (Versfeld, 2003). In Letaba/Shingwedzi (L/S) sub-region of the Luvuvhu/Letaba water management area, for example, there are about 34,000 hectares developed for irrigation and most of this occurs along the Groot Letaba River (91%) and remains in the hands of white commercial farmers, with only 2,840 ha along the Klein Letaba and its major tributary, the Nsami River in the Giyani area, and about 270 ha along the Mphongolo River in the Malamulele area (DWAF, 1990).

South Africa has a high proportion of its population living in rural areas, approximately 70% (Versfeld, 2003). Limpopo Province is the most rural province in the country and, according to the 2001 census 86% of the province's population was living in rural areas in 2001, most of these in the former homeland areas (StatsSA, 2004). Communities in the former homelands are facing unemployment rates of up to 75% due to lack of economic activity (Hoogeveen and Özler, 2006). Poverty continues to be heavily concentrated in rural areas of South Africa.

The transition to democracy in South Africa in 1994 provided an opportunity for the new government to revise legislation and to develop new policies aimed at addressing the poverty affecting the lives of many people (Seetal and Quibell, 2005: 154); of which improving access to natural resources and municipal services are important parts. There are now two major laws guiding water reform in South Africa, namely: the National Water Act (NWA) No 36 of 1998 and the Water Services Act (WSA) No 108 of 1997. These Acts are enabling laws, empowering the government to manage the water resources (NWA) and to provide potable water and sanitation services (WSA).

These two acts were intended to address issues of equality and redress past inequities (Seetal and Quibell, 2005). The Water Services Act recognises the right of everyone to access to basic water supply and basic sanitation, and the NWA provides for a racial departure from the way water has been owned, and managed, in the past (Versfeld, 2003).

The Department of Water Affairs and Forestry's White Paper on Water Supply and Sanitation Policy of South Africa states that 'the fundamental issue to be addressed in the water sector is that of equity, and that the line which divides those with adequate access to water from those without is the same line dividing the rich from the poor, the hungry from the well fed, the line of race and privilege' (DWAF 1994: 3). The goal of the national Department of Water Affairs and Forestry, as outlined in the

White Paper on Water Supply and Sanitation Policy of 1994, is to end the inequity in access to basic water supply and sanitation.

1.2 The challenge of water reform in South Africa

As mentioned above, South Africa is a water-scarce country. While the natural quality of the water is generally good, the natural quality of the water of the rivers in the southern and western coastal regions, and of the groundwater in the extreme western parts of the country, is low due to geology (Thompson, 2006). Almost 3% of the mean annual runoff of surface water is intercepted by invading alien vegetation. Water resources in South Africa are international in character and are shared with the neighbouring countries of Swaziland, Mozambique, Lesotho, Botswana, Namibia and Zimbabwe.

According to Thompson (2006), South Africa lacks effective provision of water for certain sectors. When the democratic government took office in 1994, there was great inequity between different racial groups in terms of access to water services. Only 43% of black people had access to piped water to support life and personal hygiene compared to nearly 100% for other groups (Thompson, 2006); there were 12 million people without access to safe water and 20 million people without adequate sanitation out of a total population of 42 million (DWAF, 1994).

Many women and children in rural areas continue to walk long distances to collect water for domestic use. Malubane (2005) found that rural women at Mbatlo village in Mopani district municipality had to walk a distance of up to four kilometres to collect water for domestic use. Lack of access to water supply and sanitation constrains opportunities to escape poverty, and it is appropriate that a key focus of South Africa's water services policy should be on ensuring that the poor have access to adequate, affordable and sustainable levels of defined water supply and sanitation services.

The inequity in access to water is, furthermore, a global problem. Some 1.1 billion people in developing countries have inadequate access to water and the deficits, according to the United Nations Development Programme (UNDP) human report of 2006, are rooted in institutions and political choices and not in waters' availability. The UNDP (2006) notes that there is tremendous inequity in access to clean water at household level. Households in cities enjoy access to several hundred litres of water delivered to their homes at low prices while the poor households in rural areas of the same countries have access to much less than the 20 litres per capita per day (lpcd) required to meet the most basic human needs.

Irrigation is the dominant user of water in South Africa, representing about 62% of the total water use, and it is concentrated mainly in the drier parts of the country (Thompson, 2006). Domestic and urban uses of water constitute about 27% of total water use while mining and other large industries not obtaining water from municipalities constitute 8% of the total. About 20% of total river flow is required for maintaining a healthy biophysical environment and this proportion – known as the ecological reserve - varies across the country, from 12% in drier parts to 30% in the wetter areas (Thompson, 2006).

Strong growth in water requirements (of roughly 3% per year) is foreseen in South Africa in the domestic, urban and industrial sectors in the coming years, driven by population growth, urbanisation, increased standards of living and services as well as economic growth and industrialization (Thompson, 2006).

Most of the water in South Africa occurs in the eastern and south eastern parts of the country, while the greatest needs are in the central region and adjoining areas. In some parts of the country water utilisation already exceeds the resource potential and in the northern parts of the country, both surface and ground water resources are nearly fully developed and utilised.

Surface water resources are the largest and most important water resource in South Africa and consist of rivers, streams, springs, lakes and wetlands. According to Thompson (2006), most of the water in the rivers and streams could only be made available through the construction of dams to store the water. South Africa is heavily dependent on surface water resources for most of urban, industrial and irrigation water supply.

Ground water played an important role in the development of South Africa and most farms, rural settlements and villages are primarily dependent on ground water. Many ground water sources contribute to the base flow of the rivers. Areas with the largest yield potential are the areas where ground water makes the largest contribution to surface flow. Exploitation of ground water can lead to reduction in surface water, including rivers.

Reconciling the total available water and the total water requirements shows that deficits exist in more than half of the country's water management areas (e.g. the Luvuvhu/ Letaba water management area: DWAF, 2004a).

It is estimated that South Africa will reach the limits of its economically usable land-based fresh water resources during the first half of the 21st century, if current trends in water use and population growth continue. Thompson (2006) argues that these trends could be changed by means of strategic intervention and that it is necessary to put in place 'an effective framework to ensure that the country's water resources are protected, used, developed, conserved, managed and controlled in a sustainable and equitable manner in the long term for the benefit of all South Africans.'

According to Thompson (2006) such a framework should:

- Include the provision of water services essential for achieving optimum long term, environmentally sustainable, social and economic benefit for people, plants and animals;
- Give effect to the constitutional mandate relating to water by involving the different role-players;
- Be based on the relevant provisions of the Constitution of South Africa; and
- Aim at the management of absolute water scarcity as well as the provision of water services with significant participation by all role-players ranging from local to catchment and national level.

1.3 Objectives of the study and Key Research Questions

The objective of this study was to explore the allocation and use of water for productive and domestic purposes in the context of the current water reform in South Africa through a detailed study of the village of Siyandhani, located within the Klein Letaba sub-area, in Greater Giyani Local Municipality of Limpopo Province, South Africa.

1.3.1 Specific Objectives

The specific objectives of the research were as follows:

- To establish water resources availability in the Letaba/Shingwedzi sub-region, specifically surface and groundwater, and establish water uses by different sectors (e.g. agriculture, industry, domestic, forestry etc.). This part of the study was not intended to provide new information about water availability but to illustrate the existing inequities in water allocation and use in the sub-region.

- To explore the dynamics of existing formal and informal institutions for water resources management and water services provision and the relationship between and among them: including legislation, official agencies, and customary and informal institutions.
- To understand the practice of allocation and use of domestic water, and its outcomes at the household and community levels.
- To understand the practice of allocation and use of agricultural water, and its outcomes at the household and community levels.

1.3.2 Research Questions

The central question that the study pursued was:

> *What is the current allocation and use of water for productive and domestic purposes in a communal area of the Klein Letaba sub-area, and how is it being affected by new water resource management and water services provision legislation and policies?*

The Table below indicates the more specific research questions that were addressed and the data sources used in order to achieve various research objectives.

Table 1: Specific research questions

Specific Objectives	Research questions	Data Source
Establish water resource availability and use in Letaba/Shingwedzi sub-region	• What water resources are available? Infrastructure, rivers, dams • How are the water resources available shared and used by the different sectors?	Secondary literature Secondary literature
Explore institutional dynamics of water allocation and use	• What local level water management and water services provision institutions are in place and what is the relationship of these institutions in water management? • What are their roles?	Secondary literature Secondary literature
To understand the practice of allocation and use of domestic water	• What are the drinking water sources? How far is the source? • How much water is collected / used from source? (lpcd) • What is the water used for? • Do people have access to uninterrupted drinking water? • Why are people not getting access to clean water? • Who is responsible for water services provisions and how is the quality of the service provided? • What is the perception of households on whether domestic water supply has improved in the former homelands since 1994 (in terms of the maintenance of the resources, continuity of water supply)? • What are the productive uses of water? • How much water is used for these productive activities? • What are the economic benefits of using domestic water for productive purposes? • Do people pay for water? • How does the practice of water allocation and use link to the change in policy? • Are the current water reforms relevant in the area? • What are the needs for reform in the area?	Mainly primary data with some secondary literature
To understand the practice of allocation and use of agricultural water	• What is the practice for irrigation water allocation and use and how does the practice link to the change in policy? • Why are people not using the land / water that they have been allocated in the irrigation schemes of the study sites? • How do people get access to irrigated land (Who allocates land, criteria for allocation of land, and who pays for land)? • Who allocates water? • Do people pay for irrigation water and how much do they pay? • Are the current reforms relevant in the area? • What are the needs for reform in the area?	Mainly primary data with some secondary literature

The water allocation aspect of the study involved interviewing all local institutions responsible for water services provision and water resources management e.g. local municipality, water user associations, local government department officials. The focus was on the extent to which policy objectives of greater equity in resource allocation and poverty alleviation were being achieved at local level (see Chapter 3 for detailed discussion of research methodology). This study did not expect to see the final outcomes of reform, which is still underway (or yet to begin in some areas, as this study found); it was an evaluation of water reform to date in South Africa set against the empirical situation on the ground in one locality. The wider objective of the study was to make linkages between micro-level processes (i.e. finding) and macro-level policy and institutional environments.

1.4 The Analytical Framework

The local (village) study with domestic and productive components will use the concept of scarcity. The concept of scarcity is explored within the context of a village-level study and the concept of water scarcity can help to understand the key factors which give rise to water scarcity in a given area.

Water scarcity

Water is essential for socio-economic development and for maintaining healthy ecosystems. Access to safe, clean drinking water is a basic provision and a fundamental necessity. However, at the onset of the 21st century, 1.1 billion people, the equivalent of 17% of the world's population, live without access to safe water sources (World Health Organization (WHO), 2004).

Globally, there is a growing perception of a global water scarcity as a result of increased demand, depleting supplies, competition and conflict over access to water

at local, national and international levels. Countries such as Mexico, Pakistan, South Africa and larger parts of China and India suffer from acute water scarcity (UN, 2006). South Africa remains one of the 30 driest countries in the world (The Water Wheel, 2007). Water scarcity is not just a problem in arid regions, according to Shipek (2007), communities in tropical areas such as Costa Rica experience water scarcity due to deforestation and intensive agriculture. Unsurprisingly, the developing world bears the majority of the burden of communicable disease and much of this is as a result of poor water access. In Sub-Saharan Africa, for example, 42% of the population is still without improved water supply (WHO, 2004).

Defining water scarcity

There are several ways of defining water scarcity. Water scarcity has been defined in terms of number of people per blue water availability and represented empirically in terms of people per flow unit (See Falkenmark, 2002). According to Falkenmark (2002) one flow unit constitutes 1 million cubic meters of water. Falkenmark (2002) argues that as societies reach 600 people per flow unit, they will experience water problems associated with pollution and dry spells. Expressed differently, where available water is below 1,700 cubic metres per capita (or 50 lpcd), societies will experience water stress. Winpenny (2006) classifies societies with levels of internal renewable water availability of less than 1,000 cubic meters per head as water short. Below 1,000 cubic metres per capita societies would experience chronic scarcity and below 500 cubic metres per capita, people would be living beyond the water barrier (Noemdoe, 2006). According to Noemdoe (2006) South Africa is approaching less than 1,000 cubic metres of water per capita.

A number of scholars have critiqued Falkenmark's definition of water scarcity. Noemdoe (2006) citing Pallet (1997) argues that Falkenmark's measure is very crude, neither distinguishing between total run-off and available run-off, nor accounting for ground water or water stored in dams and lakes. This means that Falkenmark

overestimates the degree of water scarcity. The United Nations (UN) (2006) refers to water scarcity as the point at which the aggregate impact of all users impinges on the supply or quality of water under prevailing institutional arrangements to the extent that the demand by all sector, including the environment, cannot be fully satisfied. Winpenny (2006) argues that this definition is of little use to policy makers and planners. He classifies scarcity into different degrees – absolute, life threatening, seasonal, temporary, cyclical etc. The notion of water scarcity as quantifiably measured is highly contested.

According to the Water Wheel [1] (which represents the position of the Ministry of Water Affairs and Forestry in South Africa), water scarcity occurs when the ways in which water is used and distributed cannot fully meet the demand from households, farms, industry and the environment.

The definition of the UN and the Water Wheel are similar because they are both concerned about supply/distribution of water and use, which determines the demand for water, rather than quantitative measures.

Scarcity is often used as a reason to improve the efficiency with which water is used or to create new institutions for water management.

What causes water scarcity?

Causes of water scarcity can be natural but can also be humanly induced. Winpenny (2006) argues that the impact of natural processes can be aggravated by human responses; human behaviour can modify the physical environment in a way that makes water scarce.

[1] The Water Wheel is a two monthly magazine on water and water research published by the South African Water Research Commission (WRC), a statutory organisation established in 1971 by Act of Parliament.

According to Winpenny (2006), water scarcity is caused by the following:

1. Growth in population and incomes: world's population is projected to be 7.9 billion by 2020, 50% larger than in 1990. Most growth is projected to be in countries where inhabitants have low levels of household water consumption, and in which the use of water-intensive appliances is likely to grow. As the population grows, more water is used. As noted by Turton and Ohlsson (1999), an initial abundance of water can change into a condition of water scarcity at the point where demographically-induced demand overtakes the prevailing level of supply. This transition to water scarcity acts as the initial trigger to the authorities who are in government, to deliver more water.
2. Climate change and variability: Winpenny (2006) argues that the influence of climatic change on the availability of water is the subject of intense debate.
3. Modifications to landscapes and land use: Degradation and land use conversion of catchments may reduce the amount of usable water available downstream if there is greater run-off. Increased use of irrigation for crops such as sugar cane, etc, would also increases the use of water.
4. Contamination of existing water supplies: surface supplies may be contaminated when a river is used for drinking water or washing.
5. A failure to manage demand: Winpenny (2006) argues that in many instances water scarcity is artificially created. This usually happens in many cases where water is available for free or at a price below its true cost of production. Winpenny consistently argues for market solutions to problems of water scarcity and availability. According to Winpenny (2006) water scarcity that water providers are grappling with today is caused by the fact that water is treated as a social good and not an economic good.
6. Financial and institutional obstacles: Many countries do not realise their water potential due to financial shortages and institutional failures. Water is potentially available but not being fully captured because of the way in which water

provision is organised and managed. Many water authorities are short of funds to invest in improving and expanding their systems, or even maintain and operate existing ones. Water authorities facing financial and institutional obstacles fail to recover their full costs, and to collect all what is due to them. The water at their disposal tends to be mal-distributed, favouring old-establishment customers, who tend to be the more affluent households and industries with good political connections.

This section has discussed some causes of water scarcity and the next section refines the concept of water scarcity.

Refining water scarcity concepts

Turton and Ohlsson (1999) hypothesise that increasing levels of water scarcity will result in a range of social responses or adaptative behaviors that are likely to result in a series of coping strategies that are allocative in nature. Their hypothesis is represented schematically in the figure below.

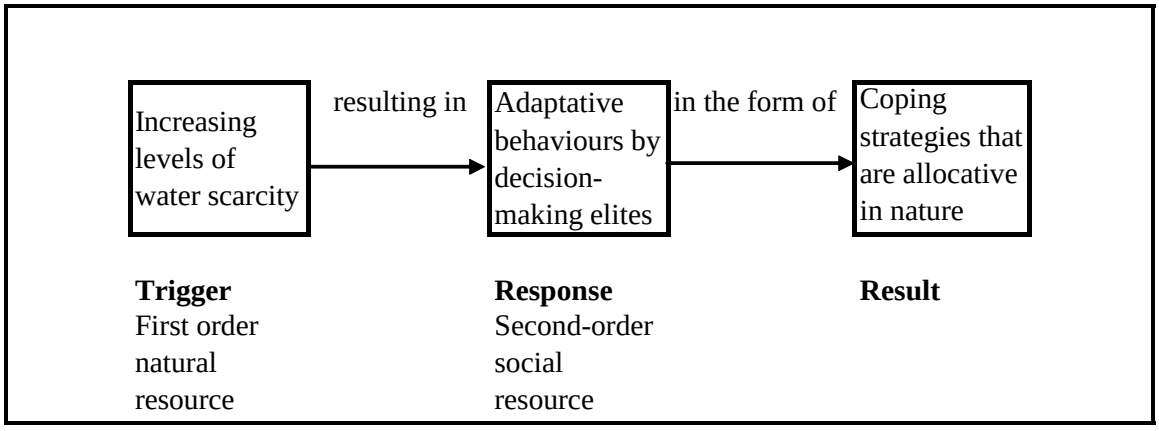

Figure 1: Schematic representation of Turton and Ohlsson's hypothesis

Source (Turton and Ohlsson (1999)

Turton and Ohlsson (1999:3-4) made a useful contribution by defining the basic concepts of water scarcity as follows:

Water scarcity is a decrease in the volume of water available per capita over time.

Water resource capture is the process by which powerful social groups shift resource distribution in their favour over time.

First-order resource is the natural resource that is either scarcer or more abundant relevant to the population over time.

Second-order resource is the set of potential adaptative behaviours that are drawn upon from the broader social context that can be used by decision making elites, either legitimately or illegitimately.

Adaptive behavior is a clearly manifest response to the changing level of water scarcity that can be in any one of a number of forms such as voluntary rationing schemes, changes in cropping cycles, rain water harvesting, formal policies etc,.

Coping strategy is the output of a decision making elite, in the form of strategies such as water demand management that seeks to manage the water scarcity in some form or another.

Allocative mechanisms or procedures are a component of the coping strategy that seeks to take water from one area or sector of utilization and re-allocate it to another.

Turton and Ohlsson (1999), developed some of the key concepts further by focusing their attention on the notions of a first and second order scarcity and the result of different combinations of a first and second-order resource relative to quantity of that specific resource (see Figure below).

		Type of resource	
		first order	second order
Quantitative aspect of the resource	Relative scarcity	1	2
	Relative abundance	3	4

Figure 2: Possible variations of type of resource and quantitative aspects of the resource

From the above matrix, Turton and Ohlsson (1999) derive the following definitions:

Water poverty is defined as the existence of both first-order resource scarcity (block 1) and a second-order resource scarcity (block 2) simultaneously. They theorize that a social entity is in a condition of water poverty if it is confronted by a prevailing condition of water scarcity in conjunction with a low level of adaptive capacity.

Structurally-induced water abundance can be defined as the condition that exists when a social entity has both first-order resource scarcity (block 1) and second-order resource abundance (block 4) simultaneously. They theorize that a social entity has managed to adapt to water scarcity by means of generating a suitable set of coping strategies. Such an entity has induced relative water abundance by being socially adaptive and technically innovative in the face of endemic water scarcity.

Structurally-induced social scarcity can be defined as the condition that exists when a social entity has both first-order resource abundance (block 3) and a second-order resource scarcity (block 2) simultaneously. Under these conditions of social resource scarcity, relative water abundance may still result in social instability. This

definition confirms that people everywhere can be affected by water scarcity, even those living in areas with plenty of rainfall or freshwater.

Water abundance can be defined as the condition that exists when a social entity has both first-order resource abundance (block 3) and second-order resource abundance (block 4) simultaneously.

The multifaceted nature of scarcity

Water is increasingly seen as a scarce resource which needs to be managed sustainably. Mehta (2003) argues that "water scarcity as constructed in global declarations and debates, is often presented in absolute and monolithic terms, obscuring the complex nature of scarcity and its linkages with ecological, socio-political, temporal anthropogenic dimensions". The complexities are reviewed below.

Water is a renewable resource and its availability is constantly subjected to variation depending on its state in the hydrological cycle. Water is also variable in state, across time and space depending on factors such as climate, season and temperature.

Water scarcity has temporal and cyclical dimensions. Mehta (2003:3) argues that "rainfall, vegetation and grass cover make water availability uncertain; it would be fallacious to see water scarcity as something that is constant and permanent". Supplies may become abundant in favourable seasons and climatic conditions. Another dimension concerns the anthropogenic dimension of scarcity. According to Mehta (2003), water scarcity tends to be naturalised today but some water scarcity is due to human intervention. Falkenmark and Rockstrom (cited in Noemdoe, 2006:21), differentiate between climatological and human-induced scarcity profiles described below as scarcity modes A,B, C, and D, where A relates to natural aridity, B to high seasonal variability and regular occurrence of drought, C due to human-induced land degradation, and D to human-induced water crowding.

Table 2: Climatological and human induced scarcity profiles

Water Mode	Scarcity	Type	Water Scarcity manifestations	Additional features
A	Aridity	Green	Short growing season determined by annual rainfall and potential evaporation	Sensitivity linked to crop choice
B	Drought	Green and Blue	Recurrent inter-annual meteorological droughts	Linked to El Nino phenomenon
C	Land degradation	Green	High Vulnerability resulting in extensive land degradation	May lead to man-made drought i.e. soil moisture deficit without experiencing Type B drought
D	Water crowding	Blue	Very limited blue water surplus results in blue water scarcity, which is exacerbated by population growth	Blue water scarcity in the savannah zone < 100 mm/yr of runoff surplus

Source: Nomdoe (2006:22)

Mehta (2003:13) further argues that in popular discourse the anthropogenic dimension of water scarcity tends to be obscured and the culpability of bad water management practices and state policies denied. Mehta (2003) argues that "it is wrong to conceive water scarcity in absolute terms, but there is an urgent need to link water scarcity with socio-political, institutional and hydrological factors". A differentiated understanding of water scarcity is important because it sharpens understanding of the multi-faceted nature of water scarcity and creates awareness of the biophysical, temporal, relational and political aspects (Mehta, 2003). Thus, water scarcity is often compounded due to poor institutional arrangements governing water (Mehta, 2003:4).

Water scarcity: socially and politically constructed

Although scarcity may have its roots in water shortage, water scarcity can be constructed differently by different social and political actors, often to meet political ends (Mehta, 2003). Mehta (2003:1) argues that "access to and control over water is usually linked with prevailing social and power relations which influence how it is used or abused". For Winpenny (2006), water scarcity may also be a social construct, a product of affluence, expectations and customary behaviour and heavily influenced human behaviour, institutions and government policies. In the international discourse on water resources management, water scarcity is taken to be a given and a starting point for policy agendas (Mehta 2003). Mehta (2003) conducted a detailed empirical and multi-sited examination of both actual water practices and discourses of scarcity in India and found that scarcity is both "real" and "constructed". She defines "real" scarcity as a biophysical phenomenon with ecological and social dimensions, usually cyclical given that periods of abundance are interspersed by periods of dearth, and highly dependent on resource availability and exogenous factors such as rainfall and climate, which are variable and erratic.

With "manufactured" scarcity which is a discursive construct, scarcity is essentialized and universalized and seen as permanent, and the cyclical dimensions of scarcity are ignored (Mehta, 2003). According to Mehta (2003) scarcity is made out to be "natural" thus ignoring the anthropogenic areas of culpability. According to Winpenny (2006), most sub-Saharan African countries are classified as surplus because water resources are ample, and water usage is low. Winpenny (2006) argues, however, that this broad picture conceals some problem areas. Underdevelopment of water infrastructure in many countries means that there are great regional differences between the availability and use of water. The quality of water, especially for villagers and marginal urban populations is a cause for concern and a public health hazard. Winpenny (2006) describes South Africa as a special case, with large areas of the country being arid and semi-arid, with most water being under private ownership

and control, and rapidly growing demand from a large urban population with higher expectations than in the past. He argues that, as a result, inter-sectoral conflicts are becoming acute.

State discourses tend to portray scarcity as natural rather than human induced and universal rather than cyclical (Mehta, 2003). The external notions of scarcity generated by state discourse and state programmes may be contrasted with local people's knowledge systems and livelihood strategies that allow them to adapt to the unpredictability and temporary scarcity of water.

Water use and conflicts

Water is embroiled in local and national disputes. Mehta (2003:5) argues that it is misleading to blame conflicts on water scarcity and on rising water needs. Instead, many conflicts are caused by other factors such as ethnic rivalries, power politics that extend to the cultural, political and economic spheres. In such cases water is used to fuel already existing conflicts. Conflicts may also arise due to the ways in which water use is linked with the prevailing social and power relations in a household, or community or in a region. According to Ohlsson and Turton (2000), first order conflicts at the supply management stage can be tensions with the possibility of opening conflicts between countries. Second order conflicts at the supply management stage may arise within countries as a result of the large number of people displaced by dam building projects. At the second stage which is end-use efficiency, first order conflicts take place between user groups within countries. This conflict is often followed by the marginalisation of weaker segments and thus increased inequities (Ohlsson and Turton, 2000). Second order conflicts may follow from the implementation of new institutional frameworks, which may infringe on the privileges of previous users. At the allocative efficiency stage, first order conflicts takes place between sectors, most notably agriculture and the cities, and may be

relatively easy to resolve. The second-order conflicts at this stage are likely to be more difficult.

Differentiated responses to water scarcity

Different entities respond differently to water scarcity at country, catchment, district and household level. As a response to water scarcity a process of water resource capture can be undertaken. Turton and Ohlsson, 1999 define water resource capture as the process by which powerful social groups shift resource distribution in their favour over time. This is particularly relevant under conditions of water deficit where access to a critical natural resource like water gives considerable advantage to those who control access and allocation of that resource.

Mehta (2003) showed various responses to scarcity at household level in a village in eastern Kutch district in India, which included migration by pastoralists with large herds and diversification of livelihood strategies during lean years.

1.5 Outline of the thesis

The thesis consists of eight chapters, as well as bibliography and two annexure, as follows.

Chapter One (Introduction) provides an introduction to the study, including a background to the water sector in South Africa and the challenges facing water reform in South Africa. It also outlines the objectives and research questions of the study, and the analytical framework used for the study.

Chapter Two (Debates about Water in South Africa) this chapter is based on a review of literature on the history of water allocation and management in South Africa and the policies guiding water allocation reform. It includes definitions of water adequacy

and basic water requirements, and a brief review of literature on domestic (household) water use.

Chapter Three (Study area and methodology) gives an introduction to the study area and the reasons for choosing it, and explains the selection, data collection and data analysis methods used.

Chapter Four (Water availability and requirements) describes water resources in Letaba/Shingwedzi sub-region of the Luvuvhu/Letaba Water Management Area, showing water requirements and water balance in the Letaba/Shingwedzi sub-region. The chapter also introduces the various water management institutions in the study area. The purpose of this chapter is the show the inequities that exist in the different sub areas of the Letaba/Shingwedzi sub-region of the Luvuvhu/Letaba Water Management Area.

Chapter Five presents the findings of a village study in the Klein Letaba Catchment. It examines water services infrastructure and domestic water allocation in Siyandhani village and water use at household level. Particular attention is paid to household composition, occupation and income sources of household members; water sources used; water availability; methods of water collection; total water use per household; productive use of water at household level; and the level of service provided by the greater Giyani local municipality.

Chapter Six presents the findings of a village study on irrigation water allocation and use in Klein Letaba Catchment. It examines irrigation infrastructure and irrigation water allocation and use in B4E irrigation scheme in Siyandhani village. Particular attention is paid to land allocation and plot holders in B4E scheme, characteristics of farmers at B4E, production at B4E scheme, problems and challenges facing farmers, water use at B4E scheme, water management institutions, the Revitalization of

Smallholder Irrigation Schemes (RESIS) programme in B4E, and assistance from the Department of Agriculture.

Chapter seven discusses the findings of the village study on domestic water use and agricultural water use.

Chapter eight concludes the study. The aim of the study was to explore the current allocation and use of water for productive and domestic purposes in a village of the Klein Letaba sub-area, and how is it being affected by new water resource management and water services provision legislation and policies. The study implies that water reform, which is widely seen as a priority for South Africa, has not yet reached the villages of the Klein Letaba.

1.6 Conclusion

This chapter started off by giving the background to the water sector in South Africa and further outlined the challenge of water reform and clarifying the aims and objectives of the study. It further provided an outline of the analytical framework for the study. The next chapter presents a policy background and context, particularly relating to water reform in South Africa and also reviews literature.

CHAPTER 2: DEBATES ABOUT WATER IN SOUTH AFRICA

The previous chapter explored the concept of water management in South Africa and set out the context for South Africa's approach to improving access to water for domestic and productive purposes.

This chapter reviews literature on the evolution of water law in South Africa and provides a background and policy context to the water management and water services in South Africa. In this chapter, I also review literature on: the human right to water, the definition of water adequacy and basic water requirements, water collection, water use, productive use of domestic water and the level of water supply service, which are crucial in water reform.

2.1 Historical background

2.1.1 Legal systems that form the foundation of water law

Roman law

The classical Roman legal system regulated the legal relationships within a small farming community along the Tiber River in Europe (Thompson, 2006). Water was relatively scarce and was used mainly for agriculture, navigation and fishing (Uys, 1996b; Thompson, 2006). Consumptive users were also entitled to reasonable common use of the running water (Uys, 1996b). There was no official system in the law dealing with water and water was regarded as a natural resource the same as air and the sea (Thompson, 2006). One of the cornerstones of the Roman property law was the implication that an owner of land was also the owner of everything above and beneath the surface of his or her land (Thompson, 2006).

Roman-Dutch law

The classical Roman law was almost forgotten until its revival in the 12th century in Italy (Thompson, 2006). Roman law was also gradually absorbed into the primitive Germanic law of Western Europe, including the Netherlands, and was transplanted to the Cape of Good Hope in 1652 with the founding of a settlement there by the Dutch East Indian Company, where it was referred to as Roman-Dutch law (Thompson, 2006). In the Netherlands, water was described as being a nuisance rather than a scarce resource (Uys, 1996b; Thompson, 2006). Due to its abundance, peaceful common consumptive use was not a problem and the emphasis of the law was rather placed on navigation and fishing (Uys, 1996b; Thompson, 2006). The Roman law principle that running water was available for reasonable rights of consumptive use was incorporated into Roman-Dutch law (Uys, 1996b). Under the Roman-Dutch law, it was uncertain to whom the water belonged: some argued that it belonged to the citizens in common property while others claimed that it belonged to the government in proprietary right (Thompson, 2006).

2.1.2 Water law in South Africa

Before codification of law in South Africa water was not classified within the law of things but was available for common use by all inhabitants and sailors who put in at the harbour in the Cape could use it for washing and drinking (Uys, 1996b). Inland water was mainly used for consumptive purposes and fresh water was used for domestic and agricultural purposes rather than for fishing or navigation due to low rainfall in the summer months and the fertile soil and favourable conditions for the growing of fruits, maize and vineyards (Uys, 1996b).

Formal irrigation from the fresh water streams in South Africa by European settlers commenced in 1657 (Uys, 1996a). Disputes amongst irrigators regarding the use of water occurred in the earliest years after 1657, and it was the beginning of the

struggle for irrigation water which still continues today (Uys, 1996a). After the British Government occupied the Cape of Good Hope in 1806, English law principles were introduced into and applied in the in the law of the Cape (Thompson, 2006). A supreme court was established in 1828 and it regarded itself as the only authority which could decide on water cases (Thompson, 2006). The court consisted of lawyers who were trained in the English and Scottish law and they were unfamiliar with the Roman-Dutch law and its application in the Cape during the 18th century (Thompson, 2006).The lawyers had a substantial knowledge of the riparian principle[2]. A new system of land tenure was also introduced in 1813 (Thompson, 2006). The land tenure system gave ownership of the land to the person occupying the land on the condition that the person paid the government an annual quitrent.

Technological development and greatly expanded irrigation in the nineteenth and early twentieth centuries led to increased pressure on the water resources and more user disputes. This necessitated increased state intervention and various laws were enacted to address specific questions (Uys, 1996a; Thompson, 2006). Irrigation Acts were promulgated for the Cape Colony and the Transvaal Republic in the latter half of the nineteenth century, which were followed by the Union Irrigation Act in 1912, which applied to all four provinces of the Union of South Africa (Uys, 1996a). Water was never declared to belong to either the state or any specific user sector. Due to the many irrigation disputes among riparian irrigators, a judicial viewpoint took root that running water belonged not to everybody but to riparian owners only (Uys, 1996a).

Riparian owners, the only lawful users, were also entitled to use water for the maintenance of animal life and vegetable life, as well as for mechanical appliances, which was in principle regarded as a recognition of all water needs, whether human or non-human (e.g. irrigation, domestic, urban, industrial, stock-watering and ecobiotic) (Uys, 1996a). This wide interpretation of riparian rights was restricted in

[2] According to the riparian principle, the possessor of land through which a natural stream runs has a right to the advantage of that stream flowing in its natural course, and to use it when he pleases for any purpose of his own not inconsistent with similar rights of the proprietors of the land above and below.

the course of time so as to include only agricultural domestic and industrial uses, and excluded water use by natural systems (Uys, 1996a).

When the water law was codified in the first decade of the twentieth century, the principle of riparian rights to water for irrigation, domestic and industrial uses was written into legislation (Uys, 1996a). According to Uys (1996a), the 1912 Water Act clearly restricted water rights to human use, specifically for domestic, irrigation and industrial use by riparian owners. These users were not equally entitled to water, but could use water in a preferential order: irrigation was regarded as the main use around which water allocation mechanisms revolved.

According to Uys (1996a), the Water Act of 1956, which was based on the Roman-Dutch riparian rights principle, tied water rights directly to land ownership. As a product of the apartheid regime, Heyns (1998) argues that the Water Act of 1956 effectively gave preferential treatment to white people, as the vast majority of land was owned by white people. Given the historical fact that Black people in South Africa were systematically stripped of their land rights, these principles of South African water law have ensured that white landowners enjoyed privileged access to, and use of, the country's water resources (Heyns, 1998). The 1956 Water Act gave private land owners extensive rights in relation to water resources (Heyns, 1998). These included the exclusive right to use so called 'private water', including rainwater falling on the land, a stream which rises on the land, or any groundwater pumped from boreholes on the land (Heyns, 1998). In 1998, it was estimated that more that 65% of all water used in South Africa was either privately owned or used under historically-obtained riparian rights (Heyns, 1998).

The Water Act of 1956 also made an attempt to recognise water user sectors other than irrigation. According to Uys (1996b), the normal flow of public water outside the so-called control areas was available for riparian owners in reasonable shares for domestic, industrial and agricultural purposes. In the control areas, irrigation still

received the highest preference as a water user and the Minister determined the quantity of water available in the public stream and allocated such water for irrigation according to a specified formula (Uys, 1996b). The Minister was bound to uphold the public interest when allocating water and had to apply the Roman-Dutch law principle, which meant that it would be contrary to the public interest to overlook any water user in need of water, irrespective of the purpose of use.

The state thus had little control over how private and riparian water rights were used. According to Heyns (1998), the 1956 Water Act did not acknowledge the indivisibility of the water cycle or that water is a common asset to be managed for the benefit of present and future generations.

2.2 Policy and legislation framework for water after 1994

The advent of democracy in 1994 provided an opportunity for the revision of legislation and creation of more equal opportunities (Seetal and Quibell, 2005:154) and improving the access to natural resources and basic municipal services. With the abolition of the ten African 'homelands' (which exercised various degrees of self-government under apartheid), the jurisdiction of the new Department of Water Affairs and Forestry became countrywide.

The then-Minister of Water Affairs and Forestry initiated a process to review all the water related legislation in May 1994. This led to the development of the White Paper on Water Supply and Sanitation Policy of 1994 by the Department of Water Affairs and Forestry, the Water Law Review Process (1995), the promulgation of the Water Services Act (WSA) (Act No. 108 of 1997) and the National Water Act (NWA) (Act No.36 of 1998). Democracy also influenced the shaping of the water clause in the Constitution of the Republic of South Africa 1996 (s 27(1) (b)), which states that everyone has a right to access to sufficient water.

Past policies left a legacy of gross inequities in municipal services, particularly water and sanitation services. Before 1994, municipalities served the former white areas while rural areas were served by regional services councils and separate structures were responsible for service delivery to black people in the former homelands. In order to redress the past inequities in access to services and to assist municipalities to fulfil their constitutional obligations the Municipal Structures Act (Act no 117) of 1998 and the Municipal Systems Act (Act no 32) of 2000 were enacted.

The Municipal Structures Act of 1998 expressed a sentiment that "there was a need to develop a democratic and developmental local government in which municipalities could fulfil their constitutional obligations to ensure sustainable, effective and efficient municipal services, promote social and economic development, encourage a safe and healthy environment by working with communities in creating environments and human settlements in which all south Africans can lead uplifted and dignified lives"(RSA, 1998b). The Municipal Structures Act and the Municipal Systems Act defines the structures and approaches to developmental local government. A key purpose of the Municipal Structures Act, amongst others, was to provide for the establishment of municipalities in accordance with requirements relating to categories and types of municipalities.

The Constitution of South Africa has committed itself to developing a participatory democracy which premises the empowerment of the people to participate in the process of governance. According to Schreiner *et al*., 2004, 'the new water policy and legislation sets an enabling framework for water use to contribute to poverty eradication and it is based on three principles of equity, sustainability and efficiency and enables the redress of historical imbalances in access to water'. The next sections consider in more detail the revision of legislation and the new legislation developed as part of the democracy in South Africa.

2.2.1 White Paper on Water Supply and Sanitation Policy (1994)

The White Paper was not intended to present a detailed strategy for achieving the overall goal of the government, which is to ensure that all South Africans have access to essential basic water supply and sanitation services at a cost which is affordable to households and to the country as a whole. Rather, its objective was to set out broad policy for the new Department with regards to water supply and sanitation services, including the development approach and principles that guided policy formulation, policy for financing of services and the institutional framework proposed. In 1994, the focus on water supply and sanitation services reflected the absence of coherent policy in this area hitherto and the high priority given to them by the new government of South Africa.

2.2.2 Water Law Review Process (1995)

The Minister of Water Affairs and Forestry initiated a process to review all water related legislation in May 1994. Seetal and Quibell (2005), argue that the critical starting point in the Water Law Review Process was political leadership and the demonstration of a political will to effect change in water resources management and water services provision. Improving access to water by the millions of South Africans was a priority for the democratic government as part of broader political, social and democratic reform in South Africa, international declarations and the prominence given to fundamental human rights and environment related matter during the second half of the 20th century. The constitution of South Africa provided the foundation for the policy and legislative framework (Thompson, 2006).

Seetal and Quibell (2005) argue that the effectiveness of the Water Law Review Process and the success of future water management depended on three critical factors:

- The development of policy and legislation needed to be an open and consultative process;
- Lessons from international, regional and local experiences had to be taken into consideration to avoid repeating earlier mistakes; and
- The integration of the water sector and other socio-political and socioeconomic development in the country.

The Water Law Review Process started in March 1995, with the publication of a booklet titled *You and Your Water Rights - A Call for Public Response,* which was intended to stimulate public interest and debate on the subject and to solicit comments (Seetal and Quibell, 2005:156). The resulting public comments were then incorporated into a set of principles developed by a Water Law Review Panel. Public consultation session were held and principles to guide the drafting of the new water law were finalised and published as the *Fundamental Principles and Objectives for a New Water Law for South Africa*, which was approved by government's cabinet in November 1996 (Seetal and Quibell, 2005:156, Thompson, 2006).

The *Fundamental Principles and Objectives for a New Water Law for South Africa* defines 28 principles within the categories of legal aspects of water (principles 1-4), the water cycle (principles 5-6), water resources management priorities(principles 7-11), water resources management approaches (principles 12-21), water institutions (principles 22-24), and water services (principles 25-28). The principles and objectives led to the publishing of the National Water Policy (NWP) outlining the direction for the development of the water law and water management systems for the new South Africa. The NWA was drafted and enacted in 1998 based on these principles and objectives to give effect to the NWP. The WSA was drafted at the same time as the NWP and it was enacted in 1997.

2.2.3 The Constitution of the Republic of South Africa (1996)

The constitutional clauses relating to water give every person a fundamental right to an environment that is not harmful to his or her well being, and requires the environment to be protected for the benefit of the present and future generations, through reasonable legislative and other measures that secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development (Section 24 (a) and (b) (iii)) of the constitution.

The South African constitution, section 25 (4) (a), commits the South African nation to land reform and to reforms that bring about equitable access to all South Africa's natural resources, including water resources. Section 25 (8) further states that the state must take legislative and other measures to achieve such reform in order to redress the results of past racial discrimination. Various criticisms have been made of the constitutional provisions on water. Thompson (2006) states that the constitution calls for reform in order to bring equitable access to the water resources, and only refers to redressing past racial discrimination and not gender discrimination in access to water (Thompson, 2006). Furthermore, the constitution does not make any reference to providing access to water for the poor. Thompson (2006:138) argues that "water reform should include redressing the results of past gender discrimination and giving the poor access to water, as this is necessary in order to bring about equitable access to the water resources". Section 27 sub-section 1 states that everyone has the right to have access to sufficient food and water and that the state must make reasonable legislation to achieve realization of these rights.

Access to sufficient water

Every person has a constitutional right of access to sufficient water and the state must ensure the progressive realization of this right. A right to have access to water is a socio-economic right which imposes obligations to the state. The right to have access

to sufficient water is dependent on the obligation of the state to take reasonable legislative and other measures to achieve the progressive realisation of this right. Thompson (2006:146) argues that this right might be more than only water to support life and personal hygiene and that this right exists independently from the right to basic water supplied in terms of the WSA of 1997, and could even be more than that right. It is unlikely that the right would include the use of water for productive or commercial purposes. According to Thompson (2006), the state and courts will have to lay down guidelines on what exactly sufficient water entails, taking into consideration the need to develop communities and reduce poverty, the fact that water is scarce, and that the right is a socio-economic right. This precise content of this right will thus have to be determined on a case-by-case basis.

Access to water

According to Thompson (2006), the constitution grants a right of access to *sufficient* water (i.e. quantity) and not a right to *adequate* water (i.e. quality). This right does not mean the provision of water in all households or for all undertakings, but at least access by all persons to long-term sustainable provision of basic minimum, potable water close to all households. Thompson (2006) argues that "the extent of state duties differs according to the economic resource available to different sectors of the population, those with sufficient economic means already have access to sufficient water as they could afford to pay water services providers to provide it to them, therefore, the different spheres of government should direct their attention to those without the necessary means and without access to water". In order to ensure that this right is realized progressively, the state must implement reasonable legislative and other measures, and ensure that its water delivery programmes enable local governments to deliver potable water services with the necessary support from the provincial governments.

2.2.4 Water Services Act (No 108 of 1997)

The WSA gives legal effect to the constitutional right to have access to sufficient water for basic human needs. The act regulates the provision of potable water and sanitation services by local authorities and builds on foundations laid by the White Paper on Water Supply and Sanitation (Thompson, 2006).

The WSA was promulgated in 1997 before the National Water Act was drafted, due to urgent need to tackle the backlog in rural drinking water supply inherited from the apartheid era, especially in the former homelands (van Koppen *et al*., 2002). The Act recognises that water services should be undertaken in a manner consistent with the broader goals of water resources management, but as noted by Soussan *et al* (2002), there are areas of uncertainty in the overlap of the WSA and the NWA. The WSA establishes the management of water services through the structures of local government which do not coincide spatially with the hydrological divisions made for water resources management in the NWA and this further raises problems of uncertainties over responsibilities and limitations to capacities at all levels, especially within local government. Nicol & Mtisi (2003) argue that these uncertainties suggest a need for more flexible boundary demarcation and the capacity to change according to the problems and needs as they arise.

Van Koppen *et al* (2002) argue that the decision to promulgate the Water Services Act before the National Water Act may lead to an artificial separation of water used for domestic and productive purposes. In this separation there are presumptions that water resources could be managed by ignoring domestic uses of the same water source (van Koppen *et al*., 2002). These authors further argue that there are assumptions that local government, with support from DWAF, is solely responsible for meeting domestic water needs of the poor, and that institutions such as CMAs and WUAs are concerned only with "Water Resource Management" and can therefore ignore domestic water needs of the poor (van Koppen *et al*., 2002). This separation

may be justified in areas that domestic water needs are well catered for, but would risk alienating people whose domestic water needs remain unmet from mainstream water management.

The Water Services Act was also drafted before the local government transformation process was finalised (in 2000) and the Strategic Framework for Water Services was published, and Thompson (2006) argue that the Act should now be amended to reflect the outcome of this process and framework. Institutional reform in communal areas, combined with the overall shift from central government to decentralized local government-based provision of services, results in what Nicol & Mtisi (2003) describe as a scramble for responsibilities and control by different institutional actors.

2.2.5 Strategic Framework for Water Services (2003)

The White Paper on Water Supply and Sanitation Policy published in 1994 by the Department of Water Affairs and Forestry, recognised that all South Africans have the right to a healthy environment and that it is the intention of Government to create the enabling environment necessary to ensure that all South Africans have access to acceptable levels of water supply and sanitation.

According to Thompson (2006), much has been achieved since then and the White Paper played a key part in creating an enabling environment. The White Paper was focused on the establishment of a new national water services function and on the role of National Government in assuming a direct delivery function to provide basic water and sanitation services rapidly to people primarily living in rural areas. Since 1994, the context has changed significantly and the White Paper on Water Supply and Sanitation Policy was replaced by the Strategic Framework for Water Services (DWAF, 2003b).

The Strategic framework provides a comprehensive summary of policy with respect to water services sector in South Africa and a strategic framework for its implementation over the next 10 years (DWAF, 2003b). The framework sets out a comprehensive approach to the provision of water services to eliminate backlogs in basic water services and improving the levels of service over time. The framework focuses on institutional reform of water services provision.

DWAF (2003b) states that "water programmes should be designed to support sustainable livelihoods and local economic development. According to DWAF (2003b) the provision of water supply services has significant potential to alleviate poverty through the creation of jobs, use of local resources, and provision of a long-term livelihood for many households.

The purpose of the strategic framework is to articulate a national vision for the water services sector[3] and it stipulates the following core goals:

- All people have access to an appropriate, acceptable, safe and affordable basic supply.
- All people are educated in healthy living practices and the wise use of water.
- Water services are provided equitably, affordably, effectively, efficiently, and in a sustainable manner with gender sensitivity.
- All Water Services Authorities are accountable to their citizens, have adequate capacity to make wise choices and able to regulate services provision effectively.
- The price of water services reflects the fact that it is a social and economic good.
- Basic services would be subsidized.

[3] Water services refer to water supply and sanitation services and include regional water schemes, local water schemes, on-site sanitation and the collection and treatment of wastewater.

2.2.6 The National Water Act (No 36 of 1998)

The purpose of the NWA is to ensure that the nation's water resources are protected, used, developed, conserved, managed, and controlled in ways which take into account the following factors amongst others: meeting basic human needs; equitable access to water; redressing the results of past racial and gender discrimination; Promoting the efficient, sustainable, and beneficial use of water in the public interest; facilitating social and economic development; providing for growing demand for water use (RSA, 1998a). The National Water Act led to the abolishment of the former system of permanent riparian rights and its replacement with a system of water management authorities which would serve as the custodian of the nation's water resources (van Koppen *et al.*, 2002 & 2003).

The NWA creates the legislative framework for the implementation of the National Water Policy. The purpose of the NWA is to ensure that the nation's water resources are protected, used, developed, conserved, managed, and controlled in ways which take into account the following factors amongst others: meeting basic human needs; equitable access to water; redressing the results of past racial and gender discrimination; promoting the efficient, sustainable, and beneficial use of water in the public interest; facilitating social and economic development; and providing for growing demand for water use.

Section 27 of the Constitution of South Africa states that everyone has the right to have access to sufficient food and water (RSA, 1996), and these rights are enshrined in the National Water Act. Throughout the National Water Act, the principle of 'redress of racial and gender inequities from the past' is mentioned as the main criterion for South Africa's new integrated water resources management. The next section covers components of the Act that are related to this study.

2.2.6.1 Equity

In South Africa, emerging approaches in water management highlight equity and productivity as two main objectives. The notion of equity originates from theories of justice (Prasad *et al*., 2006). It touches on fairness, social justice, and acceptability in relation to a particular policy, set of rules, rule-making process, or and action with implications on the exchange and distribution of material or immaterial resources, the distribution of benefits and burdens, including rights, obligations, desserts, and needs of those in specific social settings (Prasad *et al.*, 2006).

DWAF, (1997), argues that equity should be scrutinized in terms of "access to and benefit from the nation's water resources for all South Africans" and implies equity as a concept of fairness that allows for various water uses to fulfil diverse social, economic and environmental needs.

The National Water Act emphasizes equity in access to water resources, benefits and services, particularly for those who have not benefited from the country's water resources, such as women and the poor (RSA, 1998a. Prasad *et al* (2006) note that the South Africa water laws necessitate looking at equity in relation to "access to the desired quantity, quality, and reliability of water resources; access to safe and clean drinking water and sanitation services; and access to direct and indirect benefits or impacts, including from cooperation from others, from the use of water resources".

Access to water is, in practice, often unequal, with women, the poor and other disadvantaged groups getting the lesser share, which in many cases deepens poverty. Even though the stated objective of the Act is to redress past inequities, van Koppen *et al* (2002 & 2003) argue that the status quo of the apartheid era remains unaltered in two important ways: in terms of existing lawful water use and the composition of the civil service. Existing water use refers to situations whereby water users that were drawing water for productive uses and had legal rights (e.g. permits) to do so two

years before the new Act was promulgated, will retain this right. The Act thus accepts the inequities prevailing at that time. Inhabitants of the ex-homelands generally do not have any documents to prove existing lawful water use, but they can refer to the notions of use and quantity embedded in what are typically verbal contracts or local water tenure arrangements.

2.2.6.2 Water management institutions

The NWA recognises the need to establish suitable water management institutions (WMIs) to achieve the purposes on the NWA. The Act defines WMIs as a Catchment Management Agency (CMA), a water user association (WUA), a body responsible for international water management or any person who fulfils the function of a water management institution in terms of the Act. The aim of the NWA is to establish a CMA in all 19 Water Management Areas (WMA) of South Africa. The purpose of establishing a CMA is to delegate water resource management to the regional or catchment level and to involve local communities, within the framework of the National Water Resource Strategy (NWRS). WUAs will enable individual water users who wish to undertake water-related activities for their own benefit to form cooperative associations.

The establishment of CMAs requires the participation of stakeholders in the management of water resources at ground level. The governing bodies of these institutions should be representative in terms of including sections of the population that were previously unrepresented in governance forums, especially black people and women (van Koppen *et al.*, 2002 & 2003). Van Koppen *et al* (2002) argue that even if composition of the governing board is equitable, the issue is how the CMA will deal with the fact that only a limited group of water users in the water management area will be reached in the process of establishing the CMA. According to van Koppen *et al* (2002), to overcome the above issue of *representation*, the CMA should have a well designed process to institutionalize public participation according

to the subsidiary principle, so as to ensure the historically marginalized are empowered, and should coordinate water management planning and implementation with government structures at local, district, provincial, and national levels.

The approach to establishing water user associations is three-pronged: The transformation of existing irrigation boards to WUAs; the conversion of government irrigation water schemes to WUAs; and the establishment of new WUAs (Schreiner *et al.*, 2004).

Despite the enabling framework provided by legislation and policy, and the wide recognition of the need to redress past imbalances in access to water, and to democratise water management institutions, experience to date has shown the difficulties of ensuring full participation in these institutions (Schreiner *et al.*, 2004; Anderson, 2005). Full participation by the historically disadvantaged is hindered by a lack of public awareness among those who do not have access to communication technologies and electricity (Schreiner *et al.*, 2004, Anderson, 2005). According to Schreiner *et al.*, (2004), the major challenge in terms of participation has been the very limited involvement of poor communities and in particular women. Many members of these communities feel disadvantaged as the process is new for them, and they may not have the background information that other representatives (e.g. mining and industrial) have on water management. The meetings for establishment of CMAs are often not easily accessible (Anderson, 2005; Nicol & Mtisi, 2003). Effective participation by HDIs requires more than just getting the parties to the table and the mere presence of representatives of poor communities is not an indication of their involvement in the participatory or decision-making processes (Faysse 2004; Schreiner *et al.*, 2004, Anderson, 2005). Anderson (2005) argues that there is a need for communication strategies that will empower and engage all sectors due to the range of cultures involved in the process.

Another challenge in the formation of the institutions is that of power imbalances. Dominance and power by those who controlled water in the apartheid era continues. Commercial farmers and irrigation boards are in a strong position to influence the direction of the CMA while the disadvantaged communities continue to suffer from significant power imbalances in knowledge and expertise (see van Koppen *et al*., 2002 & 2003; Anderson, 2005). Anderson (2005) argues that "to make catchment management work and to truly empower the poor, the water sector in South Africa needs to build techniques to transform the most powerful actors to understand the needs of the poor and marginalized and that this issue is often overlooked amongst competing research agendas". Anderson (2005) further argues that an analysis of power dynamics within the water sectors would make a valuable contribution to South Africa's water management discourse and would require a combined effort from DWAF, research institutions and water management practitioners.

There has also been delay in the set up of these water management institutions (Faysse 2004). By 2003, no CMA had been enacted, and there was only one smallholder WUA and around 20 WUAs, which came from former irrigation boards (IBs), and one large-scale non-agricultural WUA (Faysse 2004). The first CMA, Inkomati, was established in 2004 and became functional in the 2006/2007 financial year (DWAF, 2007b). In the financial year 2005/2006, the Breede, Crocodile (West)-Marico, and Mvoti-Mzimkulu water management areas CMAs were established by Government Notice, making a total of four established CMAs (DWAF, 2006a). Proposals for the establishment of CMAs in Usutu-Mhlatuze, Thukela, Gouritz and Olifants/Doorn water management areas were gazetted for public comment in 2005/20006 (DWAF, 2006a) and all these CMAs were established in 2006/2007, making a total number of eight CMAs in the country (DWAF, 2007b). During the 2005/2006 financial year, nine WUAs were established, six of which were new associations and three were transformed irrigation boards. Three of the newly formed WUAs are in Limpopo province and are made up of resource-poor (i.e. black) farmers only.

The transformation of irrigation boards into WUAs and the conversion of government irrigation water schemes to WUAs have raised important issues of equity and redress (Schreiner *et al*., 2004). In the case of Thabina irrigation scheme as reported by Perret *et al* (2003), within a communal area, for example, the establishment of a WUA was recommended. Both men and women were involved in crop production, but the participatory process leading to the establishment of the WUA was mainly attended by men and the women present at the meetings were not vocal. The elected WUA committee had no women members, and the reasons given for the non-inclusion of women in the process ranged from women being illiterate to their unavailability due to their household responsibilities. The main constraint with regard to the creation of smallholder WUAs in developing countries, according to Perret (2002), is financial sustainability. In South Africa, the WUAs do not meet any of the needs of the HDIs with regard to water, such as funds for investment in water distribution network or for maintenance of the distribution network. Faysse (2004) argues that if this problem is not addressed, there is a risk of HDIs losing interest in participating in water resources management institutions.

According to Faysse (2004), South Africa has set very ambitious goals in terms of involving the users and especially the small-scale ones in the management of water resources. For Nicol & Mtisi (2003), the rolling out of the institutional reforms has been affected by local level complexity in determining who should be represented on the new structures and how they can become self-financing in practice.

The National Water Act makes provision for the reallocation of water from high-volume users to poor users through compulsory licensing process (Schreiner *et al.*, 2004; van Koppen *et al.*, 2003). The NWA defines compulsory licensing as a mechanism to reconsider all the water use authorisations in an area in order to achieve a fair allocation of water in stressed catchments and promote beneficial use of water in the public interest. DWAF has already identified 80 sub-basins where they

will undertake compulsory licensing due to water stress (van Koppen *et al.*, 2003). In cases of over-allocation, all current and potential users in a particular area might be called to apply for new licenses in the interest of equity (Schreiner *et al.*, 2004). Compulsory licensing will cancel all existing licenses and water can be reallocated (Schreiner *et al.*, 2004; van Koppen *et al*., 2003). The Act requires that the proposed allocation schedule, which is part of compulsory licensing procedure, must reflect the quantity of water to be allocated and to whom licenses ought to be issued in order to redress the result of past racial and gender discrimination in accordance with the constitutional mandate for water reform.

Changes in the way water rights are allocated may have negative impacts on those that were using water beneficially and in such situations, a person may claim compensation for any financial loss suffered in consequence via the Water Tribunal [NWA sections 22 (6&7) and 43-48]. van Koppen *et al* (2003) argue that "the inclusion of the above clause weakens the possibility of reallocating water, but there is a safeguard built into the Act that exempts payment of this compensation if the reallocation was for: "providing for the reserve, rectifying an over allocation of water use from the resource in question, or to rectify an unfair or disproportionate water use". Compulsory licensing is in its early stages but Schreiner *et al.* (2004) believe that it is the most powerful tool in achieving equity in access to water and in ensuring that water is used optimally in achieving both black empowerment and poverty eradication. van Koppen *et al.*, 2003, argue that "compulsory licensing will be highly effective and necessary to regulate a small number of high volume users, but cannot be so effective in identifying how much water is used by the majority of small-scale users or to provide any legal protection against efforts of high volume users to forcibly continue control over scarce resources".

The next section is a critical analysis of recent debates on the human right to water and the violation of the human right to water.

2.3 The Human right to water

The rights based approach is founded on the assertion that all persons have the right to access water sufficient for their personal and domestic needs (Khalfan, 2004). Khalfan (2004) argue that current national and international programmes are not as focused and targeted as possible towards securing this basic right for the 1.1 billion people worldwide without access to clean water.

The human right to water is indispensable for leading a life in human dignity and it is a prerequisite for the realization of other human rights (UN, 2003; Khalfan, 2004). According to Filmer-Wilson (2005), the right to water was explicitly recognized as a fundamental human right by the Committee on Economic, Social and Cultural Rights in November 2002 with general comment no. 15. Before this the right to water was only mentioned in the Convention for the rights of a child in 1986 and the convention on the elimination of all forms of discrimination against women in 1979 (Filmer-Wilson, 2005).

Calaguas (1999) poses the following questions which need to be answered to make the right to water and sanitation explicit:

- How much water, and of what quality do individuals have a right to?
- What kind of access is necessary to fulfil the right?
- What responsibilities do individuals have vis-à-vis this right?
- What priority does this right carry in relation to other uses of water?
- How is the right promoted, safeguarded and monitored?

The human right to water entitles everyone to sufficient, safe, acceptable, physically accessible and affordable water for personal and domestic uses (UN, 2003). An adequate amount of safe water is necessary to prevent death from dehydration, to

reduce the risk of water-related disease and to provide for consumption, cooking, personal and domestic hygienic requirements.

Article 11, paragraph 1, of the International Covenant on Economic, Social and Cultural Rights (ICESCR) specifies a number of rights emanating from, and indispensable for, the realization of the right to an adequate standard of living "including adequate food, clothing and housing" (Office of the High Commissioner for Human Rights (OHCHR), 1966. The use of the word "including" indicates that this catalogue of rights was not intended to be exhaustive (UN, 2003).

Water is required for a range of different purposes other than personal and domestic uses, to realize many of the Covenant rights (UN, 2003). For Example, water is necessary to produce food (right to adequate food) and ensure environmental hygiene (right to health), water is essential for securing livelihoods (right to gain a living by work) (UN, 2003). Nevertheless, priority in the allocation of water must be given to the right to water for personal and domestic uses.

Violation of the right to water

In determining which actions or omissions amount to a violation of the right to water, it is important to distinguish between the inability and the unwillingness (of a State party) to comply with its obligations. This follows from articles 11, paragraph 1, and 12 of the ICESCR, which speak of the right to an adequate standard of living and the right to health, as well as from article 2, paragraph 1, of the Covenant, which obliges each State party to take the necessary steps to the maximum of its available resources (OHCHR, 1966). A State which is unwilling to use the maximum of its available resources for the realization of the right to water is in violation of its obligations under the Covenant.

To assist the monitoring process, right-to-water indicators should be identified in the national water strategies or plans of action. The UN (2003) calls for the designed of indicators to monitor, at the national the State. According to the UN (2003) these indicators should address the different components of adequate water (such as sufficiency, safety and acceptability, affordability and physical accessibility), be disaggregated by the prohibited grounds of discrimination, and cover all persons residing in the State's territorial jurisdiction or under their control. After identification of appropriate right to water indicators, governments should set appropriate national benchmarks in relation to each indicator.

According to the UN (2003), people who have been denied their right to water should have access to effective judicial or other appropriate remedies at both national and international levels. In the case of South Africa, the right to water has been entrenched in the constitution and the South African courts are beginning to promote the right to water. In 2006 five residents of Phiri instituted a legal action against the City of Johannesburg, case no 06/13865 (Tsoka, 2008). The City of Johannesburg had installed prepayment water meters scheme in Phiri, a township in Soweto. Prior to 2001, the residents of Phiri were entitled to an unlimited water supply at a flat rate. In 2001, the City of Johannesburg agreed to provide every household or account holder within the city with 6 kilolitres free water per month per household (Tsoka, 2008). However, the residents of Phiri's 6 kilolitres per month were to be dispensed by a prepayment meter system implemented in 2004, through Operation Gcinámanzi and it was pointed out that anyone who did not opt for pre payment meters would be without water (Tsoka, 2008). In terms of the system, once the 6 kilolitres have been consumed, the water supply to the stand is automatically cut off, and the affected account holder had to purchase water credits to be entitled to the supply of water until the next month's allocation of 6 kilolitres. The prepaid meters cut off water supply without reasonable notice to enable the users to make representations or purchase water credits if they are able to.

The applicants of case no 06/13865 challenged the following:

- The disconnection of their unlimited water supply at a fixed rate.
- The introduction and continued use of prepayment water meters.
- The amount of 25 lpcd or 6 kilolitres per household per month.

On the 30th of April 2008, the High Court of South Africa has ruled that the City of Johannesburg's forced prepayment water meters scheme in Phiri is unconstitutional. This judgement reaffirmed the principle of progressive realisation and increased the minimal amount of safe drinking water that the City is obligated to provide.

The judgement by the high court marked a key turning point in the struggle of South Africa's historically marginalised groups for their right to water. For the first time, a court has affirmed the right to sufficient water for basic daily requirements. The Court has ordered the City to provide residents of Phiri with 50 litres of free water per person per day (Tsoka, 2008), and this was an increase from the allocation whereby each household (on average containing 16 persons) is only provided with 200 litres per day (COHRE, 2008). The court noted that 25 litres per person is insufficient, especially for people suffering from HIV/AIDS. Tsoka (2008) argued that each WSA may increase the minimum of 25 lpcd depending on its resources and its residents' needs.

The City was also directed to provide residents of Phiri with the option of a normal metered water supply. The judgment held that Johannesburg's water policy was discriminatory. For an example, the people in low-income historically black townships(e.g. Phiri) are required to pay for water in advance, those in wealthy historically white suburbs (e.g. Sandton) are entitled to water on credit, and to negotiate payment with the City when they delay payment of their bills. According to the Centre on Housing Rights and Evictions (COHRE) (2008), the decision by the high court of South Africa will be an immense boost to poor communities in South

Africa and elsewhere. COHRE (2008) notes that the work to promote the right to water in South Africa as a whole must continue, through the courts and through the mobilisation of residents in rural areas and townships and broader civil society, in order to ensure that this success is entrenched and the desired real changes on the ground are realised.

The next section defines the concept of 'adequacy of water'.

2.4 'Adequacy of water'

The elements of the right to water must be *adequate* for human dignity, life and health, in accordance with articles 11 (paragraph 1) and 12 of the ICESCR (OHCHR, 1966). The adequacy of water should not be interpreted narrowly, by mere reference to volumetric quantities and technologies. Water should be treated as a social and cultural good, and not primarily as an economic good. The manner of the realization of the right to water must also be sustainable, ensuring that the right can be realized for present and future generations.

The United Nations (2003) applies the following factors in all circumstances in terms of adequacy of water:

Availability. The water supply for each person must be sufficient and continuous for personal and domestic uses.[4] These uses include drinking, personal sanitation, washing of clothes, food preparation, personal and household hygiene. According to the UN (2003) the quantity of water available for each person should correspond to World Health Organization (WHO) guidelines. Some individuals and groups may also require additional water due to health, climate, and work conditions.

[4] "Continuous" means that the regularity of the water supply is sufficient for personal and domestic uses (UN, 2003).

Quality. The water required for each personal or domestic use must be safe, therefore free from micro-organisms, chemical substances and radiological hazards that constitute a threat to a person's health (WHO, 2006). Furthermore, water should be of an acceptable colour, odour and taste for each personal or domestic use. Unsafe dirty water is the major cause of water related diseases that kill up to 5 million people annually (Calaguas, 1999). Dirty water results in high costs to families, communities and governments in the form of direct medical expenses, lost work time, lost education, lost economic productivity of sick workers, therefore contributing to household and community poverty (Calaguas, 1999). With treated drinking water, there is a general agreement that ideally it should contain zero E.coli; however in village water supply that uses ground water, the aim is that in any 12 month period, tests of water quality should only contain the average of 8 E.coli per 100 ml of water (Calaguas, 1999).

Accessibility. Water and water facilities and services have to be accessible to everyone without discrimination. Accessibility has four overlapping dimensions:

(i) *Physical accessibility*: water, and adequate water facilities and services, must be within safe physical reach for all sections of the population. Sufficient, safe and acceptable water must be accessible within, or in the immediate vicinity, of each household, educational institution and workplace.

(ii) *Economic accessibility*: Water, and water facilities and services, must be affordable for all. The direct and indirect costs and charges associated with securing water must be affordable, and must not compromise or threaten the realization of other Covenant rights. Current global water policy emphasizes that water is a finite resource and that it should be treated as an economic commodity, and not just a social commodity, therefore having an economic value. This brings up the issue of affordability of water as an element in the human right to water and sanitation.

(iii) *Non-discrimination*: Water and water facilities and services must be accessible to all, including the most vulnerable or marginalized sections of the population, in law and in fact, without discrimination on any of the prohibited grounds; and

(iv) *Information accessibility*: accessibility includes the right to seek, receive and impart information concerning water issues.

The right to water in itself does not answer the tough questions such as the precise amount of water that each person is entitled to under the principle of 'basic water requirements'. It only provides a useful framework for addressing these challenges and encouraging all actors to collaborate on solutions.

The next section defines basic water requirements for different domestic uses of water.

2.5 Basic water requirements

Efforts to define the right to water and sanitation have focused on the concept of a basic water requirement (BWR) that governments, water agencies, and community organizations should guarantee to everyone under its jurisdiction before other uses of water. The BWR refers to the amount of water that an individual would need daily to fulfil their basic domestic needs: sanitation, cooking, bathing, and drinking (Calaguas, 1999). The water required for different purposes varies according to climatic conditions, lifestyle, culture, tradition, diet, technology, and wealth (Gleick, 1996).

Gleick (1996) argues that the type of access to water alone is an important determinant in water use. Water use in litres per capita per day (lpcd) range from less than ten where the water source is a stand pipe farther than 1km to 400 litres where there is a house connection, mostly in urban areas with gardens.

Minimum drinking water requirement

A study by Gleick (1996) estimated the minimum human requirement for drinking water at about three litres per person day under average temperate climatic conditions. He argues that it is necessary to increase this figure in tropical and subtropical climates. This water should be of sufficient quality to prevent water-related diseases.

Basic water requirement for sanitation

There is a direct link between the provision of clean water, adequate sanitation services, and improved health. Extensive research has shown the clear health advantages of access to adequate sanitation facilities (see for example: Malubane, 2005). There are a wide range of sanitation technologies that require water or no water. In rural areas of South Africa technologies such a ventilated improved pits (VIPs) and ventilated improved double pit latrines, which require no water except for minimal washing, are being widely implemented.

The choice of sanitation technology depends on the developmental goals of a country, the water available, the economic choice of the alternatives, and powerful regulatory, cultural and social factors (Gleick, 1996). Because there are technologies that require no water, Gleick (1996) argues that it is technically feasible to set a minimum water requirement for sanitation at zero. There are two factors that argue against setting the minimum at zero: Health benefits are identified when up to 20 litres per capita per day of clean water are provided; and where economic factors are not a constraint, there is a high preference for water-based systems. A study by Malubane (2005) in two villages of Greater Giyani Municipality indicated that 37% of the households preferred water borne system to VIPs. Gleick (1996) recommends a minimum of 20 lpcd to account for the maximum benefits of combining waste disposal and related hygiene, and to permit for cultural and societal preferences.

Basic water requirement for food preparation

Howard and Bartram (2003) argue that defining requirements for water for cooking is difficult, because it depends on the diet and the role of water in food preparation. Water use for food preparation in wealthy regions ranges from 10 to 50 litres per person per day, with a mean of 30 lpcd (Gleick, 1996). In California, an average of 11.5 lpcd was used for cooking with an additional 15 litres used for dish washing. Gleick, (1996) suggest that on an average 10 lpcd is required for food preparation whilst Thompson *et al* (2001) show that in East Africa only 4.2 lpcd were used for both drinking and cooking for households with a piped water connection and 3.8 lpcd for households without a connection. Taking into account drinking needs, this suggests that between 1.5 and 2 lpcd is used for cooking (Howard and Bartram, 2003).

Water for bathing and laundry

Average water use for bathing in industrialized nations is about 70 litres per person per day, with a range from 45 to 100 litres per person per day (Gleick, 1996). Gleick (1996) recommends a basic level of 15 lpcd for bathing in developing countries or regions with no piped water.

Howard and Bartram (2003) argue that minimum requirements for domestic supply should include adequate water for laundry and bathing. As noted by Howard and Bartram (2003) in some cases laundry and bathing will be done at the house and in other circumstances some or all of these activities may be carried out at the water source rather than at the household. Howard and Bartram (2003) notes that in rural areas it may be socially acceptable for people to bathe and launder clothes at or close to the water source. Thompson *et al* (2001) in Howard and Bartram (2003) noted that in East Africa 30% of the population without household connections to piped water

supply use unprotected water sources for laundry. Howard and Bartram (2003) argue that this increases risks to health by exposure to water-based and vector-borne diseases such as schistosomiasis.

Basic water requirement for all uses

Gleick (1996) recommends that international organizations, national and local governments should adopt a basic water requirement standard for human needs of 50 litres per person per day and guarantee access to it by all individuals irrespective of their social, economic or political status. According to the RSA (1998a), the basic human need reserve provides for the essential needs of individuals served by a specific water resource and includes water for drinking, food preparation and personal hygiene.. This has been legislated to mean a minimum of 25 lpcd of potable water, within 200m of the home at a flow rate of 10 litres per minute and a 98% reliability of service delivery (Hope & Garrod, 2004, Thompson, 2006).

Gleick (1996) argues that unless this basic need of 50 lpcd is met, large scale human misery and suffering will continue and grow in the future. The recommended level of 50 lpcd, which should be considered a fundamental human right, is based on health considerations and on assumptions about technological choices at modest levels of economic development, and assumes minimum levels of 15 lpcd for bathing, 10 lpcd for cooking and 25 lpcd for drinking and sanitation. While billions of people lack this standard today, it is a desirable goal from a health perspective and from a broader goal of meeting a minimum quality of life. Poor quality of domestic water is a severe and widespread problem and it is likely that many people who may receive more than the recommended quantity are getting contaminated and unhealthy water.

Efforts to integrate environmental issues, and recent concerns with sustainable economic and social development, have seen a return to the concept of meeting basic

human needs first proposed nearly two decades ago (Gleick, 1996). One of the most fundamental of those needs is access to clean water.

The data collection instrument for the village study on domestic water use addressed six themes as follows: water sources, water availability, water collection, water use, productive use of domestic water, and the level of water supply service. Current debates on four of the six themes are reviewed in the next section.

2.6 Water collection

A study by Thompson *et al* (2001) in East Africa indicates that women continue to be burdened by drawing and carrying water, which takes a lot of their time. The study further highlights an increase in the number of young men collecting water to sell. Women and girls carry a double burden of disadvantage, since they are the ones who sacrifice their time and their education to collect water (UNDP, 2006). According to the study by Thompson *et al* (2001) in East Africa, the average daily number of trips per household for water collection increased from 2.6 in the late 1960s to 3.9 in the late 1990s (Thompson *et al*, 2001).

Once the time taken to collect water at a source exceeds around five minutes, or the distance exceeds 100m from the house, the quantity of water collected decrease significantly (Howard & Bartram, 2003). Beyond a distance of one kilometre, or more than 30 minutes total collection time, quantities of water will be expected to further decrease in rural areas where only consumption needs can be met (Howard & Bartram, 2003). The amount of water collected is also connected to the capacity of the household to store water. Zerah's study (as cited in Howard & Bartram, 2003:20) indicates that low income families are likely to be at greatest risk from poor water supply continuity as they have limited resources and they might be less able to store large volumes of water at home. The amount of time spent collecting water is also an indicator of water scarcity. According to Howard & Bartram (2003) supply reliability

also influences quantities of water collected although there is very limited data to establish what relationships exist.

Thopmson *et al* (2001) argue that time spent queuing for water reduces the time available for cooking and cleaning and makes children late for school, and these factors have an adverse effect on livelihoods. Howard & Bartram (2003) suggest that reducing time taken to collect water will allow greater time available for child feeding, food preparation and better hygiene generally.

In arid and semi-arid parts of the world with poor domestic water supply but with relatively abundant water for irrigation, canal water can even be the only source of water for all purposes. This, according to Boelee *et al* (2007) is called multiple use[5] of water.

Boelee *et al* (2007:44) distinguish five different types of water use activities as follows excluding the particular field or crop the irrigation water was intended for:

1. other agricultural purposes, such as irrigating home gardens, watering livestock, washing agricultural equipment, soaking fodder;
2. Domestic purposes, such as laundry, bathing, washing household utensils, cooking, drinking, house cleaning, sanitation;
3. Commercial purposes, usually small-scale activities or home industries, such as brick making, shops, washing vehicles, pottery, mat weaving;
4. Other productive purposes, usually non-consumptive, such as fisheries and water mills;
5. Recreation.

[5] According to Boelee *et al* (2007:44) multiple-use of water is the use of water which was assigned to agriculture for other purposes such as domestic uses or small-scale industry.

2.7 Water use

Historically, people have used water for many different purposes in their livelihoods, including drinking, washing, cooking, irrigating, and manufacturing. Over the years, the modern water 'sector' has been created, with its range of sub-sectors like irrigation, industry and domestic. Moriarty *et al* (2004) argue that each of the sub-sectors has its own approaches, doctrines, and rigid sectoral boundaries. The success of the sectoral approach has been to provide billions of people worldwide with safe water supplies for domestic use, for agriculture and for industry but the great failure is that 20-30% of the world's population, especially the poor and women, have not shared in these benefits (Moriarty *et al.,* 2004).

Amounts of water used for basic needs vary according to quality and proximity of the water supply and the size and wealth of households. The average use for basic needs purposes in rural areas of South Africa is close to or below the basic needs figure of 25 lpcd (Soussan *et al.,* 2002; Pérez de Mendiguren Castresana, 2004). Pérez de Mendiguren Castresana (2004) argue that the fairly low water use for basic activities is linked to the absence of in-house water connections, as use is effectively limited by what people can carry, often from a considerable distance.

2.8 Productive uses of domestic water at household level

Pérez de Mendiguren Castresana (2004) argue that the initial target of 25 lpcd in South Africa reflects a definition of needs that assumes domestic water supply is only about health and hygiene, for drinking, cooking, sanitation and washing. According to Pérez de Mendiguren Castresana (2004) the national human needs reserve does not cover water for productive purposes that might help income-poor women and men to improve the harvests of their vegetable gardens, their poultry and livestock enterprises, for example.

Productive uses of domestic water at a household level might include brewing, small-scale food production and house building in low income areas **(**Howard and Bartram, 2003). It is increasingly recognised that productive uses of water have particular value for low-income households and communities and have health and well-being benefits (Howard and Bartram 2003). Direct health benefits are derived from improved nutrition and food security from garden crops that have been watered (Howard and Bartram, 2003). Indirect health benefits arise from improvements in household wealth from productive activity. According to Schreiner *et al*., (2004) access to water for domestic and productive purposes is a critical dimension of poverty alleviation and van Koppen *et al (*2002) argue that poverty is a much broader phenomenon and encompasses a range of interrelated dimensions of deprivation.

Schedule one of the NWA stipulates small water uses that are permissible under any condition, without any need for registration, authorization, or payment, but according to van Koppen *et al*., (2003) it is not clear whether productive uses for basic income needs are permitted. Schedule one concerns water used for reasonable domestic use, livestock other than feedlots and small gardening, but not for commercial purposes.

Research has shown that a wide range of water-dependent productive activities such as vegetable gardens, beer brewing, brick making and livestock take place in South Africa and usually exceed the targeted basic need of 25 lpcd (see Pérez de Mendiguren Castresana, 2004). Studies carried out in Limpopo Province relating to productive water use at household level revealed that between 18% and 45% of the respondents' reported irrigating vegetable garden crops with domestic water supply in the dry season (Hope and Garrod, 2004; Pérez de Mendiguren Castresana, 2004). A study by Pérez de Mendiguren Castresana (2004) concludes that 'an additional water supply of 40 lpcd is able to support a wide range of productive activities'.

Howard and Bartram (2003) notes that quality of water used for productive processes needs to be suitable for domestic supply where it is used to process food for retail

sale. Productive uses taking place at household level have yet to be recognized in the planning and allocation process (van Koppen et al, 2003; Soussan *et al*., 2002; Pérez de Mendiguren Castresana, 2004). Nicol & Mtisi (2003) argue that insufficient account has been made of household livelihood uses within the water sector reform process, and specifically the lack of commitment to ensuring that water for productive use at household level is available, reliable and affordable. Similarly, Soussan *et al* (2002) argue that "there is a need for the re-assessment of the concept of water for basic human needs to include water needs for livelihoods activities".

Awareness of the importance of the productive uses of domestic water by national and local government is critical for poverty reduction in poor rural communities (Soussan *et al.*, 2002; Hope & Garrod, 2004). The major challenge is to create the means within the new institutional structures to press for water for broader livelihood uses, and to bring some clarity to issue of payments for water usages that are non-commercial but go beyond the basic domestic level usage (Nicol & Mtisi, 2003).

2.9 The level of water supply service

Howard and Bartram (2003) argue that accessibility is not related to volumes of water available but to the level of service provided. Household water security improves with increasing service level, which will contribute to reducing poverty (Howard and Bartram, 2003). Howard and Bartram (2003) identify five categories of service level, as shown in the table below, which can be interpreted in terms of household water security. The 'no access' group effectively has no household water security as the quantities collected are low, the effort taken to acquire water is excessive and quality cannot be assured. The group with 'basic access' has basic household water security provided that the water is reasonably continuous and quality can be assured at source and protected during subsequent handling. The group with 'intermediate and optimal access have effective and optimal household water security respectively.

Table 3: Service level descriptors of water in relation to hygiene

Service level description	Distance/time measure	Likely quantities collected	Level of health concern
No access	More than 1000m, or 30 minutes total collection time.	Very low (often less than 5 lpcd).	Very high as hygiene not assured and consumption needs may be at risk. Quality is difficult to assure; emphasis on effective use and water handling hygiene.
Basic access	Between 100 and 1000m (5 to 30 minutes total collection time).	Low. Average is unlikely to exceed 20 lpcd; laundry and/or bathing may occur at water source with additional volumes of water.	Medium. Not all requirements may be met. Quality difficult to assure.
Intermediate access	On-plot (e.g. single tap in house or yard).	Medium. Likely to be around 50 lpcd higher volumes unlikely as energy/time requirements are still significant.	Low. Most basic hygiene and consumption needs are met. Bathing and laundry possible on-site, which may increase frequency of laundering. An issue of effective use is still important and water quality is assured.
Optimal access	Water is piped into the home through multiple taps.	Varies significantly but likely above 100 lpcd and may be up to 300 lpcd.	Very low. All uses can be met, quality readily assured.

Cairncross's study (as cited in Howard & Bartram, 2003:17) in Mozambique demonstrated that water consumption in a village with a stand pipe within 15 minutes

walk was 12.30 lpcd compared to 3.24 lpcd in a village where it took five hours to collect a bucket of water. Average water consumption when it is piped into the home is relatively high at 155 lpcd but decreases to 50 lpcd when water is supplied to the yard level. When water is outside the home (e.g. springs or hand pumps), average consumption drops further to 16/lpcd (Howard & Bartram, 2003). Thompson *et al* (2001), thus argue that quantities of water used for bathing (including hand washing) and washing of clothes and dishes are sensitive to service level. Households using water sources outside the home use an average of 6.6 lpcd for washing dishes and clothes and 7.3 litres for bathing. By contrast, households with a piped water supply use on average 16.3 lpcd for washing dishes and clothes and 17.4 lpcd for bathing (Thompson *et al* , 2001).

The deterioration in the quality of service, through decreased quantity or availability may lead to further poverty among poor households that were using water for small-scale economic activities such as food production (Howard and Bartram, 2003). If the interruption in supply is predictable, then regular discontinuity may be mitigated to some extent as the predictability can allow households to develop coping strategies for water collection.

Howard and Bartram (2003) argue that increases in quantities of water used will only be achieved through upgrading of service level. Authors such as Hope & Garrod (2004), Pérez de Mendiguren Castresana (2004) go further to say that upgrading ground water supplies to street taps will provide little additional welfare to rural households but a change from ground water to house tap or yard taps will greatly enhance people's lives, provided that the services are sustainable. The above finding has significant implications for domestic water policy which is broadly based on delivering water within 200m of the home.

2.10 Conclusion

This chapter explores the conceptions of water management in South Africa, isolating some of the key policies and strategies underpinning the South African government's efforts to improve access to water. The chapter also attempts to put into context South Africa's approach of improving access to water for domestic and productive purposes by reviewing global and national debates that deal with some of the issues pertinent to water reform. The next chapter shall provide a spatial, socio-economic as well as biophysical description of the study within the broader context of the province of Limpopo.

CHAPTER 3: STUDY AREA AND RESEARCH METHODOLOGY

The previous chapter explored the conceptions of water management in South Africa and put into context South Africa's approach to improving access to water for domestic and productive purposes by reviewing the international and national literature.

The present chapter provides a spatial, socio-economic and biophysical description of the area covered by this study, within the broader context of the province within which it is located. The chapter starts with an overview of the location and process leading up to the selection of the study site, and then proceeds to discuss the spatial dimensions of Limpopo Province, Mopani District Municipality, Greater Giyani Local Municipality, and Siyandhani village and the Klein Letaba Catchment. The biophysical description of the study site is provided, with particular focus on climate, topography and hydrology, where such information is available.

The second section of the chapter explains the design and implementation of the research, including issues of selection, methods used for collecting secondary and primary qualitative and quantitative data, and methods used to collect and analyze data.

3.1 Location

The detailed study was carried out in Siyandhani village, which is located, hydrologically speaking, in Klein Letaba sub-area in the Letaba/Shingwedzi (L/S) sub-region, which in turn forms part of the Luvuvhu/Letaba Water Management Area (See Figure 3 below). The other sub-region in Luvuvhu/Letaba Water Management Area is Luvuvhu/ Mutale. The other three sub-areas of Letaba/Shingwedzi (L/S) sub-region are Groot Letaba, Lower Letaba and Shingwedzi. Before 1994, Siyandhani village was part

of the homeland of Gazankulu. The homeland was divided into districts and Siyandhani was located in the district of Giyani. The homelands were abolished in April 1994, at which point Giyani district was incorporated into the new Northern (later Limpopo) Province. The provinces were subsequently divided into new district and local municipalities; today, Siyandhani falls within Limpopo Province, Mopani District Municipality and Greater Giyani local municipality. These areas are described in detail below.

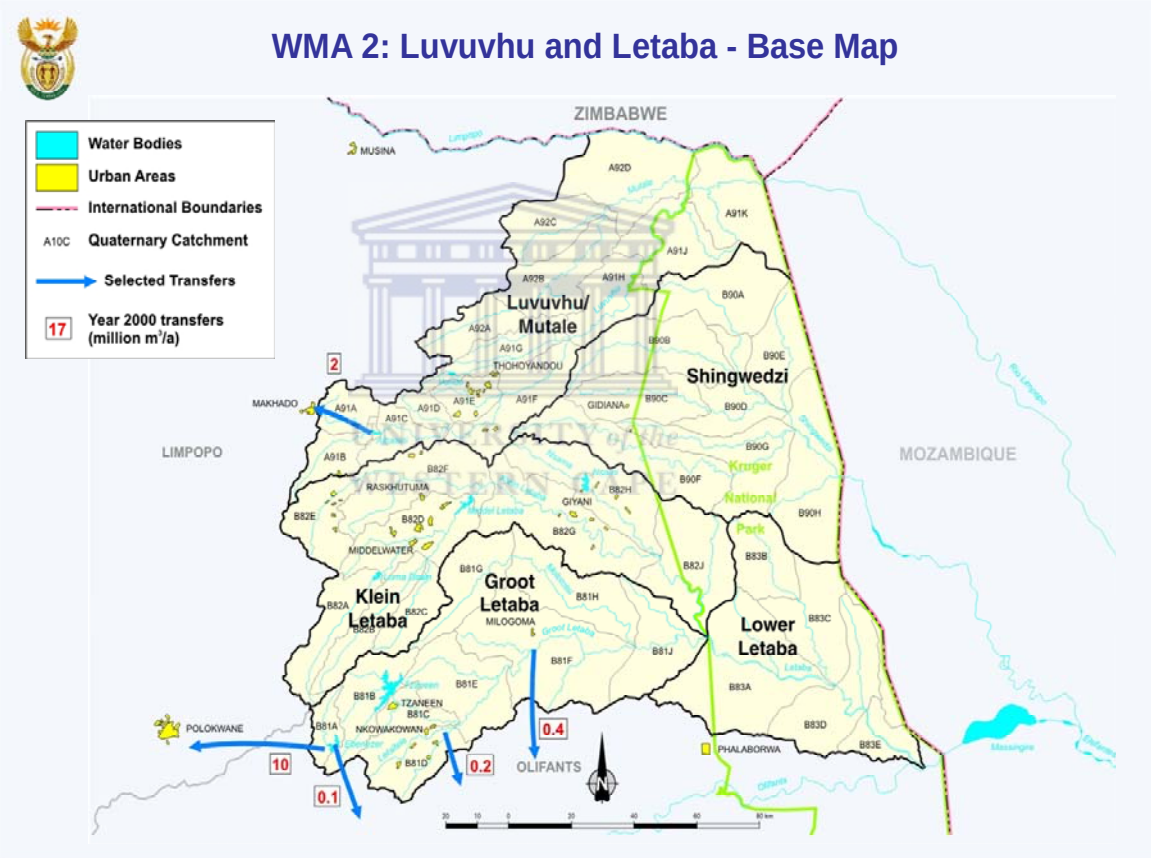

Figure 3: Sub-areas of Letaba/Shingwedzi sub-region

(Source: www.dwaf.gov.za)

3.2 Selection of the case study site

In order to explore the widest possible range of water uses, it was decided to select an area with an irrigation scheme, which would be useful for exploring the practice of allocation and use of irrigation water. The irrigation scheme to be selected had to have farmers farming individually because the researcher decided to study irrigation water use by individual farmers and not groups. The study area had to be characterised by intersectoral water uses ranging from irrigated agriculture as well as great need for water for uses which include domestic uses, and productive uses such as livestock keeping, brick laying, etc.. Preliminary visits were made to the Giyani area in November 2005, in the form of meetings with senior officials of the Department of Agriculture in Giyani and Mopani District Offices, to find out about agricultural activities in the area and irrigation schemes in particular. The officials provided useful information on agricultural conditions in the Giyani area and on the activities of their department, as well as facilitating visits to a selection of irrigation schemes. During the same month visits were made to the Mabunda, Selwane, and Mariveni irrigation schemes.

The purpose of the visit was to gather information on the size of the schemes, numbers of farmers involved, systems of administration and land allocation, and water-related issues such as sources of water, allocation, payment, irrigation infrastructure and matters related to supply of domestic water in the surrounding villages.

After assessing the information about these schemes gathered during the first field visit, it was decided that Mariveni would be a suitable site for the study but it was later realised that all three schemes in the area were now functioning as cooperatives. Another field visit was taken to Giyani in the period 30 January to 3 February 2006, this time to Bend and Hlaneki projects, both part of the Middle Letaba irrigation scheme. A subsection of the Bend project - Block B4E - is located within Siyandhani

village while the Hlaneki project is a few kilometres from the Hlaneki village. The purpose of the visit was to gather similar information as in first visits to the other schemes. Gaining access to the Siyandhani village was not difficult but local leaders and officials maintain a close watch on who comes and goes within their community and many rural people do not trust outsiders. During preliminary visits to Siyandhani, I met with two local farmers to get a background to the scheme. When making appointments with the local farmers, it was important to mention that I have been referred to them by the local agricultural officer. In both of these schemes farmers were farming as individuals (or households), but Hlaneki irrigation scheme was rejected because it was not located within a village but outside the village. It was decided that block 4E of Middle Letaba irrigation scheme and Siyandhani village itself would be a suitable site for the study.

Once the decision was taken to make Siyandhani the main focus of the study, it was thought prudent to seek the approval and assistance of official structures and of the traditional authority in the village i.e. Chief Siyandhani, who also informed his local headmen about the study. The officials of the Departments of Agriculture and Water Affairs were also visited. The Department of Water Affairs and Forestry provided information about the organisation of the department locally and its responsibilities, about water services infrastructure in the Giyani area and the challenges facing the Department there. This approach had considerable success, as it facilitated direct access to all officials connected with the scheme and water services in the village both at local and district offices in Giyani, all of whom were co-operative and provided valuable assistance through the course of the study.

3.3 Overview of the study area

This section gives an overview of the study area organised according to the various relevant administrative and geographical divisions, including the Klein Letaba hydrological sub-area, the former homeland of Gazankulu, the former Giyani District

of the Gazankulu homeland (including Giyani town), Limpopo Province, Mopani district municipality, greater Giyani municipality, and Siyandhani village. The next section gives an overview of Limpopo Province in terms of location, population, smallholder irrigation schemes, the revitalisation of the irrigation schemes, and domestic water supply.

3.3.1 Overview of Limpopo Province

Limpopo is situated at the North Eastern corner of the Republic of South Africa. South Africa (See map below), and has a total land area of 1,219,090 km^2 and Limpopo Province occupies 123,840 km^2 of the country's total area, making it the fifth largest province in the country (Statistics South Africa - StatsSA - 2004).

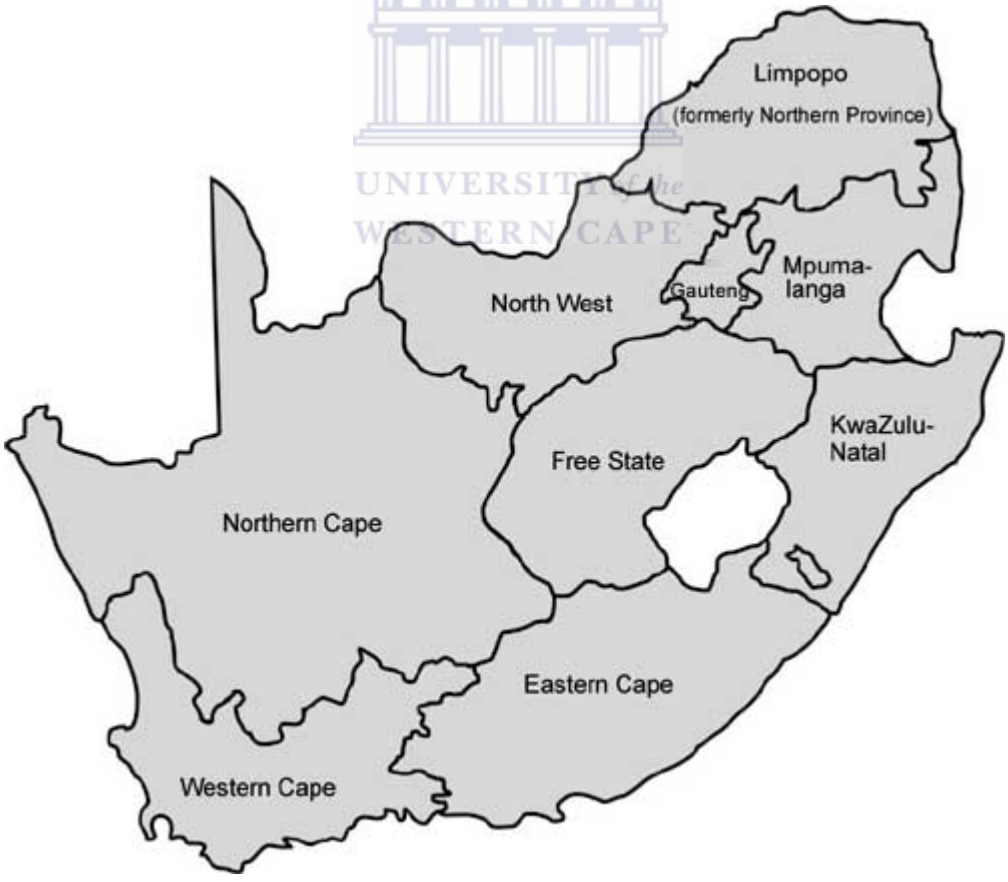

Figure 4: Provinces of South Africa (2005) (Source: http://www.issafrica.org)

The Province is divided into five district municipalities (see Figure 6) and has an estimated population of 5,670,800, consisting of 97% Black African, 0.2% Asian, 0.2% Coloured and 2.4% White people, using the standard census categories (StatsSA, 2006a). The highest number of people can be found in the Waterberg District, whilst the Sekhukhune District has the lowest number of inhabitants. It is estimated that the population of the province consists of 47% males and 53% females (StatsSA, 2006a). Limpopo is the most rural of any provinces in the country with approximately 89% of the population living in non-urban areas.

Limpopo has a wide climatic variation. It is characterized by year-round sunshine with an average temperature of 27 degrees Celsius in summer. Winter is a sunny season with cold mornings, warm midday and cool to cold nights.

Concerning land allocation, Wegerif (2004:16), states that "over two thirds of the land in Limpopo Province (approximately 87,000 km²), was allocated for white ownership and use in the past, primarily for commercial agriculture with some forestry and [nature] conservation". Farming on this land was carried out on about 7,200 commercial farming units (Wegerif, 2004). The three former homelands of Gazankulu, Lebowa and Venda occupied 36,000 km², just under one third of the land area, and accommodated approximately 299,000 small farmers as well as the majority of the 5.1 million African population (Wegerif, 2004:16).

Figure 5: Limpopo Provincial Map (2007)

Source: (www.limpopo.gov.za)

Smallholder irrigation schemes in the province

Approximately 60% of irrigated land in the province is used by commercial farmers (Limpopo Province Department of Agriculture (LDA), 2002) with the remaining 40% comprising small-holder schemes in the former homelands. South African smallholder irrigation schemes are multi-farmer irrigation projects larger than 5 ha in size that were either established in the former homelands or in resource-poor areas by black people or agencies assisting their development. Using this simple definition, Denison & Manona (2007) counted 183 small-holder irrigation schemes in the province with a total irrigable area of 28,283. There are 17,785 farmers on the 183 small-holder schemes, with an average plot size of 2.2 ha (Denison & Manona, 2007). The Table below shows the number of small-holder schemes by size category

in the province. The table indicates that 41% of the schemes are sized between 51-150 ha with only one scheme having more than 1,500 ha.

Table 4: Number of schemes by size category in the province

Size category (Ha)	No
< 5	3
5-50	57
51-150	76
151-500	30
501-1500	11
>1500	1
Missing data	5
Total	183

The Table below indicates the area under irrigation by irrigation type in the province. Approximately 38% of smallholder irrigation schemes use surface or flood irrigation, 36% use overhead sprinklers, 10% use drip or micro-irrigation and only 1% use centre pivots.

Table 5: Area under irrigation type (Ha)

Water use type	Irrigation area (ha)	% by area	No of farmers
Surface (flood) irrigation	10,834	38.3	8,302
Overhead Sprinkler	10,214	36.1	3,763
Centre pivot	471	1.7	248
Drip/Micro	3,070	10.9	unknown
Unknown	3,694	13.1	12,313
Total	28,283	100.0	

(Source: Denison & Manona, 2007)

Most of these schemes have degraded infrastructure due to lack of maintenance in recent years. The schemes were mostly government managed and maintained up to the mid-1990s, with beneficiary farmers not involved in the day-to-day maintenance of the schemes infrastructure (Lahiff, 2000; LDA, 2002).

The failure of many irrigation schemes in the former homelands, despite huge investments, led government to reconsider its active and direct role in small-scale irrigation farming. The result of this was the closure of many irrigation schemes. In Limpopo Province, it is acknowledged that many of the irrigation schemes have been inactive for many years, due to inappropriate planning and design, poor operational and management structures, beneficiaries and government extension officers lacking technical know-how and ability, absence of involvement and participation by users, inadequate institutional structures, and inappropriate land tenure arrangements (Perret, 2002).

The entire agricultural sector in the province employs 118,861 people (Wegerif, 2004). The province produces, on average, approximately 75% of the country's mangoes, 65% of its papaya, 36% of its tea, 25% of its citrus, bananas, and litchis, 60% of its avocados, and two thirds of its tomatoes. Other products include maize, coffee, nuts, guavas, sisal, cotton, tobacco and timber, with more than 170 plantations (www.limpopo.gov.za).

The Revitalisation of Smallholder irrigation schemes in the province

Since 1998, the Limpopo Province Department of Agriculture (LDA) has embarked on a programme of revitalisation of small scale irrigation schemes (RESIS) in the province with the objective of transferring the ownership of the schemes to the farmers. Before transfer takes place, LDA (2002) commits to assisting the community with finance, equipment and technical skills in order to revitalise these schemes and ensure their sustainability.

The RESIS programme commenced in 1998 with three pilot projects in the province. In April 2000, five more schemes were included under the Water Care Programme (WCP) of the National Department of Agriculture's Land Care Programme. In January 2002, the second phase of the WCP included 16 irrigation schemes in different districts of the province. In September 2002 a master plan was developed for the expansion of the programme to include all viable small holder schemes in the province (LDA, 2002).

According to LDA (2002) the department only assists the community if beneficiaries are willing and commit to take ownership of the schemes and to contribute in kind during the revitalisation process. Each community has to apply formally for assistance to the department; the department will first assist the farmers to identify revitalisation needs of the schemes through a pre-development survey and technical evaluation of resources and infrastructure. The pre-development survey focuses on the socio-economic status of the community, needs and problems while the technical evaluation assesses the state of the scheme infrastructure, natural resources of the area, the climate and agricultural potential of the scheme.

The farmers are then assisted to establish appropriate management structures for the sustainable take over and management of the schemes. This involves the formation of farmer groups and a WUA with its management committee with farmer groups represented on the management committee. The registration of a WUA with DWAF enables the farmers to operate as a legal entity and apply for access to DWAF grants for any additional infrastructure rehabilitation that may be necessary (LDA, 2002).

Once the committees are in place the rehabilitation of infrastructure commences and the gradual transfer of the schemes to their WUA commences. During the process farmers are trained in scheme management and administration, financial management, and farming practices to ensure improved productivity of the scheme

and allow farmers to take responsibility of management and maintenance of the scheme.

Domestic water supply in the province

The percentage of households that have access to piped water in Limpopo province is below the national average of 84.5% in 2001 and 88.6% in 2007. Only 83.6% households in the province had access to piped water in 2007, up from 78.1% in 2001 (StatsSA, 2007). The percentage of households with access to piped water within 200 metres was 55.0% in 2001 and increased to 56.3% in 2007 (StatsSA, 2008).

In 2001 the province had 502,225 households with water supply below the RDP standard (See chapter 2) and in 2007 the figure was 296,655 (DWAF, 2007a). This includes households with access to formal water supply infrastructure but below RDP service levels, such as communal tap further than 200m from their dwelling, unacceptable quality, unacceptable flow, etc.

In 2004, there were 917,324 consumer units (e.g. households) receiving basic water services from municipalities in Limpopo province, growing to 1,174,926 in 2005 (an increase of 28.1%) (StatsSA, 2006b). Approximately 50.7% of those receiving basic water services in 2005 were receiving free basic water services (i.e. were classified as poor).

3.3.2 Overview of Mopani District Municipality

Mopani District Municipality (MDM) is situated in the North-eastern part of Limpopo Province, 70 km from the town of Polokwane. It is bordered in the east by Mozambique, in the north by Vhembe District Municipality and Zimbabwe, in the south by Mpumalanga Province (Enhlazeni District Municipality), to the west by Capricorn District Municipality, and in the south west by Sekhukhune District

Municipality (see Figure 5). The district is named Mopani due to the abundance of Mopani trees in the area.

MDM has five local municipalities, namely: Greater Giyani (GGM), Greater Letaba, Greater Tzaneen, Ba-Phalaborwa, and the recently incorporated Maruleng municipality, which was formerly part of Bohlabela District Municipality. MDM is largely rural in nature and covers a land area of approximately 22,421.83 km^2, with 15 urban areas (towns and townships), 325 villages and 106 wards (MDM, 2007).

In 2006, MDM was estimated to have a population of 1,223,747, with 81% of the population living in communal areas, 14.2 % in urban areas and 4.6% on commercial farms (MDM, 2007). The Table below shows the population of MDM per local municipality. Greater Tzaneen municipality has the highest number of people in the district while Maruleng municipality has the lowest. The farm-dwelling population is highest in Greater Tzaneen municipality (55%), due to the concentration of commercial farms in the municipality.

Table 6: Estimated population per local municipality of MDM, 2006

Local Municipality	Population	'Rural'	Urban	'Farm dwellers'
Greater Giyani	276,688	247,585	29,083	0
Greater Tzaneen	442,282	362,453	45,836	33,993
Greater Letaba	260,286	245,523	14,763	
Ba-Phalaborwa	137,264	49,633	69,950	17,681
Maruleng	107,247	95,162	2,494	9,591
Total	1,223,747	1,000,356	162,126	61,265

(Source MDM, 2007).

People in Mopani district are employed by the farming, public sector, industry, mining, trade, transport, manufacturing, energy, and construction sectors. The public sector is the largest employer in the district: 39% of employed people in Greater

Giyani are employed by this sector (MDM, 2007). The second largest employer in the district is the farming sector, with 25.9%.

3.3.3 Overview of Greater Giyani local municipality

The Greater Giyani Municipality (GGM) is a local municipality, established in terms of the Constitution Act, no 108 1996, the Demarcation act 27 of 1998 and Section 12 Notice issued in terms of the Local Government: Municipal Structures Act 117 of 1998.

Greater Giyani Municipality is situated in the northern quadrant of Limpopo Province and the north of the Mopani District Municipality at approximately 170 km from Polokwane (Figure 3). The eastern part of GGM borders the Kruger National Park. The GGM comprises a land area of approximately 2,967 km^2 with eleven traditional authorities comprising 91 villages and one urban area. It is divided into 30 wards, with a total of 60 councillors (Greater Giyani Municipality, 2006). The town of Giyani is the largest in the municipality and is the home of Mopani District Municipality and GGM offices and previously housed the administrative offices of the former Gazankulu homeland (MDM, 2005). In 2006, Greater Giyani was estimated to have a population of 276,688 with 247,585 (89%) in rural areas and 29,083 (11%) in Giyani town (MDM, 2007).

Land and land reform in Greater Giyani

A considerable percentage of land within GGM comprises of rivers, grazing land, subsistence farms, irrigation schemes and other natural resources. Significant areas of land are owned by the State and fall under the custodianship of Traditional Authorities.

The Greater Giyani Municipality's integrated development plan (IDP) of 2006 indicates that six restitution claims were received from Greater Giyani area in terms of the Restitution of Land Rights Act of 1994. The Table below indicates the claims and the current status of the claims. The Table indicates that only two of the six claims are settled, one claim is at the valuation stage, two are at the negotiations stage and one claim is at referral stage.

Table 7: Land claims status in Greater Giyani as at November 2006

Settled Claims	**Projected settlement for 2005/6**	**Referrals**
Hlomela	Shimange (Valuation stage)	Mushiane Community
Msengi	Siyandhani (Negotiations)	
	Murhongolo (Negotiations)	

According to GGM (2006), the Regional Land Claims Commissioner in Limpopo is faced with the following challenges in terms of the land claims in the province: counter claims or overlapping of claims; disputes over the validity of Chieftainship; current land owners (occupiers) challenging the validity of claims; new land owners not having the expertise to continue with the production and running of commercial farms; inadequate capacity of staff to deal with all claims at once; and negative media reporting.

Domestic water supply in Greater Giyani

According to GGM (2006), the current infrastructure in Giyani is inadequate to supply water to the whole of Greater Giyani Municipality and supplying water to all the villages within Greater Giyani municipality puts too much pressure on the existing water purification plant. The Table below indicates the population that needs water supply and the main water supply for households in Greater Giyani. The Table indicates that households with water inside their dwellings decreased from 18.94% in

1996 to 11.26% in 2001 and the re-demarcation of municipalities might have contributed to the discrepancies in these figures (GGM, 2006).

Table 8: Main water supply to households

Households	1996	%	2001	%
Dwelling	7,942	18.94	5,887	11.26
Inside Yard	12,396	29.56	16,894	32.31
Community Stand pipe	19,274	45.96	7,112	13.60
Community stand pipe over 200m	0	0.00	15,404	29.46
Borehole	712	1.70	1,485	2.84
Spring	1,091	2.60	20	0.04
Rain Tank	336	0.80	71	0.14
Dam/Pool/Stagnant Water	0	0.00	110	0.21
River/Stream	0	0.00	3,065	5.86
Water Vendor	0	0.00	150	0.29
Other	189	0.45	2,086	3.99
Total	41,940	100.00	52,284	100.00

(Source: Greater Giyani, 2006)

Agriculture in Greater Giyani

Trade and agriculture are the two most important economic sectors in the municipality. Fruits and vegetables are grown mostly on community gardens in tribal land and in the irrigation schemes (Mopani District Municipality, 2005). The Middle Letaba Irrigation scheme supplies water in the area, but there are many subsistence farmers, such as farmers on community gardens who are not situated next to the irrigation schemes and practice dry land farming, or irrigate on a very small scale. Other small-scale agricultural activities include livestock farming. Commercial farmers in Greater Giyani produce fruits and vegetables such as bananas, mangoes,

and tomatoes and they get water for irrigation form the Middle Letaba irrigation scheme (Mopani District Municipality, 2005). The factors impacting economic growth in the municipality include geographical location (distance to markets), shortage of skills, climatic conditions, poor infrastructure and diseases.

3.3.4 Overview of Siyandhani Village

Location

Siyandhani village is located within ward 30 of Greater Giyani Municipality, two kilometres east of Giyani Town central business district (CBD). Before 1994, Siyandhani village fell under the Giyani district of the former homeland of Gazankulu. The former homeland of Gazankulu is situated in the North Eastern part of the former Transvaal, in the Republic of South Africa (see map below). Under the apartheid-regime, Gazankulu was declared to be home of all speakers of the Shangaan/Tsonga language.

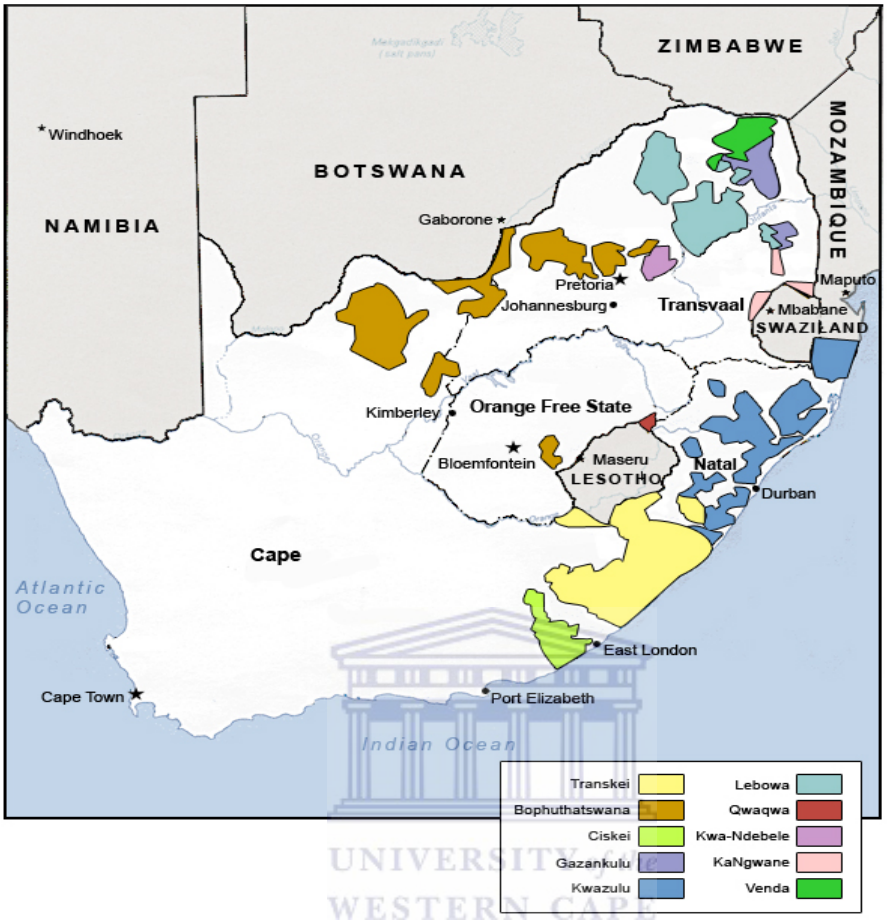

Figure 6: Former homelands of South Africa

(Source: http://www.historicalvoices.org/pbuilder)

For administrative purposes, Gazankulu was divided into six magisterial districts, namely Giyani, Malamulele, Mhala, Nhlanganani, Ritavi I and Ritavi II. It's most important towns were Giyani, Nkowankowa, Thulamahashe, Malamulele and Letsitele. The newly created town of Giyani, situated at the former trading post of Bend, was chosen by the Gazankulu Government as its capital city and seat of government of Gazankulu and its administration.

Giyani Town is situated in the former north-eastern Transvaal area of South Africa about 150 km north-east of Polokwane and 400 km from Pretoria (Els van Straten and partners, 1987a: 8). Closest large towns are Tzaneen 108 km to the south-west and Phalaborwa about 160 km to the south-east. The town of Giyani is located in the centre of the northern and largest portion of Gazankulu and to the north of the Klein Letaba River; the former white residential area of Kremetart is situated south of the Klein Letaba River. Siyandhani village is situated north of the Klein Letaba River opposite Kremetart.

The administrative issues at Siyandhani

The village was under the leadership of Chief Siyandhani until the enactment of the Bantu Authorities Act of 1951. The Bantu Authorities Act established new tribal authorities (TAs) as the chief governing system and replaced the native representative council (King, 2004). The Bantu Authorities were organised into tribal, regional and territorial levels with chiefs dominating at all levels.

The apartheid government utilized TAs to control landscapes and people. King (2004) notes that "the use of TA was a continuation of the British system of indirect rule, which was based on the belief that Europeans and Africans were culturally distinct and that the institutions of governance most suited to Africans were those they had traditionally constructed". The use of these institutions required some modification of existing organizational structures, particularly aspects of traditional government that was deemed repugnant by European ideals or aspects that restricted the effective exploitation of the country or people. The British colonists, and later the apartheid government, deposed and marginalised rebellious chiefs while rewarding those that supported them. The appointment of traditional authorities marked a departure from existing African traditions as the white-controlled state freely appointed leaders without consulting councillors or elders. These appointed leaders were given greater authority than they historically possessed. In the Giyani area,

Ngove TA was established; all chiefs in the surrounding villages (e.g. Siyandhani and Mabunda) now fell under Chief Ngove and their status as chiefs was reduced to that of Indunas (headmen). This is what Chief Siyandhani had to say about the issue of TA: "*The Chiefs were just told that they are no longer chiefs and that they were now under chief Ngove*" (Chief Siyandhani, 12 March 2007).

The former Chief Siyandhani passed away in 1973 and the Siyandhani people continued to be under the traditional leadership of Chief Ngove. The current Chief Siyandhani took the chieftaincy on 11 May 1977 (He still considers himself to be a real chief). In an interview with Chief Siyandhani I asked a question about the chieftaincy and the tribal authority and the chief was not comfortable at all to talk about the subject.

Topography

The largest part of Giyani, including Siyandhani is situated at an altitude of between 450 and 500m above sea-level (Els van Straten and partners, 1987a: 10). The topography slopes gradually down to the Klein Letaba River at 450 m and below. Small hills give rise to an undulated topography but in the south-eastern part of Giyani, between the river and the town, the topography is almost flat. The altitude rises above 500m in the hill to the south-west of Kremetart and at the Mangombe hills (Els van Straten and partners, 1987a: 10).

Climate

There are two distinct seasons, namely a warm to hot summer with a relatively high level of humidity, and a cooler, drier winter. The mean annual rainfall is about 600mm and 88% of this occurs during the summer half of the year, with a mean monthly maximum of 140mm during January (Els van Straten and partners, 1987a: 12). The lowest mean monthly rainfall is during June, when only 7 mm can be

expected. The average annual rainfall in Giyani in the period between 1983 and 1992 was 516 mm. In official discourse, Giyani is considered drought-prone, with droughts taking place every 2-3 years.

Frost is rare in Giyani. The mean daily minimum temperature of 8 degrees Celsius is experienced during July and mean daily maximum of 31 degrees Celsius is recorded during December (Els van Straten and partners, 1987a: 12). The absolute maximum is 43 degrees Celsius and the absolute minimum is -2 degrees Celsius (Els van Straten and partners, 1987a: 12).

Hydrology

All drainage channels in Giyani drain towards the south, into the Klein Letaba River. Because of the relatively high summer rainfall of about 600mm per annum, of which 88% occurs during summer season from November to April, flooding of the drainage channels occurs frequently (Els van Straten and partners, 1987a: 10).

Population

Giyani district is characterised by scattered rural settlements and the land is used predominantly for subsistence farming activities and small-holder irrigation. According to Els van Straten and partners (1987a:14), the rural population density of the region surrounding Giyani was relatively high, restricting the agricultural potential of the area. During the late 1980s, the Giyani region had a density of 2.5 ha per person as opposed to the optimum of 22.2 ha per person (Els van Straten and partners, 1987a: 14). In 2007 there were approximately 2,000 households in Siyandhani village. During the late 1980s the population in Siyandhani was estimated between 2,900 and 3,500 persons (Els van Straten and partners, 1987a:14). In 2002 the population was 5,460 and in 2006 it was 7,374 (Greater Giyani Municipality, 2005; Mopani District Mucipality, 2006). Because the village is located close to

Giyani town, its growth has been driven in part by the arrival of people from other places seeking work in Giyani.

Land ownership

Most land in the former homelands is held under communal tenure. Other forms of tenure include freehold land held by individuals and groups, including state land and church missions, which account for relatively small areas. Communal land tenure in South Africa, specifically in homelands, combines elements of individual and collective property rights, and has some basis in African Customary law, which has been modified by successive governments during the twentieth century. Alternative forms of land holding were effectively denied to black by law.

Communal land is owned by the state, but it is held in trust by tribal chiefs and allocated to people living under their jurisdiction (Budlender & Latsky, 1991 cited in Lahiff, 2000:18). Communal land includes land for occupation by named tribal groups under the 1913 Natives Land Act and 'released' land acquired by the South African Native Trust under the terms of the 1936 Native Trust and Land Act. Els van Straten and partners (1987a:15) argue that development in Giyani was limited by the fact that land around Giyani town was under the control of tribal authorities and this posed a problem for urban expansion. Els van Straten and partners (1987a) further state that if tribal land is required for urban development, such land had to be proclaimed urban area.

By 1986, all communal land control was passed to various homeland governments as part of transition towards independence (Lahiff, 2000). Under communal tenure, every household in a communal area has a right to a residential site, an arable plot for subsistence purposes and access to common property resources such as grazing. The system is communal in the sense that individuals' entitlement to land flows from membership of a village tribe rather than from private ownership. Once residential

and arable plots are allocated by tribal chief or village headman acting on behalf of the chief, they are reserved for the exclusive use of the occupying household. Under the customary law, the right to land usually applies only to male-headed households, but sometimes extended to women. Those who are allocated have a right to permanent use and benefits of the land, but have no right to sell it and can only transfer to a family member with permission from the tribal leaders (Lahiff, 2000).

Before the collapse of the homeland administrations and the legislative reform in the early 1990's, occupants of communal land could register their allocated arable and residential holdings with the Local Tribal Authority and magistrate office, where they would be granted Permission to Occupy (PTO) verbally or in writing. Communal land tenure system is at the heart of land reform in South Africa, and the thrust of the debate is the need for individually based forms of land holding. The government of South Africa has promulgated the Communal Land Rights Act 11 in February 2004, which provides for the transfer in ownership of land in the former homelands to communities residing there, but the Act is not yet in effect (Hall, 2004).

Land claims in Siyandhani village

Some of the people of Siyandhani village were forcibly removed during the construction of Giyani town in 1966; hence the current land claims by Siyandhani community members under the Restitution of Land Rights Act of 1994. The Siyandhani claim is currently at the negotiation stage between the Siyandhani Chief, the Limpopo Land Claims Commissioner and the private owners of some of the businesses that are being claimed (see Table 9 above). Siyandhani is claiming the following in the Giyani area:

- Giyani Sports, Arts, and Culture Centre
- Munghana Lonene Radio Station
- Kheto Nxumalo Agricultural High School

- Blocks 1-5 and 7 of the Bend Project of Middle Letaba irrigation scheme
- Giyani Airport
- Gaza Gold Mine
- Tiveka Bukuta complex
- Baloyi business complex
- Giyani central business district (CBD)

The next section gives and overview of the Klein Letaba sub-area in terms of layout, land use, farming and irrigation in the sub-area.

3.3.5 Overview of the Klein Letaba sub-area

The Klein Letaba sub-area has 9 quaternary catchments as defined by DWAF (2004a). The Klein Letaba sub-area is largely comprised of the former homeland of Gazankulu, with a large number of black small-scale farmers mostly found in the villages surrounding the town of Giyani. Along the Klein Letaba and its major tributary, the Nsama River, there are about 2,840 ha formally developed for irrigation, located entirely in the Giyani area of the former Gazankulu homeland (DWAF, 1990). Land use in the villages surrounding Giyani town include livestock grazing, dry land cultivation of maize, sorghum, beans and sweet potatoes (See Table below for land use in the Klein Letaba sub-area).

Table 9: Land use in Klein Letaba sub-area

Quaternary Catchment[6]	Irrigation (km^2)	Forestry (km^2)
B82A	6.1	7
B82B	18.3	8
B82C	10.9	13
B82D	0.3	15
B82E	0.2	14
B82F	0.6	8
B82G	10.1	0
B82H	2.8	0
B82J	0.0	0
TOTAL	49.3	65

(Source: DWAF, 2004a)

During the 1980s, agricultural officials in Giyani district recorded 40 farmers on 145ha of land (Gazankulu Department of Agriculture and Forestry (GDAF), 1986:48). These farmers made provision for their own pumping machines, pipes, fencing materials and ploughing facilities (GDAF, 1987). In the mid 1980's the farmers planted various summer and winter crops such as maize, ground nuts, cabbages, tomatoes, onions, etc.

There are 49.3km^2 under irrigation spread between Middle Letaba Dam and Nsami Dam, located entirely in the Giyani area of the former Gazankulu homeland (DWAF, 2004a; DWAF 1990). The 49.3 km^2 irrigation is made possible by the Middle Letaba irrigation scheme. The scheme was envisaged to comprise an area of ± 5,400 ha in three areas, namely: Homu, Hlaneki and Bend (GDAF, 1991:21). The scheme was

[6] DWAF (2004a) defines a quaternary catchment as the basic unit of area resolution of primary drainage regions.

developed in two phases: during the first phase an area of 2,800 hectares (ha) was completed in 1991

The 2800 ha of the MLIS are distributed as follows: Homu Project 240 ha, Hlaneki project 1200 ha, and Bend project 1360 ha (GDAF, 1993:12). In 1991, it was estimated that approximately 400 commercial and 1,000 so-called 'garden farmers' would eventually be settled on this scheme (GDAF, 1991:22).

The Middle Letaba scheme was, until 1994, under the control of the Gazankulu Department of Agriculture and Forestry, but now it falls under the authority of the Limpopo provincial administration.

The irrigation infrastructure at Bend was constructed in 1985 and completed in 1991. The Bend irrigation project, with 1360 ha, is divided into ten blocks. Blocks one to seven are located at Mapuve and Siyandhani villages and blocks eight to ten is located at Xikukwani and Makoxa villages.

Out of a total of 1360 ha under irrigation, an area of 255 ha was allocated to Sapekoe for short term uses, and 345 ha were allocated to Anglo-American Farms (GDAF, 1987:23).

Those who were interested obtaining a plot in the Bend project of MLIS made applications through Ngove tribal authority (TA). The TA would select people and then send the list to the Department of Agriculture for approval. The people who had strong ties with the Ngove TA were the ones who were allocated plots.

The next section gives an overview of the former homeland of Gazankulu in terms of location, the people, population, and the homeland administration.

3.4 Research Methodology

3.4.1 Research approach

The study was conducted using a variety of data collection methods, and combining qualitative and quantitative methods with qualitative methods being more dominant. While the qualitative and quantitative approaches differ in many ways, they also complement each other in a number of ways. According to Mouton (2001), the characteristics of qualitative research are that it is descriptive and has a natural setting as the direct source of data and the researcher is the key instrument. More specifically, the study entailed a combination of observation methods, in-depth interviews, a survey, and literature review as already shown in chapter two.

3.4.2 Research design

The purpose of this thesis was to explore the allocation and use of water for domestic and productive purposes in Siyandhani village and Letaba Catchment as a whole. According to Babbie (2007), one of the reasons why exploratory studies are done is to satisfy the researcher's curiosity and desire for better understanding. The main reason why an exploratory study was chosen was due to the very limited availability of information on water management and use in the study area. Exploratory studies are valuable in social research and they are essential whenever a researcher is breaking new ground and can yield new insights for future research (Babbie, 1992; 2007).

The unit of analysis for this exploratory study is households at Siyandhani and individual farmers at B4E irrigation scheme. The disadvantage of exploratory studies is that they seldom provide satisfactory answers to research questions, although they can serve as the basis for more in-depth studies to follow (Babbie, 2007). The main

sources of error of this design are the potential bias of the researcher and lack of rigour in analysis (Mouton, 2001).

3.4.3 Site selection

Siyandhani village was selected as the case study site. In the study, purposeful selection is used. Purposeful selection takes place when the researcher selects a case from which substantial new information can be learned (Merriam, 1998:31).The site was selected using a three stage process. The first stage involved the purposive selection of Letaba catchment, as one of South Africa's major catchments and one that is shared (albeit highly unequally) between white and black communities. The second stage entailed the selection of an area within Letaba Catchment, specifically the Klein Letaba hydrological sub-area, which was a more manageable unit of analysis and contained a high concentration of poor and small-scale water users. In the third stage, a specific village and irrigation scheme – Siyandhani and the B4E scheme - were selected for in-depth study.

3.4.4 Selection of households for domestic water use

Within Siyandhani village the domestic water use component of the study included the study of 25 households in the village. Purposive selection was used to select households based on the proximity and use of different water sources: five households that are close to the Kheto school farm and use this source were interviewed; five households close to B4E irrigation scheme; five households close to "A bobomeni" water source; five households close to the B4E pump station; and five households that can access water from their yard taps. Data collection for the domestic water use study was undertaken during two initial visits followed by regular monthly visits over the following five months. The first two visits were exploratory in nature and the subsequent monthly visits were to household using the five different water sources to monitor water supply from the sources. The first visit was in the

week on 12-23 February 2007 and the second visit was in the week of 12-21 March 2007. The monthly visits were carried out until the end of August 2007. All the respondents for the domestic water use were females because males were generally not interested in the topic of water use at household level. Some men were initially interested in why the researcher was visiting their homes, but after they found out the purpose of the visits they lost interest and left the women to respond to the questions.

3.4.5 Selection for productive water use study

The productive water use component of the study was carried out at B4E irrigation scheme located at Siyandhani village. There are 19 small-scale farmers who are allocated plots or irrigation fields on this scheme. The intention was to interview all 19 plot holders at the scheme, but only 11 farmers could be contacted during the period of data collection.

3.4.6 Data collection and instruments

Collection of secondary data was carried out continuously for twenty-four months during the study period as an on-going process. Resourceful libraries were visited at the University of Pretoria, IWMI Africa office and DWAF in Pretoria. The Department of Sports, Arts and Culture Archive office in Giyani was also visited. Online databases and documents were also accessed, as shown in bibliography. A variety of 'grey' (unpublished) literature and reports were also accessed in the district municipality, satellite offices of DWAF that has relevance to the subject matter and the study area.

Collection of primary data was through qualitative and quantitative methods including focus group discussions, semi-structured interviews and structured interviews and surveys. These methods of primary data collection are discussed below.

Focus Group Discussions

Focus group discussions were carried out with both domestic and productive water users. One group discussion was carried out at the B4E scheme and focussed on both productive water use on the irrigation scheme and domestic water use within households. The group consisted of two men and three women. The second group discussion was held at "A Bobomeni" water source in the village, and women dominated the group. The following issues were discussed at the water source: Why do community members use this source, how long have they used it, what is the water from that source used for, how does using that source impact their life and their health, availability of water from that source. The findings of the focus group discussions were later supplemented by follow up visits to the village and key informant interviews.

Use of questionnaires

Use of questionnaires for domestic water use in the village

The next stage of data collection involved a household survey on water use using a questionnaire (see Annexure A for a copy of the questionnaire). The study employed a purposive selection of five target groups, according to use of a water source, as outlined above. Five households using each of the water sources were identified and interviewed.

During the first period of data collection in 12-23 February 2007, a draft questionnaire on domestic water use was piloted in three households, and a focus group discussion with three local women and two men was held on the use of water for domestic purposes. Local water sources for domestic use were also identified. After piloting the questionnaire, it was changed to suit the study site using what has been learned during the piloting. The first questionnaire included questions on

payment for water, proportion of income spent to pay for water of the questionnaire, where is the money paid, and cultural or social barriers preventing access to water. All these questions were found not to be applicable to the study area.

On the second visit in March, respondents from 22 households were interviewed using the improved questionnaire and the three households that were visited during the pilot were revisited to capture information that did not appear in the pilot questionnaire e.g. questions on whether household use water from the canal, quality of water, how is the water used, what is done before drinking the water, did anyone suffer from diarrhoea, cholera or bilharzias in the last three months.

Since it was noticed that the people at Siyandhani buy water, they were asked how much they spent on water, where they get the money to buy water, and what could be done with the money if they were not buying water. Respondents who did not use water productively at household level were asked why this was the case, and what productive activities they could undertake if water was available. The questionnaire covered topics like household composition, occupation, and income sources; water sources; water availability; water collection; total water use; productive use of water at household level; and the quality of service by government (if any).

Use of questionnaires for agricultural water use in the village

Data collection for the irrigation water component of the study was done between 15 February 2007 and 23 April 2007. The data collection period was prolonged due to the frequent unavailability of farmers at the scheme. As mentioned before, the intention was to interview all 18 plot holders at the scheme but only 11 farmers[7] could be found at the scheme during the period of data collection. Eleven farmers were thus interviewed by the use of a second questionnaire (see Annexure B for the

[7] Farmers are people who are actively engaged in the farming enterprise through investment or direct labour and make decisions related to crop production and marketing. They can be active on their own land or on land where someone else has the right to occupy (Denison and Manona, 2007).

questionnaire). The researcher made individual appointments with the farmers to interview them at their own plots on the scheme.

Semi Structured Interviews with Key Informants

Key informants who are the elderly and knowledgeable people in the village included the chief and headmen, pump station operators at village level, chairperson of the B4E irrigation scheme and the local councillor. These people were contacted for detailed clarification of the issues that arose from focus group discussions and questionnaires. Semi-structured interviews were carried out with officials from formal institutions (e.g. Department of Water Affairs and Forestry, Mopani District Municipality, and Greater Giyani Municipality) responsible for water services provision and water resources management in order to understand the practice of allocation and use of water for productive and domestic purposes.

The data collected by this approach were basically primary spatial, temporal, socio-economic and institutional data. Spatial data include information on location and differential relationship of resource activities, problems and opportunities. Institutional data include information on activities of various groups and organizations within the village, local municipality, district municipality etc, and how they influence water management and water services and how villagers perceive their relationship with these institutions.

Direct observations

Site visits to the village and irrigation scheme created opportunities for direct observations. During site visits environmental conditions, social interaction, water collection burdens (e.g. women carrying children to water sources and old ladies in wheel barrows) were observed and this served as another source of evidence for the study.

3.4.7 Techniques of data interpretation and analysis

The aim of the data analysis was to discover patterns among the data. The study employed quantitative techniques of data analysis. Firstly the key process in data analysis, coding, was adopted in the analysis of qualitative data. The questionnaire was coded before analysis and the qualitative data from questionnaires were quantified. The data was then entered into a Microsoft Excel spread sheet for analysis.

The qualitative analysis was meant to supplement the quantitative analysis. The analyses were complementary to each other and were not mutually exclusive, with each method bringing extra information which helped to deepen the researcher's understanding of the topic.

Reliability and validity of the results

Reliability and validity issues are addressed because both quantitative and qualitative research methods are used in the research. Reliability refers to the extent to which research findings can be replicated (Merriam, 1998:205). The findings of this study are not unique to the study area; they can be replicated in another study in other villages of Mopani District Municipality or even other villages in the Province as a whole. Validity deals with the question of how research findings match reality. Merriam (1998: 204) provides six strategies to enhance internal validity in quantitative research, as follows:

1. Triangulation - using multiple sources of data or methods to confirm emerging findings.
2. Member checks – taking data and tentative interpretations back to the people from whom they were derived and asking them if the results are plausible.
3. Long term observation.

4. Participatory or collaborative modes of research.
5. Peer examination.
6. Clarifying the researcher's biases, assumptions, and theoretical orientation at the outset of the study.

The researcher used member checks and long-term observation to enhance the internal validity of the findings of the study.

3.5 Conclusion

This chapter started by describing the location and selection of the study are, and then provided a spatial overview of Limpopo Province, Mopani District Municipality, Greater Giyani Local Municipality, Siyandhani village and Klein Letaba Catchment.

The second section of the chapter explained the study approach, design, sampling, and selection, methods used for collecting secondary and primary qualitative and quantitative data, methods used to capture and analyze data.

The next chapter looks at the water availability and water requirement in the study area.

CHAPTER 4: WATER RESOURCES AND WATER MANAGEMENT IN LETABA/SHINGWEDZI SUB-REGION

The previous chapter provided the background to the study area. The purpose of this chapter is to explore the distribution of water resources and infrastructure, and the allocation of water for productive and domestic uses, in the different sub-areas of the Letaba/Shingwedzi sub-region of the Luvuvhu/Letaba Water Management Area. The Letaba/Shingwedzi sub-region consists of four sub-areas, namely Shingwedzi, Groot Letaba, Klein Letaba, and Lower Letaba.

The Shingwedzi and Klein Letaba sub-areas are largely comprised of the former homeland of Gazankulu, with large numbers of black small-scale farmers, mostly found in the villages surrounding the town of Giyani. The Groot Letaba sub-area is a combination of parts of the former Republic of South Africa and the former homelands of Gazankulu and Lebowa, with a large number of white commercial farmers around the town of Tzaneen and black small scale farmers in the former homeland areas. The Lower Letaba sub-area is mainly occupied by the Kruger National Park, and this sub-area will be excluded from the discussions because water use for productive and domestic purposes here is insignificant. In order to understand the differences that exist in the sub-region, the Klein Letaba sub-area will be compared with the Groot Letaba sub-area. The Klein Letaba and Groot Letaba sub-areas have major differences (see Table below) in terms of settlement histories, ethnic composition, land ownership and access to irrigated land.

Table 10: Contrasts between Klein Letaba and Groot Letaba sub-areas

Issues	Sub-area 1: Klein Letaba	Sub-area 2: Groot Letaba
Settlement history	Part of this area is the former homeland capital of Gazankulu and was settled by blacks mostly in rural areas surrounding Giyani town.	This area formed part of the former Republic of South Africa, settled by whites in Tzaneen, Letsitele and Magoebaskloof and it is surrounded by former black townships of Nkowankowa and Lenyenye, and various villages.
Ethnicity	The dominant ethnic group is Tsonga.	The ethnic groups include whites, Tsonga, Lobedu, and N. Sotho (Bapedi).
Land ownership	Most land that people are using for agricultural purposes is communal land allocated by traditional authorities.	Most land in the sub-area is in private ownership by white commercial farmers.
Access to irrigated land	7% of farmers in the black areas have access to irrigated land.	91% of irrigated land is controlled by whites.

4.1 Water supply infrastructure

4.1.1 Water supply infrastructure in the sub – region

The water supply infrastructure consists of dams for storage, bulk water pipes and canals for conveyance. Several major dams have been constructed in the Groot Letaba and Klein Letaba sub-areas (see Table below). The Tzaneen Dam and Ebenezer Dam are in the upper reaches of the Groot Letaba River catchment. Tzaneen Dam and the Middle Letaba Dam are the two largest dams in Limpopo Province (see below).

Other large dams in the catchment include the Ebenezer, Magoebaskloof, Nsami and Modjadji Dams. There are no major dams in the Shingwedzi and Lower Letaba sub-

areas, but some small dams have been constructed in the Kruger National Park (KNP) for the purpose of game watering (DWAF, 2003a).

Table 11: Major dams in the Groot Letaba and Klein Letaba sub areas

Dam	River	Year Built	Full Supply Capacity ($10^6 m^3$)	Full Supply Area (km^2)	MAR (million m^3/a)		Firm Yield (million m^3/a)
					Virgin	Net	
Groot Letaba Catchment:							
Dap Naude	Broederstroom	1958	2.04	0.28	15.4	10.5	3.2
Ebenezer	Groot Letaba	1959	70.12	3.86	48.9	32.5	23.9
Magoebaskloof	Politsi	1971	4.99	0.45	35.7	29.1	9.1
Hans Merensky	Ramadiepa	1958	1.26	0.49	31.3	25.3	6.8
Tzaneen	Groot Letaba	1977	157.57	11.69	200.6	159.0	58.0
Thabina	Thabina	1984	2.80	0.24	7.1	5.5	2.9
Modjadji 3	Molototsi	1997	8.16	1.16	8.8	8.4	4.4
Total			**246.00**	**18.00**	**347.0**	**270.0**	**108.0**
Klein Letaba Catchment:							
Middle Letaba	Middle Letaba	1984	184.00	19.30	72.0	61.1	16.0
Nsami	Nsama	1976	24.40	5.70	5.4	5.4	1.2
Lorna Dawn	Middle Letaba	1971	12.00	1.20	23.2	21.1	2.3
Total			**220.00**	**26.00**	**100.0**	**87.0**	**19.0**

(Taken from DWAF, 2004a:3-5)

The Table indicates that the Groot Letaba sub-area has seven dams with a total full supply of 246 $10^6 m^3$ covering 18 km^2 and the Klein Letaba sub-area has three dams with a total full supply of 220 $10^6 m^3$ covering 26 km^2.

4.1.2 Water supply infrastructure in Klein Letaba sub-area (Giyani)

This section provides an overview of water services infrastructure in the Klein Letaba sub-area. The water supply infrastructure includes dams for storage, water schemes that are in the study area, purification plants, bulk water pipes and canals for conveyance.

4.1.2.1 Nsami Dam

The decision to seat Giyani as capital of former Gazankulu in 1971 lead to the construction of Nsami dam as a surface water source. Nsami Dam is situated 7 km north-east of Giyani, at a bend in the Nsami River. The dam covers 800 ha and construction started in 1972 and was completed in 1976 (Els van Straten and partners, 1987b:3). The dam is situated at an altitude of 445 m above sea level.

Bulk supply mains to Giyani and rural areas ‘A’ and ‘B’ followed immediately after dam construction. Rapid population growth lead to the extension on the distribution system to the new high-lying development at Giyani town and extension of this supply (System ‘D’) beyond Kremetart up to the Great Letaba river.

The Nsami dam served the Giyani area on its own for more than 10 years. Dramatic developments took place in 1994 following the establishment of the democratic dispensation when the bordering areas around Elim (in the former Venda) and areas at Bolobedu (in the former Lebowa) were added to the service area. This additional demand on the system was exacerbated by major irrigation demands from farmers in the former homelands in the upper catchments of the Middle Letaba River as well as the occurrence of severe drought cycles; water supply thus became problematic and shortfalls in water supply are now regularly experienced.

4.1.2.2 Middle Letaba Dam

Rapid settlement, the need for irrigation water and the growth of Giyani town required additional storage and the Middle Letaba dam was constructed in the mid eighties, simultaneously with extensions on the distribution system. Middle Letaba Dam is found at the confluence of the Klein and Middle Letaba Rivers. The Middle Letaba Dam is the biggest impoundment in the Klein Letaba sub-area and covers an area of about 1,843 ha (Palmer & Chutter, 2003:9).

The Middle Letaba dam and Nsami dam supply domestic and irrigation users over an extensive area. The Middle Letaba and Nsami dam are linked by the 60 km long Middle Letaba Canal (Palmer & Chutter, 2003:9; Venter, 2006), and losses (in the form of unauthorised extraction) along this canal are reported to be approximately 40% (DWAF, 2004a). Domestic water is purified at Nsami Dam and supplies numerous villages with domestic water (DWAF, 1990).

A purification plant was built at the Middle Letaba Dam in 1988 (Gazankulu Department of Works, 1988). Since the construction of the dam in the 1980s, the dam only filled up in the year 2000 because of the floods and it collapsed during the same year's floods. Water treated from this plant does not supply Giyani Town or Siyandhani village but other villages to the north, in Vhembe District Municipality, which are not part of the study area.

4.1.2.3 The Middle Letaba Regional Water Scheme

The Middle Letaba Regional Water Scheme (MLRWS) is the main water supply scheme in the Klein Letaba river catchment. The MLRWS, which includes Middle Letaba and Nsami Dams as main storage dams, serves 541,000 people who reside in Greater Giyani and Greater Letaba local municipalities of Mopani District Municipality, and Makhado and Thulamela local municipalities of Vhembe District

Municipality (Mopani District Municipality, 2006). See Table below for population of local municipalities served by MLRWS.

Table 12: Population served by Middle Letaba RWS

Local Municipality (LM)	Population	Percentage of total population served
Greater Giyani LM	258,335	48%
Greater Letaba LM	81,652	15%
Makhado LM	185,514	34%
Thulamela LM	15,214	3%
Total for MLRWS service area	540,715	100%

Source (MDM, 2006:156)

According to Mopani District Municipality, the management of the major regional water scheme should now be the highest priority of the two district municipalities involved, namely Mopani and Vhembe. Mopani DM (2006) states that 'some reaches of the bulk supply system have inadequate capacity and extension by parallel pipelines and additional booster pumps are required. These together with inadequate treatment capacity, form the major constraint in the bulk supply infrastructure'.

Existing water treatment works infrastructure in Middle Letaba RWS consists of Middle Letaba, Mapuve and Giyani water treatment works. Middle Letaba purifies 21.6 Ml/day, Mapuve purifies 3.6 Ml/day and Giyani purifies 29.4 Ml/day (MDM, 2006:181).

The Water Services Plan of Mopani District Municipality states that "the communities in the Middle Letaba River catchment area who are supplied from the Water Treatment Works of the Middle Letaba Dam, Nsami Dam and the Mapuve have all been experiencing increasing water shortages and system pressure problems (MDM, 2006:156). Siyandhani village and parts of Giyani town which are supplied by the water treatment works in Nsami Dam experience water shortages very

frequently. The 29.4 Ml/day purified at Giyani is not enough to supply the population in Giyani and all the villages in Greater Giyani municipality.

The MLRWS has three sub-schemes namely: System M, Mapuve System and Giyani System (MDM, 2006:18). For the purpose of this study, Giyani System will be discussed in detail since Giyani town and Siyandhani village get their water from this system.

The Figure below shows the Mapuve and Giyani system of the MLRWS, including the location of Siyandhani village and Giyani town. The Giyani System of the MLRWS is further divided into system A, B, C, D, F1 and F2. Giyani town and Siyandhani village are both supplied by system C of the Giyani sub-scheme.

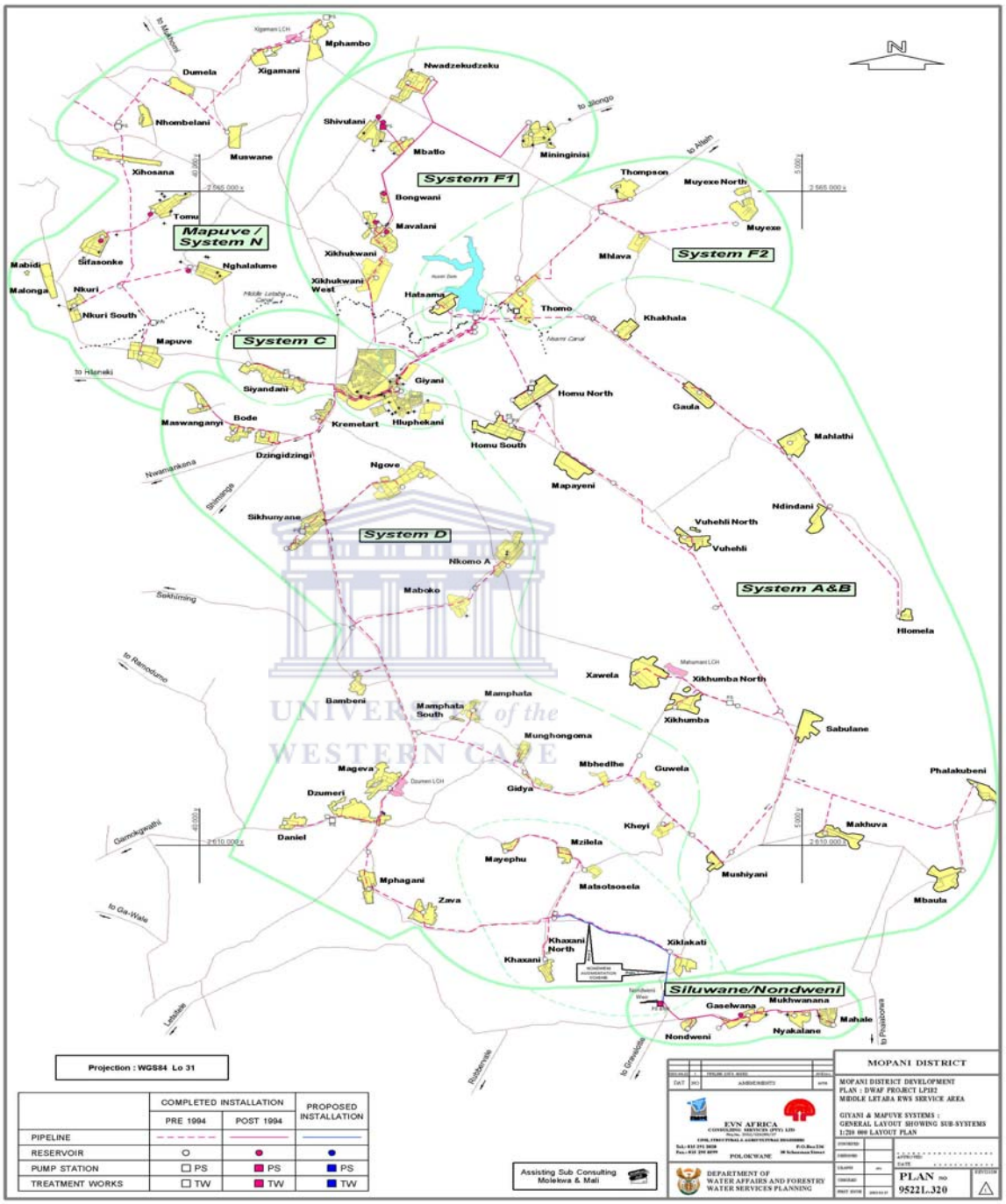

Figure 7: Middle Letaba RWS – Giyani and Mapuve sub-schemes

Source (MDM, 2006)

4.1.2.4 Giyani Water Treatment Works

The Giyani Water Treatment Works, situated at Nsami Dam, was constructed in four phases and started operating in 1978. The design capacity of the plant is 28 mega litres per day (Ml/d) and a flow of 30 Ml/d is treated every day. Water is supplied to the plant by gravitation from the Nsami and Middle Letaba dams through the 60 km long Middle Letaba Canal.

These two dams were provided water for irrigation areas as well as the Giyani town and surrounding residential areas during the late 1980s (Els van Straten and partners, 1987b). In the early 1990s the Nsami Dam was supplying most of the water purified at the plant while the Middle Letaba Dam water level was very low. In the early 1990s, two additional raw water pumps were installed in the subtract tower of the Nsami Dam to compensate for the shortage of water from Middle Letaba Dam (Welters et. al, 1991).

4.2 Water resources availability

Water resources in this case refer to the amount of water that exists in nature and is available in the area as surface water and ground water. I will first look at surface and ground water separately, in terms of their availability and usage, then at the combined impact, and then at the water balance.

4.2.1 Surface water

According to DWAF (2004a), surface water resources in the sub-region are well developed and yet the domestic, irrigation and industrial water needs in some sub-areas of the region are not being met (see Chapter Five, below, on domestic water use). The Table below shows the available water in the Letaba/Shingwedzi sub-region for the years 2000 and 2005. Surface water is the dominant source of water

supply in the three sub-areas of the sub-region, the exception being Shingwedzi where more than half of the water available is abstracted from the ground.

Table 13: Water resources of L/S sub-region in 2000 & 2005 (million m^3/a)

Sub-area	Natural Resource				Usable return flow				Total local yield [8]		Grand Total	
	Surface Water		Ground water		Irrigation		Urban					
	2000	2005	2000	2005	2000	2005	2000	2005	2000	2005	2000	2005
Shingwedzi	1	0	2	3	0	0	0	0	3	3	3	3
Groot Letaba	133	133	12	12	13	13	1	1	159	159	159	159
Klein Letaba	21	21	9	9	1	1	1	1	32	32	32	32
Total	**155**	**154**	**23**	**24**	**14**	**14**	**2**	**2**	**194**	**194**	**195**	**194**

(Source: DWAF, 2003a:21; DWAF, 2004a)

The Table above also shows that there was no surface water available in Shingwedzi sub-area in 2005, while the estimates for 2000 shows an availability of 1 million m^3/ a. This can be attributed to the lack of storage dams in the sub-area and the drying up of the rivers; the availability in 2000 might be linked to the fact that the rivers filled after the floods of the same year.

The Table also shows that the Groot Letaba sub-area has the highest water availability at 133 million m^3/a, while the gross surface water availability in the Klein Letaba sub-area is estimated at 21 million m^3/a, derived mostly from the yield of the

[8] After allowances for ecological component of Reserve, river losses, alien vegetation, rain-fed agriculture and urban runoff

Middle Letaba dam and smaller dams upstream. South Africa has great variations in its landscape and in the conditions under which Black rural people live. The Groot Letaba sub-area is a naturally well-watered area compared to the dry Klein Letaba sub-area.

These peculiarities can only be understood by going back to the history of land dispossession and the manner in which European settler's accumulated capital and laid the foundations for their own well-being at the expense of the indigenous people. Land policy in South Africa over the past one hundred years actively supported the emergence of White commercial agriculture and capitalist profiteering through, among other measures, eliminating independent African production and restricting access to land to communal reserves (homelands) designated solely for African occupation. .In Limpopo Province, the homelands were not particularly small since they were nearly half of the province but overcrowding and underdevelopment in the former homelands, poor soil quality in the marginalized lands that people were coerced onto, lack of resources, landlessness and land hunger are but some of the problems that the new democracy in South Africa has to confront.

Different standards have also been applied and continue to be applied in white and black areas in determining water requirements, which can also be linked to the history of dispossession. There is no clear indication from the sources on how the local water requirements for irrigation or domestic uses were estimated in 2004. The Table above indicates that the total yield of Klein Letaba is 32 million m^3/annum and total local requirement of Klein Letaba sub-area is officially estimated at 37 million m^3/annum; this results in a deficit of 5 million m^3/a (Table 18). The gross surface water availability in the Groot Letaba sub-area is estimated at 168 million m^3/a, derived from the Tzaneen and Ebenezer dams and run-of-river abstractions. After allowing for the impact of the ecological reserve (24 million m^3/a) and alien vegetation (10 million m^3/a), the available surface water resource is 133 million m^3/a. According to DWAF's 2005 estimates, the total local requirement for Groot Letaba sub-area is 181

million m^3/annum and this results in a deficit of 37 million m^3/a in 2005 (see Table 18). The water requirement in the Groot Letaba sub-area, however, is more than four times higher than that for Klein Letaba sub-area, but this has been arbitrarily set. If black farmers irrigated at the same level as white farmers their requirements would also be higher.

4.2.2 Ground water

The use of ground water is of importance in the WMA. A large proportion of the rural domestic and stock watering requirements are supplied from ground water via privately-owned boreholes, including most of the heavily populated rural villages of the former Gazankulu homeland in the Klein Letaba and Shingwedzi sub-areas. The ground water use is mostly upstream of Middle Letaba dam where it is used to supplement surface water supplies for irrigation and for domestic use.

According to DWAF (2004a), information on ground water use is only available at the level of the WMA and estimates of ground water use per sub-area are not available. The Table below provides an overview of the use of groundwater in the WMA and shows a total abstraction of 57.2 million m^3 of which 66% is for domestic use by rural communities while only 16 % is used for irrigation.

Table 14: Ground water use in Luvuvhu/ Letaba WMA

Use	Million m^3/ annum	% of Total Use
Irrigation	9	16
Livestock	0.2	<1
Rural communities	38	66
Municipalities	8	14
Mining	2	3
Total	57.2	100

(Source: DWAF, 2004a)

According to DWAF (2004a), ground water resources within the water management area are under-utilized to varying degrees, depending on both the groundwater occurrence and the demand, and could potentially provide more than the RDP level of 25 litres per person per day. The quality of groundwater in Letaba/Shingwedzi sub-region generally satisfies the DWAF water quality guidelines and it is suitable for both domestic and agricultural use.

4.3 Water requirements in Letaba/Shingwedzi sub-region

The irrigation sector dominates water use in the WMA, and represents nearly 75% of the total water requirements in the WMA (DWAF, 2003a:14). The sectoral requirement for water is a clear reflection of the strong rural and agricultural nature of the economy within the WMA. The Table below gives a summary of the sectoral water requirements in each of the sub areas at a standard of 98% assurance of supply in the years 2000 and 2005. Mining and bulk industrial water uses do not take place in the sub areas.

Table 15: Water Requirements in L/S sub-region in 2000 & 2005 (million m^3/a)

Sub-area	Irrigation		Urban (1)		Rural (1)		Afforestation (2)		Total local requirements		Transfers out		Grand Total	
	2000	2005	2000	2005	2000	2005	2000	2005	2000	2005	2000	2005	2000	2005
Shingwedzi	0	0	0	0	3	3	0	0	3	3	0	0	3	3
Groot Letaba	126	133	3	3		10	35	35	174	181	11	15	185	196
Klein Letaba	25	25	3	3	8	8		1	37	37	0	0	37	37
Total	**151**	**158**	**6**	**6**	**21**	**21**	**36**	**36**	**214**	**221**	**11**	**15**	**225**	**236**

(Source: DWAF, 2003a:14; DWAF, 2004a)

1) Includes component of Reserve for basic human needs at 25 lpcd

2) Quantities given refer to impact on yield only.

It is clear from the Table above that more than 80% of the total water requirements within the Letaba/Shingwedzi sub-region (as currently defined) are in the Groot Letaba sub-area, mostly for the irrigation and forestry sectors, which shows the intensity and concentration of irrigation and afforestation in this sub area. Irrigation in the Klein Letaba only contributes 16.5% of water requirements in the sub area.

The Table above indicates that the Groot Letaba has the highest rural water requirements and also indicates an increase in irrigation requirement from 126 million m^3 /annum to 133 million m^3/annum over the period. This raises the questions of why the water requirements increased: is it because of the extensification (more hectares) or intensification (more litres per hectare) of irrigation, and who is benefiting from this increase is it existing white farmers or new black or white farmers.

The next two Tables (below) show urban and rural water requirements in the Letaba/Shingwedzi sub-region. It is important to note that the per capita water 'requirement' in urban areas of Groot Letaba sub-area is more than double the per capita water requirement in rural areas, a direct continuation of the racial and spatial discrimination that prevailed under apartheid.

Table 16: Urban Water Requirements in 2000 for L/S sub-region

Sub-area	Urban population	Domestic (direct)	Indirect	Urban losses	Total	Urban per capita (domestic)	Urban return flow
		Million m^3/a				lpcd	%
Shingwedzi	7 340	0.1	0.1	0.1	0.3	23	29
Groot Letaba	32 527	1.5	1.0	0.8	3.3	127	44
Klein Letaba	43 346	1.4	0.6	0.7	2.7	91	36
Total	83 213	3.0	1.7	1.6	6.3	271	

(Taken from DWAF 2003a)

Table 17: Rural Water Requirements in 2000 for L/S sub-region

Sub-area	Rural population	Domestic	Stock watering	Total	Rural per capita (domestic)
		Million m^3/a			lpcd
Shingwedzi	135 554	2.7	0.0	2.7	55
Groot Letaba	468 354	9.4	0.3	9.7	55
Klein Letaba	408 648	8.2	0.2	8.4	55
Lower Letaba	3 846	0.2	0.0	0.2	120
Total	**1 016 402**	**20.5**	**0.5**	**21.0**	

(Source: DWAF 2003a)

Table 16 (above) shows that the urban water requirement in the Groot Letaba sub-area is defined as 127 litres per person per day while in the Shingwedzi sub-area it is only 23 litres per person per day. This water 'requirement' is the targeted amount that is allocated by official agencies to each category of user. This reflects a high level of inequality in water allocation in the sub-region and does not reflect actual requirements in practice (i.e. what people really need). These highly unequal 'requirements' are treated as normal or natural in the official literature/discourse, without acknowledgement (or seeming awareness) of their arbitrariness or inequality.

The two Tables above also indicate inequities between urban and rural areas, e.g. water requirement in Klein Letaba urban areas is set at 91 lpcd and in rural areas at 55 lpcd, except for the Lower Letaba, which is 120 lpcd. As mentioned before, the Lower Letaba sub-area is the Kruger National Park and the water requirement is 120 lpcd due to a large number of white people employed in the Park and provision for the mainly white tourists.

Table 17 shows a daily rural per capita requirement of 55 litres for almost all the sub-areas which is far less than the requirement for urban use in Groot Letaba and Klein Letaba urban areas. The way in which rural people access water effectively limits the

amount of water used in most of the rural areas. Research by Malubane (2005) in two villages of Greater Giyani municipality found that people had to walk for a distance of up to four kilometres to collect water for domestic use.

4.4 Water balance in Letaba/Shingwedzi sub-region

The Table below shows the reconciliation of available water and (official) total water requirements for the year 2000 and 2005. The Table shows deficits in Groot Letaba and Klein Letaba sub-areas, which, according to DWAF (2004a:24) are attributable to the provision made for the ecological component of the reserve, which still need to be implemented. DWAF (2004a) argue that under current conditions, without provision for the reserve, the water availability and water requirements are approximately in balance in the Groot and Klein Letaba sub-areas. This indicates that water usage has expanded to match all the available supply.

Table 18: Reconciliation of requirements and water available for year 2000 & 2005 (million m^3/a)

Sub-area	**Available water**		**Water requirements**							
	Local yield		**Local requirements**		**Transfers out**		**Total**		**Balance**	
	2000	2005	2000	2005	2000	2005	2000	2005	2000	2005
Shingwedzi	3	3	3	3	0	0	3	3	0	0
Groot Letaba	159	159	174	181	11	15	185	196	(26)	(37)
Klein Letaba	32	32	37	37	0	0	37	37	(5)	(5)
Total	**194**	**194**	**214**	**221**	**11**	**15**	**225**	**236**	**(31)**	**(42)**

(Source: DWAF 2003a; DWAF 2004a:3-31)

1) **Brackets indicate a negative balance**
2) **Transfers in and out of sub-areas may include transfers between sub-areas and transfers between WMAs.**

The Table above shows no transfers into *any* of the sub-areas. There is, however, a significant transfer *out* of the Groot Letaba sub-area to the Polokwane urban area. The total transfer in 2005 out of the Groot Letaba sub-area to Polokwane, which lies within the Olifants water management area, was 15 million m^3.

4.5 Water allocation and use in Letaba/Shingwedzi sub-region

This section looks at domestic and irrigation water use and allocation in Letaba/Shingwedzi sub-region, but focuses on domestic and irrigation water use in the Groot and Klein Letaba sub-areas and, more narrowly, on the domestic allocation and use of water in the Giyani area. The Table below shows domestic water use in the quaternary catchments[9] of Groot and Klein Letaba sub-areas in the year 2000. DWAF (2004a) mentions that information on actual water use in the domestic sector is limited (and therefore potentially inaccurate) due to the paucity of records.

[9] DWAF (2004a) defines a quaternary catchment as the basic unit of area resolution of primary drainage regions.

Table 19: Domestic water use in Groot and Klein Letaba sub-areas in 2000

Town/ Magisterial District	Quaternary Catchment	Water use in 2000 (million m^3 /a)	History
Haenertsburg	B81A	0.04	Former white town
Tzaneen	B81C	5.5	Former white town
Politsi	B81B	0.14	Former white town
Duiwelskloof	B81B	0.41	Former white town
Ga-Kgapane	B82C	0.35	Fomer Lebowa town
Letsitele	B81D	0.26	Former white town
Ritavi 1	B81E	0.26	Former Gazankulu magisterial district[10]
Ritavi 2	B81D	0.73	Former Gazankulu magisterial district
Naphuno	B81D	2.66	Fomer Lebowa town
Bolobedu	B81G	1.30	Fomer Lebowa town
Giyani	B82G	2.56	Former Gazankulu capital
Namakgale		0.98	Fomer Lebowa town
Total		**14.93**	

(Source: DWAF, 2004a)

The Table above indicates that the former white town of Tzaneen is the highest domestic water user in the sub-region; the town alone used 36% of the water, while the Ritavi 1 magisterial district, which is larger than a town in terms of population and is predominantly black and rural, used only 0.01% of the water. This again reflects inequities in water use between the former white and former black areas.

In Tzaneen it is estimated that the average consumption of water is about 1,200 lpcd which includes municipal uses and losses (DWAF, 2004a). A significant amount of potable water is used for garden irrigation in the Tzaneen area. According to DWAF (2004a), individual water users in the town of Tzaneen are metered and must pay for water used, and water supply is generally reliable. The situation is very different, however, in the surrounding townships of Nkowankowa, Lenyenye and Dan, in terms

[10] Gazankulu was divided into six magisterial districts, namely Giyani, Malamulele, Mhala, Nhlanganani, Ritavi 1 and Ritavi 2. Nkowankowa was the most important town in Ritavi 1 and Ritavi 2

of services provided and payment for services. The level of services in these townships varies from street taps in some areas to fully serviced households with water borne sewage in others. The water supply in these townships is also not reliable at all. Very few users are metered and cost recovery is generally very low. Unauthorized connections to the reticulation system account for much of the water use in the area and the level of consumption is much higher than what was planned (DWAF, 2004a).

The next section looks at irrigation water use in Groot and Klein Letaba sub-areas. The Table below shows irrigation water use from different dams in Groot and Klein Letaba sub-areas.

Table 20: Irrigation water use in Groot and Klein Letaba sub-areas in 2000

Dam / River	**River**	**Year Built**	**Irrigation water use in 2000 (million m^3 /a)**
Groot Letaba:			
Dap Naude	Broederstroom	1958	
Ebenezer	Groot Letaba	1959	14.1
Magoebaskloof and Hans Merensky	Politsi	1971	12.9
Fanie Botha			
Hans Merensky	Ramadiepa	1958	
Tzaneen	Groot Letaba	1977	105.1
Thabina	Thabina	1984	
Modjadji 3	Molototsi	1997	
Letsitele River	Letsitele River		14.8
Nwanedzi River	Nwanedzi River		15.0
Total			**161.9**
Klein Letaba:			
Middle Letaba	Middle Letaba	1984	10.3
Nsami	Nsami	1976	
Lorna Dawn	Middle Letaba	1971	
Total			**10.3**

(Source: DWAF 2004a)

It is again evident from the Table that most irrigation (94% of water) takes place in the Groot Letaba sub-area and only 6% in the Klein Letaba sub-area.

4.5.1 Water allocation from Giyani Water Treatment Works in Giyani area

This section looks at water allocation from the Giyani water treatment works. It describes how water from the treatment plant is allocated to different villages of Greater Giyani municipality through different pipeline systems, and looks specifically at the pipeline system C which supplies Giyani town and Siyandhani village. Giyani is the largest urban centre served by the Middle Letaba Regional Water Supply Scheme (MLRWS), and water supply in Giyani Town is generally not reliable. Residents of Section A extension, known as Nyagelani and Mountain View, often go for two days or more without water in their taps. The residents of Nyagelani typically only get water between 6 and 8 am everyday.

4.5.1.1 Water allocation from Giyani Water Treatment Works

From Giyani Water Treatment Works, purified water is gravity-fed from supply reservoirs on Mangombe hill near treatment works to high pressure and low pressure zones reservoirs in Mangombe hill next to the Township. The purified water is then distributed to different systems, namely A, B, C, D, E and F (see Figure 7: MLRWS).

System C, which is supplied from the low zone reservoir, supplies water to Giyani Township, the Giyani central business district, and Siyandhani village. System D which is supplied from high zone reservoir supplies Kremetart and parts of section A and D2.

The Table and Figure below indicates how many villages are supplied by each system, the number of people in those villages, the amount of water allocated to each system and the allocation per person per day from each system. The allocation per

person is calculated by dividing allocation per system by the population figure. The population and allocation per person figures are shown for 2002 and 2006.

The Table shows that there are inequities in the allocation of water between the township and the villages. It is clear from the Table that system C and D are allocated the most amount of water from the Nsami plant per day. System C gets 37% of the allocation and D get 20.8% of the allocation and these systems supply mostly Giyani town, while allocations for the other systems range from 0.9% for system D South to 12.8% for system A.

The population supplied by pipeline C had an allocation of 298.5 lpcd in 2002, which fell to 275.9 in 2006 due to growth in population (from 40,204 in 2002 to 43,490 in 2006). Figure 8 indicates per capita allocation figures for 2002 and 2006, with the highest allocation of 514.6 lpcd in 2002 and 505.5 lpcd in 2006 for pipeline D, which supplies the former white Town of Kremetart. System D south had an allocation per person of just 4.6 lpcd in 2002 and 4.7 lpcd in 2006 which is far below the RDP standard of 25 lpcd. The Water Services Manager of Mopani District Municipality was asked to comment on this figures and he replied that he cannot comment and DWAF must be asked about the figures.

Table 21: Allocation of water from Giyani water treatment works

	Pipe line A	Pipe line B	Pipe line C	Pipe line D	Pipe line DS	Pipe line E	Pipe line F South	Pipe line F North
Number of villages/town	6	13	1	1	21	3	4	7
Population (2002)	16691	37500	40204	13103	64786	6100	10980	24264
Water allocated (kl/day)	4138	3788	12000	6743	300	573	1344	3526
Allocation per person(lpcd) 2002	247.9	101.0	298.5	514.6	4.6	93.9	122.4	145.3
Population (2006)	16913	38083	43490	13339	64163	6538	13024	24603
Allocation per person(lpcd) 2006	244.7	99.5	275.9	505.5	4.7	87.6	103.2	143.3

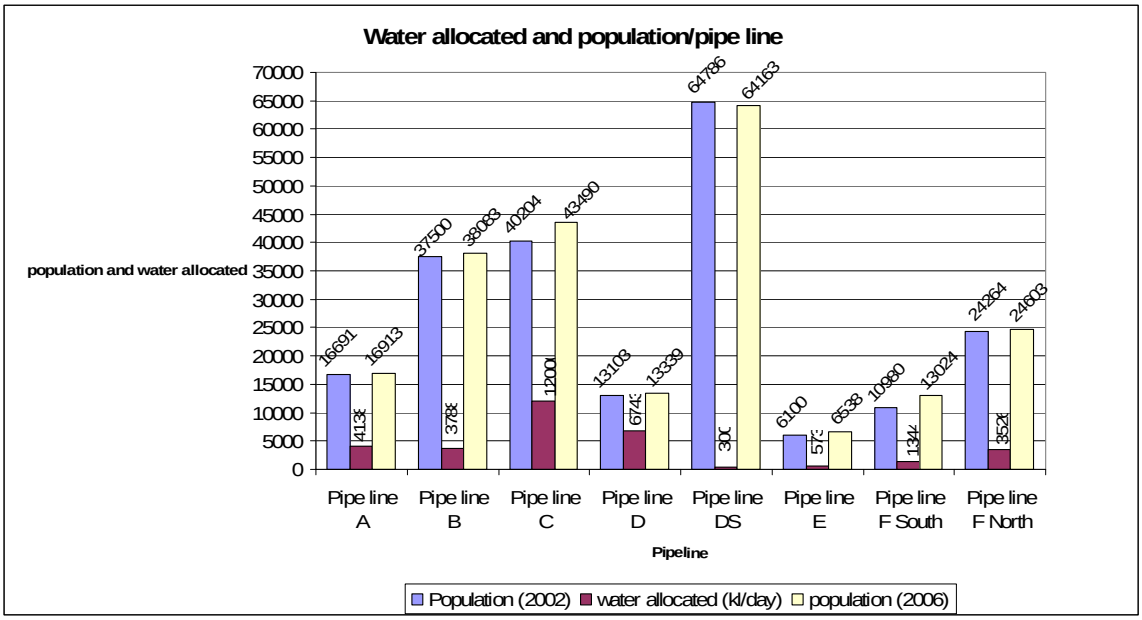

Figure 8: Water allocated and population / pipeline

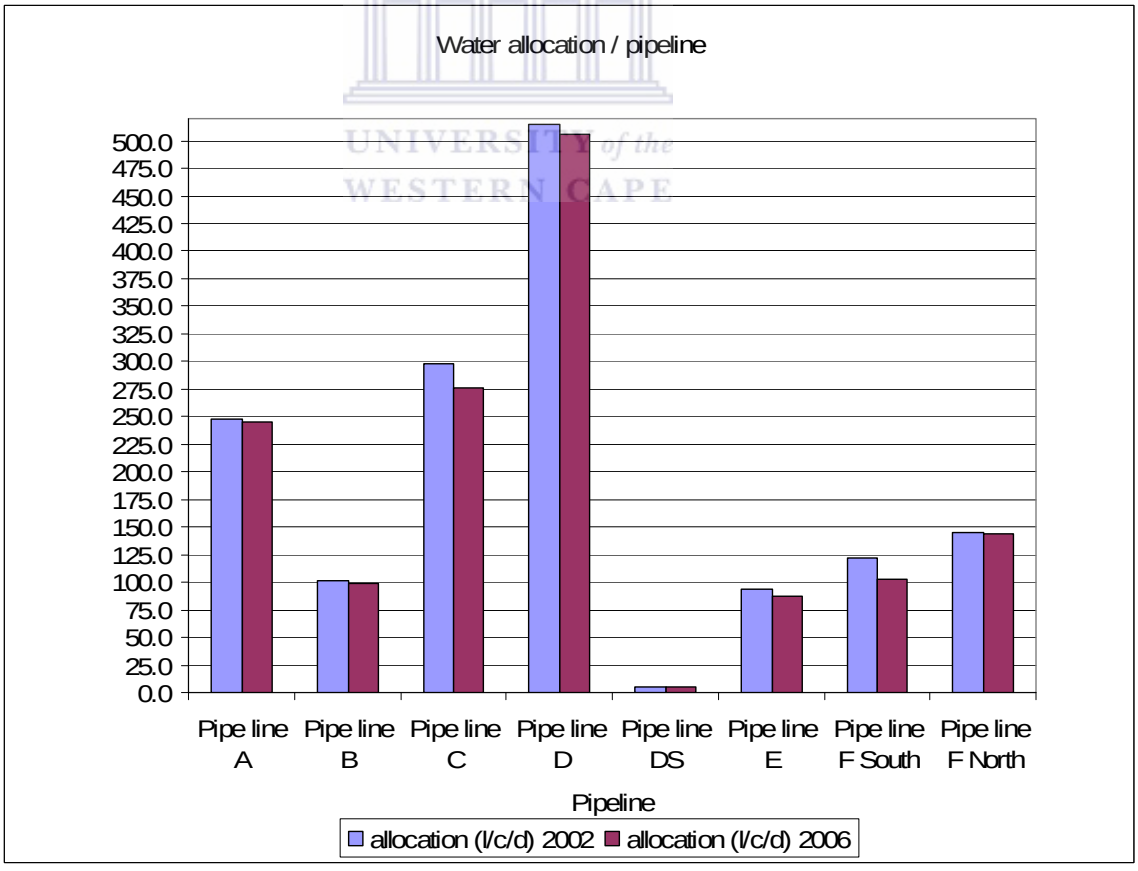

Figure 9: Water allocation per person (lpcd) per pipe line

The Table below indicates the amount of water used from pipeline C in kilo litres a month. The water allocated to pipeline C is constant at 360 000 kilo litres every month. The Table indicates that most of the time the amount of water allocated is more than the amount of water used.

Table 22: Water use from pipeline C

Giyani Water Works Pipeline C											
	2006 April	May	June	July	August	September	October	November	December	2007 January	February
Current reading (kl)	1079360	1396660	1714480	1996500	2309090	2601430	2888570	3181880	3527780	3814220	4111510
Previous reading(kl)	688780	1079360	1396660	1714480	1996500	2309090	2601430	2888570	3181880	3527780	3814220
Water used(kl) Pipeline C	390580	317300	317820	282020	312590	292340	287140	293310	345900	286440	297290
Water allocated pipeline C / month	360 000	360 000	360 000	360 000	360 000	360 000	360 000	360 000	360 000	360 000	360 000

According to DWAF (2004a), a high proportion of the total amount of water supplied to Giyani is not accounted for, due to a combination of reticulation system losses, unauthorized water connections, faulty water meters and general wastage. A significant amount of potable water is also used for irrigation in the Giyani area. According to DWAF (2004a) these factors, combined with low levels of payment and institutional failures at a local level, affect the sustainability of water services. On average a total of 5,500 water bills are sent out by the Greater Giyani municipality to the users and only 100 of these are paid each month (DWAF, 2004a). Many households in Giyani mentioned that they do not pay for water because they do not have water in their taps most of the time. The next section looks at water management institutions in the study area.

4.6 Water management institutions in the study area

4.6.1 The history of water management in Giyani

In the former homelands, water authority was vested in the homeland governments, and with representatives such as tribal chiefs and councils at community level (van Koppen *et al.*, 2002 & 2003). The homeland governments undertook some rural drinking water supply schemes. Chiefs and headmen were the main contact persons for the homeland government within rural communities and with any other agencies involved in water supply. In the Giyani area, the former Gazankulu Water Supply and Sanitation Division of the Department of Works was responsible for the provision of purified water to both the rural villages and towns in the homeland. The Water Supply and Sanitation function was previously in the hands of the Department of Agriculture and Forestry, and was transferred to the Department of Works in 1988 (Gazankulu Department of Works, 1988).

On July 1, 1994 the new Department of Water Affairs and Forestry came into existence by proclamation of the President of the Republic (DWAF, 1994). This led to the amalgamation of all water and forestry related personnel, functions and budgets of the previous homelands together with the assumption of the new functions of water supply and sanitation. While the process of amalgamation took place, which was envisaged to be a maximum of two years, a new directorate: community water supply and sanitation (CWSS) was also established to promote water supply and sanitation provision. The objectives of the CWSS Directorate were:

- Assuring the effective ongoing operation of potable water supply systems for which DWAF is responsible;
- Planning and expansion of services in collaboration with the provincial government;

- Promoting investments necessary to achieve the expansion of services;
- Developing organisations needed at a local and regional level to achieve the goals of the new government as expressed in the Reconstruction and Development Programme; and
- Monitoring and regulating water supply and sanitation activities in accordance with the Constitution.

Rogers and Hall (2003) notes that when proposing changes to water governance systems, it is important to understand and distinguish between the different functional levels in water management which are operational, organisational and constitutional. The operational level focuses on the use or control of water for specific purposes to fulfil specific needs e.g. domestic water supply, irrigation, environmental management. The organisational level co-ordinates and reduces conflict between competing uses, administers the rules of water use and the users in a water system. The constitutional function creates the enabling environment within which the other functions operate. It sets the policies and legislation, taking into account external governance and political imperatives. Rogers and Hall (2003:21) argue that in many countries such functions are unclear and often governments may be unable or unwilling to exercise their responsibilities. In South Africa the functions are clearly stated in the policies but there are difficulties in consolidating the roles and responsibilities of the following stakeholders in water services in Limpopo Province: DWAF as a regulator (DWAF), authorities (WSA) and supporters (Department of Local Government and Housing and DWAF) (Portfolio Committee on Water Affairs and Forestry, 2006).

According to the Committee, ensuring adherence to Water Services regulations and standards is a problem in the province, especially to assure good services to customers in terms of quality, quantity, affordability and sustainability.

4.6.2 Institutions involved in water services and their roles

The constitution of South Africa created an enabling environment within which water services can be provided through local government. The National Water Act created an enabling environment through which water can be managed through water management institutions. The constitution sets the policies and legislation, taking into account external governance and political imperatives. This section looks at the institutions that are responsible for water services provision, water management, and other institutions in the study area. The first three institutions – MDM, GGM and DWAF - are responsible for water services provision; the water user association and the catchment management agency are responsible for water management; while the other institutions, all at the village level, are responsible for management of the scheme.

4.6.2.1 Mopani District Municipality

The Mopani District Municipality is the water services authority (WSA)[11] in the study area. According to the Municipal Systems Act (2000), a municipality has all the functions and powers assigned to it in terms of the Constitution. Section 84 (1) of the Municipal Structures Act (1998) allocates the function of water services (i.e. potable water supply systems (84(1) (b)) and domestic waste water and sewage disposal systems (84(1) (d)) to a District Council.

According to Mopani DM (2006), only two of the five local municipalities, namely: Greater Tzaneen and Ba-Phalaborwa qualify to be water service providers[12]. The basis for the service provision is established by the service authority that ultimately remains responsible for the provision of the service. All water service providers that provide water services to or on behalf of water services authorities must do so in

[11] DWAF (2003b) defines a WSA as any municipality that has the executive authority to provide water services within its area of jurisdiction in terms of the Municipal Structures Act 118 of 1998.
[12] Water service providers (WSP) are the organisations that assume operational responsibility for proving water and/or sanitation services.

terms of a service delivery agreement with the water service authority (RSA, 2000; DWAF, 2003b). According to DWAF (2003b), the WSA has the constitutional responsibility for planning, ensuring access to, and regulating provision of water services within its area. Each of the responsibilities is discussed below.

Ensuring access to water: The WSA must ensure the realisation of the right of access to water services, particularly basic water services subject to available resources by seeing that appropriate investments in water services infrastructure are made.

Planning: The WSA must prepare a WSDP to ensure effective, efficient, affordable, economical and sustainable access to water services that promote sustainable livelihoods and economic development. In carrying out the function of planning for the future, it is of crucial importance for the WSA to have a service level policy. This involves identifying the different levels of service that will be offered by the WSA and highlighting what the capital and operating cost implications of each level will be. This policy might include what level of service can be provided free of charge versus what levels consumers will be expected to pay for. In 2006 the WSA did not have a service level policy for water and no community participation plan for the selection of service level (Mopani DM, 2006).

Regulation: The WSA must regulate water services provision and water services providers within their areas of jurisdiction and within the policy and regulatory frameworks set by DWAF through the enactment of by-laws and the regulation of contracts.

Provision: The WSA must ensure the provision of effective, efficient, and sustainable water services (including water conservation and demand management) either by providing water services themselves or by selecting, procuring and contracting with external water services providers.

The Table below outlines major functions and outputs for Mopani District Municipality to fulfil the WSA role and responsibilities as stated in MDM (2006). The table indicates that all outputs/policies that a WSA is suppose to have are in place at Mopani District Municipality.

Table 23: Roles and responsibilities of Mopani DM as a WSA

WSA functions / outputs	In place? (Yes/ no)	N/A	If no, when will it be in place?	Support required (yes/no)
Policy development				
Indigent Policy	Yes			Yes
Free basic water policy (including equitable share)	Yes			No
Procurement policy	Yes			
Regulation and tariffs				
Water Services bylaws with conditions as required by the Water Services Act	Yes			Yes
Mechanisms to ensure compliance with bylaws	Yes			No
Tariff structure	Yes			No
Tariffs promulgated	Yes			No
Infrastructure development (projects)				
Mechanisms to undertake project feasibility studies	Yes			Yes
Criteria for prioritising projects	Yes			
Mechanisms to assess and approve project business plans	Yes			
Mechanisms for selecting, contracting, managing and monitoring implementing agents	Yes			
Mechanisms to monitor project implementation	Yes			
Water conservation and demand management				
Water conservation and demand management strategy	Yes			
Performance management and monitoring				
Performance management systems		N/A		
Water service monitoring and evaluation (M&E) system	Yes			No
WSDP				
WSDP information system	Yes			
Mechanisms for stakeholder participation	Yes			
Mechanisms to monitor and report on WSDP implementation	Yes			
WSP institutional arrangements				
Criteria to select appropriate WSPs		N/A		
Mechanisms to contract, manage and monitor WSPs		N/A		
Mechanisms to approve WSP business plans		N/A		
WSA overall capacity				
Sufficient staff and systems to fulfil all WSA functions	Yes			
Other (state)				

Section 23 (1)(a) of the Municipal Systems Act states that a municipality must undertake developmentally-oriented planning so as to ensure that it together with the other organs of state contribute to the progressive realisation of the fundamental rights contained in sections 24,25,26, and 27 of the Constitution. Section 73 (1) (a-c) goes on to say that a municipality must give priority to the basic needs of the local community, promote the development of the local community and ensure that at least all members of the community have access to minimum level of basic municipal services.

MDM has a strategy to ensure that it meets its obligation as a WSA. The strategy has identified the following priorities:

- To provide affordable potable water to RDP standards to 100% of the population by July 2008;
- To ensure the continuous supply of water to existing users as well as new service areas;
- To provide Free Basic Water (FBW) to all poor households;
- Transfer of DWAF water supply schemes to Mopani District Municipality as Water Service Authority by 31 March 2006
- To reduce water losses to below 20%.

One of the priorities is to provide affordable potable water of RDP standards to all people in the municipality by July 2008. The municipality believes that the use of municipal funds, as well as funding from DWAF, the Extended Public Works and the Municipal Infrastructure Grant (MIG) programmes will result in improved provision of water to the MDM to at least RDP standards (See Table below). By March 2008, the municipality was left with only three months to reach its target and it was already clear that this target will not be met (see detailed discussion in Chapter Five, below).

Table 24: Priorities to improve access to clean water in MDM

Issue	**Access to clean water**		
Strategic Priority	**To provide affordable potable water to RDP standards to 100% of the population by July 2008**		
Programmes	**Output**	**Outcomes**	**Timeline**
Capital development programme, with emphasis on Strategic Development Areas, making use of own funds, DWAF & MIG programmes as well as the labour intensive Extended Public Works Programme.	Water bulk & reticulation infrastructure, including pipelines, pump stations, reservoirs. Etc.	Improved provision of water to the MDM to at least RDP standards.	30 June 2008
Strategic Priority	**To ensure the continuous supply of water to existing users as well as new service areas**		
Programmes	**Output**	**Outcomes**	**Timeline**
Maintenance of high level of services provision from water sources, purification plants and existing infrastructure.	Operations and maintenance management plans. Creation of appropriate and relevant water personnel structure.	Effective and efficient maintenance and supply of water services. Development of highly skilled and motivated work force in the water sector.	Dec 2006
Strategic Priority	**To provide Free Basic Water (FBW) to all poor households**		
Programmes	**Output**	**Outcomes**	**Timeline**
Implementation of Free Basic Water Policy.	- Adoption of FBW policy.	Provision for Free Basic Water to all poor households within all municipal areas.	July 2007
Strategic Priority	**Transfer of DWAF water supply schemes to Mopani District Municipality as Water Service Authority by 31 March 2006**		
Programmes	**Output**	**Outcomes**	**Timeline**
Transfer of DWAF water supply systems to Mopani District Municipality.	- Section 78 Process completed. - Status quo assessments of existing schemes completed.	- Mopani DM as Water Service Authority will take ownership and authority of all previously-owned DWAF water schemes. - Where applicable, Service Providers will provide distribution of water.	December 2006
Strategic Priority	**To reduce water losses to below 20%**		
Programmes	**Output**	**Outcomes**	**Timeline**
Reduction of water losses programme.	- Complication and Implementation of Water Loss Strategy.	- Reduction of water losses and more efficient use of water resources.	July 2007

4.6.2.2 Greater Giyani local municipality

Section 78 (1) of the Municipal Structures Act provides criteria and processes for deciding on mechanisms to provide municipal services (RSA, 1998b). Mopani District Municipality carried out an assessment of all local municipalities in its area of jurisdiction, guided by section 78 of the Act. Among the conclusions of the assessment were that Greater Giyani, Greater Letaba and Maruleng Local Municipalities lacked the capacity to provide water services. Greater Tzaneen and Baphalaborwa, as former white municipalities have the capacity to provide water services.

A municipality may provide a municipal service in its area through an internal mechanism, which may be any business unit, or a department or an administrative unit within the municipality, or any other component of its administration; or an external mechanism by entering into a service agreement with a municipal entity[13]; another municipality; an organ of state; a community based organisation or any other institution that is competent to provide the service. Mopani District as the WSA decided that the appropriate mechanism to provide the service in the three municipalities that lacked capacity to provide water services was through a municipal entity. The action plan on the implementation of the signed transfer agreement between DWAF and the MDM indicates that the entity should be formed by March 2007. In an interview with Mopani District water services manager in August 2007, he mentioned that the entity would be established, but did not exist then.

[13] A municipal entity means a company, co-operative, trust, fund or any other corporate entity y established in terms of any applicable national or provincial legislation and which operates under the ownership control of one or more municipalities, and includes, in the case of a company under such ownership control, any subsidiary of that company; or a service utility; or a multi-jurisdictional service utility (RSA, 2003).

Whichever option the MDM chooses, it remains the WSA and it is still responsible for supplying potable and reliable water to its community. It is clear that there is much competition between district and local municipalities, and role differentiation is not clear in practice. According to Mopani DM (2006), in 2006 the DWAF Water Services Directorate was still acting as WSP in all rural areas in the three local municipalities that are not qualified to act as WSPs, and they provide water services in consultation with local municipalities.

4.6.2.3 The Department of Water Affairs and Forestry (DWAF)

The DWAF, which is the custodian of the water resources and overall leader of the water sector, is responsible for sector policy, support and regulation. The Department of Water Affairs and Forestry's strategic framework for water services (SFWS) of 2003 states that "*DWAF water services assets have to be transferred to water service authorities with the Department of Provincial and Local government regulating and overseeing the activities of local government"*.

The delay in the transfer of DWAF schemes to municipalities is currently a major issue facing municipalities in terms of water services. When the new DWAF was established, many schemes from the old "homeland" governments were transferred to DWAF. These schemes and other built after 1994 now need to be transferred to the water service authority within whose area of jurisdiction they are located. The Table below indicates schemes that have still to be transferred to the WSA from DWAF.

Table 25: Schemes to be transferred from DWAF to Mopani DM

Description	Name	Settlement Type
NL1	Mametja Sekororo	Dense, Scattered, Villages
NL2	Thabina / Tours / Ritavi	Urban, Dense, Scattered, Villages
NL3	Modjadji - Letaba Scheme	Urban, Dense, Scattered, Villages
NL4	Sekgopo	Dense
NL5	Sekgosese 2	Dense, Villages
NL6	Middle Letaba RWS Service Area	Urban, Dense, Scattered, Villages

DWAF has embarked on a process of transferring all its water services works and associated water services function to municipalities. This transfer is taking place in terms of the Joint Transfer Policy which has been agreed between DWAF, Department of Provincial and Local Government (DPLG), National Treasury and the South African Local Government Association (SALGA). According to DWAF (2003b), all transfers of schemes and water service functions were meant to be completed by 30 June 2005. In order for a Water Services Authority (WSA) to receive DWAF assets there has to be a "Transfer Agreement" signed between DWAF and the WSA. The date by which all WSAs must sign Transfer Agreements has been extended to March 2006. According to Mopani DM (2006), the transfer agreement was envisaged to be signed in June 2006, but the actual date of the signing of the Transfer Agreement between DWAF and Mopani District Municipality was 1st of August 2006. The actual transfer of assets (infrastructure, staff and finance) had not yet taken place as of 24 October 2008.

After the transfer agreement was signed, an action plan for the implementation of the signed Transfer Agreement was developed. The implementation plan of the signed transfer agreement contained target dates for technical assessments, legal analysis, institutional analysis, human resource assessment and financial issues to be addressed before Mopani DM can sign the assets register and take over all assets from DWAF.

Of interest to the study is the institutional and human resource assessment. The key steps in the transfer process for institutional and human resource assessment are as follows:

Key steps in the transfer process	**Reference document / supporting tools**	**Actions to be taken**	**Responsibility**	**Target Dates**
Adoption of section 78 recommendations	Section 78 (3) Report	Ensure adoption by council and all local municipalities	MDM	March 2007
Facilitate signing of WSP contracts	WSP contracts with LM specific information	WSP finalised and signed	DWAF and MDM	10 March 2007
Establishment of a municipal entity	Concept note	Appoint transaction advisors	DWAF	March 2007
Find interim arrangement to precede the Entity		Reappoint DWAF as a WSP in the municipal entity area	DWAF and MDM	April to December 2007
Set up contract management capacity within MDM to manage WSPs		Facilitate the appointment of SP under Masibambane	DWAF	March 2007
Secondment of staff	Transfer agreement	Effective 1st April 2007 until 30 November 2007	DWAF and MDM	April to November 2007
Transfer of staff	Scheme organograms	Select staff to be absorbed and develop a training plan and access DWAF funding	MDM	1st December 2007

There seems to be a delay in the establishment of a municipal entity, which is responsibility of both DWAF and the WSA. The plan shows that the entity was suppose to be established by March 2007. In August 2007 the entity did not exist. In a telephonic conversation with a DWAF official on 24 October 2008, he mentioned that the municipality has not signed the asset register yet because the entity has not been established. He mentioned that WSA does not want to control the assets from DWAF, so they will only sign the asset register when the entity is established so that on the same day the assets can be signed to the entity. The official mentioned that the

entity might be established between December 2008 and April 2009. The plan also shows that for the period between April and December 2007 DWAF will be reappointed as a WSP in the municipal entity area. The failure of DWAF and MDM to honour their commitments and the general missing of deadlines creates disorganisation within the municipality, and this has a negative impact on the level of water supply service in the area, especially in those municipalities that are in the former homelands of Gazankulu and Lebowa.

4.6.2.4 Middle Letaba Water User Association

There is a water user association in the study area, called the Middle Letaba water user Association (WUA). The process of the formation of the WUA started in December 2004 and was carried out in terms of section 92(1) of the National Water Act in September 2006[14]. According to a DWAF official, one public participation session was held with government officials of DWAF and DoA, and three public participation sessions with farmers from Bend, Hlaneki, Homu and Thomo. The WUA had 22 founding members.

The objectives of the Middle Letaba WUA are as follows:

- To ensure the equitable distribution of water to all water users in the area.
- To control and manage water resources and water works in its area of operation.
- To operate and maintain water works within the area of jurisdiction.

The water resources to be controlled by the WUA include the following:

[14] The Middle Letaba WUA was established by Government Notice No. 904 (DWAF, 2006c).

1. The Nsami River which originates from Mudavula and flow to Nsami dam (excluding the dam) until the confluence of the Nsami River and the Klein Letaba River.
2. The Klein Letaba River downstream from its confluence with the Middle Letaba River, until its confluence with the Nsami River.
3. The main canal from the Middle Letaba dam that feeds the irrigation schemes of Hlaneki, Bend and Homu.
4. Underground water used for commercial purposes in the area.

The management committee of the Middle Letaba WUA was selected on the 7th of December 2006, but the WUA was still not functioning by 23 April 2007.

4.6.2.5 Catchment Management Agency

A Catchment Management Agency (CMA) is intended to ensure equitable, efficient and sustainable water-resource management. CMAs are required to establish governing boards, which are responsible for integrated water-resource management and developing a catchment management strategy. The boards have to represent the various sectors of society within their specific water-management areas and consist of water users, potential water users, local and provincial government, and environmental interest groups. DWAF aims to establish CMAs in all of South Africa's 19 water management areas, as required by the National Water Act. The department will then devolve administration to local water users and communities, accompanied by vigorous capacity-building, so that historically excluded communities can participate in water management.

The formation of Luvuvhu/ Letaba CMA

The Luvuvhu/ Letaba CMA was not yet established as of 26 April 2007. At that same time catchment management forums (CMFs), were established for each catchment

within the Luvuvhu/Letaba WMA. In April 2007, representatives from the CMFs were selected to form the CMA. According to a DWAF official, there was a delay in the selection of representatives from the CFMs that are dominated by the white people because they tend to be less interested in the process and do not come to the meetings. According to a DWAF official, the absence of representatives from many of the CFMs delays the whole process of the formation of the CMA.

A workshop was planned for the 24-25 May 2007 where all representatives of the CMFs would be given more information about the NWA and the requirements for the formation of a CMA. The Luvuvhu/Letaba Catchment Management Agency is envisaged to be launched and functional by 2009.

4.6.2.6 Other institutions in the study area

There are a number of institutions dealing with water and related matters at Siyandhani village and the Block 4E (B4E) irrigation scheme, including the B4E Irrigation Scheme Management Committee and Siyandhani Farmers Association. The institutions are discussed below.

B4E irrigation scheme management committee and Siyandhani Farmer's Association

The B4E Irrigation Scheme Management Committee is elected every two years from among the farmers on the block. Currently the committee consists of the following: a chairperson, vice chairperson, secretary, vice secretary, Treasurer, and two additional members. A constitution has been developed for the B4E Irrigation Scheme by the Management Committee.

The constitution of B4E Irrigation Scheme states that a person becomes a member of the B4E irrigation scheme by: holding a plot at the scheme and accepting the rules of the scheme and those of the Siyandhani chieftaincy. Each and every member of the

B4E irrigation scheme is expected to make a monthly contribution of R40 for the management of the scheme. A person can lose membership if:

- He/she does not use land allocated
- The plot holders' workers steal other farmers' produce or equipments
- No monthly contribution is made to Siyandhani Farmers Association and B4E irrigation scheme
- The plot holder does not attend meetings three times in succession without written notice
- The plot holder does not come to the scheme for more than three weeks without written notice
- The plot holder does not fix water leakages in the plots
- A farmers does not apply fertilizers, pesticides and herbicides and does not remove weeds from crops

The objectives of the B4E Irrigation Scheme as stated in their constitution are as follows:

- To teach members how to plant and care for plants
- To teach members how to manage a business and make money
- To help members to be independent and do things for themselves
- To guide members on the selection, packaging and marketing of produce
- To teach members how to have good leadership

The constitution stresses that the objectives of the B4E are highly dependent on the support from the agricultural officer from the Department of Agriculture. Denison and Manona (2007) argue that the functions of water management on small-scale irrigation schemes should be separated from the farm production elements. In line

with this, the B4E scheme management committee is responsible for water, infrastructure and administration issues pertaining to the scheme and the individual farmers are responsible for farming related activities such as mechanisation, inputs, marketing of produce. The committee establishes disciplinary procedures and has to strictly implement them. The committee sets and collect farmer's monthly contribution, link up with other water users, and prepare and control budgets

Another institution in the study area is the Siyandhani Farmers Association (SFA). Members of the association are farmers that hold plots in Blocks 1 to 7 of the scheme. All farmers at B4E are members of the SFA. The members pay R150 joining fee and R30 monthly contribution to the SFA. The Farmers at B4E represent themselves at the Association.

4.7 Conclusion

The chapter provided insight into the availability and requirements for water in Letaba/Shingwedi sub-region. It demonstrated that water infrastructure in the former white area of Groot Letaba is more developed that in the former black areas such as Shingwedzi and Klein Letaba and that water resources availability is higher in the former white areas due to the development of dams to capture the water.

The chapter went further to demonstrate the differences in official interpretations of water requirements (as measured in lpcd) in the sub-region, in terms of urban and rural areas. The rural per capita requirements are set at 55 litres for all sub areas except for the Lower Letaba. Water requirements for urban areas ranged from 23 to 127 litres, with the 127 litres applying in the former white Groot Letaba sub-area, with average consumption in Tzaneen estimated at about 1,200 lpcd which includes municipal uses and losses.

The chapter also showed that inequities in allocation exist within the Giyani area. The Giyani town and the former white suburb of Giyani are allocated 275 and 505 lpcd, respectively, while the people in rural areas are allocated as little as 4.7 lpcd.

The chapter also gave a background of all institutions involved in water management and water services in the study area. The next chapter presents the results on domestic water allocation and use at Siyandhani village.

CHAPTER 5: DOMESTIC WATER ALLOCATION AND USE IN SIYANDHANI

The previous chapter outlined water resources availability and requirements, and water infrastructure, in the study area, as well as the inequities that exist in terms of these. It went further to describe the water management and water services institutions operating in the area, thereby laying the foundation for the presentation of the present and following chapter. This chapter presents the results of the exploration of water allocation and use at Siyandhani village. In the first section, I review the water services infrastructure in Siyandhani.

The second section looks at water allocation in Siyandhani and how water from Nsami Dam is allocated to different villages within Greater Giyani municipality through various pipeline systems. I concentrate on pipeline system C, which supplies Giyani town and Siyandhani village. The section goes on to explore household-level water allocation at Siyandhani, and what this means in terms of allocation per person per day.

The third and final section of the chapter examines in detail water use at household level and includes the following: household composition, occupation, and income sources; water sources; water availability; water collection; water use per household; productive use of water at household level; and household members perception about the level of service by the local municipality in terms of water supply. I will demonstrate how the provision of water is inadequate for the reasonable water needs of most villagers. This water scarcity also demonstrates how the combination of 'natural' scarcity and socially created scarcity produces hardship – for example, villagers (mostly women and girls) having to walk long distances to collect water for domestic water use.

5.1 Siyandhani village water services infrastructure

Siyandhani village is supplied with water from the Giyani water works through system C of the Giyani sub-scheme of Middle Letaba Regional Water Supply Scheme. System C also supplies Giyani Town (section A, D1, D2, E and F), Giyani Industrial area and Giyani central business district (CBD). The water from system C is supplied through pipes into two storage reservoirs in Siyandhani village. There are two storage reservoirs in the village with a storage capacity of 200 kilolitres (See Figure 7). There is a booster pump between the two reservoirs which is located a few metres from the first storage reservoir (Fig. 7). The booster pump is supposed to pump water from the first reservoir (low zone) to the second reservoir (high zone). The booster pump operator who is employed by the Department of Water Affairs and Forestry (DWAF) mentioned that *"the first reservoir had a little water in 2006 but we did not use the booster pump because the water was very little. If the storage reservoir has water, the water is distributed to households, but only households downstream can access the water. In January and February 2007 the reservoir had no water"*. This indicates that the amount of water received by the village is not sufficient and sometimes they do not get water at all from the pipeline C.

According to DWAF officials, the second reservoir does not get water due to low water pressure which is caused by illegal connections to the pipeline in Siyandhani village. When DWAF officials were asked what they did about the illegal connections they mentioned that they asked community members to show them where the illegal connections were, but the community members refused to show them the illegal connections.

This finding was a bit surprising because DWAF officials are suppose to know where the main pipes are and they were suppose to regularly check whether there are any unauthorised connections on the main pipes. I therefore believe that blaming illegal connections in Siyandhani village is just conjecture on the part of the DWAF

officials, and it is equally likely that the low water pressure is caused by the off takes that happen before the water reaches Siyandhani as will be demonstrated by Table 26 and figure 10.

The water supply scheme in Siyandhani was designed to supply 65 lpcd through street taps for an estimated population of 5,415 in 2006 (Eksteen, van der Walt, and Nissen, 1991). The water from Nsami Dam was supposed to fill the first reservoir and then the water could be pumped to the second reservoir and distributed to the street taps so that people can access water from there. Currently there are only two functional street taps in the village and people can access water from these only after rains. Ninety percent of the households in the village have yard taps which household members have installed themselves illegally (MDM, 2006:160).

According to a DWAF official, the yard connections are illegal and they cause the collapse of the whole water supply scheme in Siyandhani because water demand resulting from yard connections cannot be met. Since the scheme was designed to provide 65 lcpd with the rudimentary (street-level) system and 110 lcpd via house connections (Eksteen, van der Walt, and Nissen, 1991) and now according to a DWAF official, the RDP standard of 25 lpcd is being applied in the village, one can conclude that there has been a down grade in water supply standard from 65 to 25 lcpd. This is what a DWAF official had to say about water allocation in the study area "Water allocated in Giyani town is between 120-200 lpcd because it is a high level of service area where people are able to pay for water, and Kremetart uses 475 lcpd instead of 220 lcpd; while water allocation at Siyandhani village was suppose to be 25 lcpd by default and, because it is only at the RDP standard, people in this village do not pay for it". The 25 litres sometimes it is not delivered at Siyandhani (see section 5.2).

There are approximately six boreholes and sand wells along the Klein Letaba River, and one of the six boreholes was supposed to augment the water supplied by system

C to Siyandhani village by flowing to the reservoir in the village before being distributed to street and yard taps. The borehole for Siyandhani supplied the village for about a year and half before a cable from the transformer to the borehole was stolen in February 2007. This cable had not been replaced as at 28 August 2007.

5.2 Water supply at Siyandhani Village

As shown by Table 26, water used from system C varies every month. Table 26 and Figure 10 shows that from July 2006 up to February 2007, the water that gets to Siyandhani village has not been more than 4% of water allocated to pipeline C, with some months where the village only got 1% of water allocated to pipeline C. This is because system C is a free flow system where the different sections of the town and the CBD take off as much water as they like and Siyandhani village gets what remains after all the other users have taken what they can.

Water supply to Siyandhani improved in the months of July and August 2007 when the village consumed 7.1 % and 9.5 % of the water allocated to pipeline C. During a visit to the village in August 2007, household members mentioned that water supply has improved since the beginning of winter. DWAF officials were asked why the water supply improved in the village and they mentioned that in winter less water is used in the township and that when summer starts the water problem in Siyandhani will resume.

Table 26: Water supplied from pipeline C to Siyandhani village

Giyani Water Works Pipeline C																
	2006 April	**May**	**June**	**July**	**August**	**September**	**October**	**November**	**December**	**2007 January**	**February**	**April**	**May**	**June**	**July**	**August**
Current reading (kl)	1079360	1396660	1714480	1996500	2309090	2601430	2888570	3181880	3527780	3814220	4111510	4724330	5021660	5508250	5831480	6086650
Previous reading(kl)	688780	1079360	1396660	1714480	1996500	2309090	2601430	2888570	3181880	3527780	3814220	4408800	4724330	5021660	5508250	5831480
Water supplied (kl) Pipeline C	390580	317300	317820	282020	312590	292340	287140	293310	345900	286440	297290	315530	297330	486590	323230	255170
Water supplied pipeline C per month (litres)	360 000	360 000	360 000	360 000	360 000	360 000	360 000	360 000	360 000	360 000	360 000	360 000	360 000	360 000	360 000	360 000
SIYANDHANI																
	2006 April	**May**	**June**	**July**	**August**	**September**	**October**	**November**	**December**	**2007 January**	**February**	**April**	**May**	**June**	**July**	**August**
Current reading				959520	971870	984820	989040	990520	1005310	1011580	1013890	1026790	1032580	1040920	1063780	1087980
Previous reading				947060	959520	971870	984820	989040	990520	1005310	1011580	1016200	1026790	1032580	1040920	1063780
Water supplied (kl) Siyandhani				12460	12350	12950	4220	1480	14790	6270	2310	10590	5790	8340	22860	24200
% supply of pipeline C				4.4	4.0	4.4	1.5	0.5	4.3	2.2	0.8	3.4	1.9	1.7	7.1	9.5
Water supplied converted to litres				12460000	12350000	12950000	4220000	1480000	14790000	6270000	2310000	10590000	5790000	8340000	22860000	24200000
Daily supply				401935.48	398387.10	431666.67	136129.03	49333.33	477096.77	202258.06	82500.00	353000.00	186774.19	278000.00	737419.35	780645.16
Allocation/capita/day (litres)				**54.5**	**54.0**	**58.5**	**18.5**	**6.7**	**64.7**	**27.4**	**11.2**	**47.9**	**25.3**	**37.7**	**100.0**	**105.9**

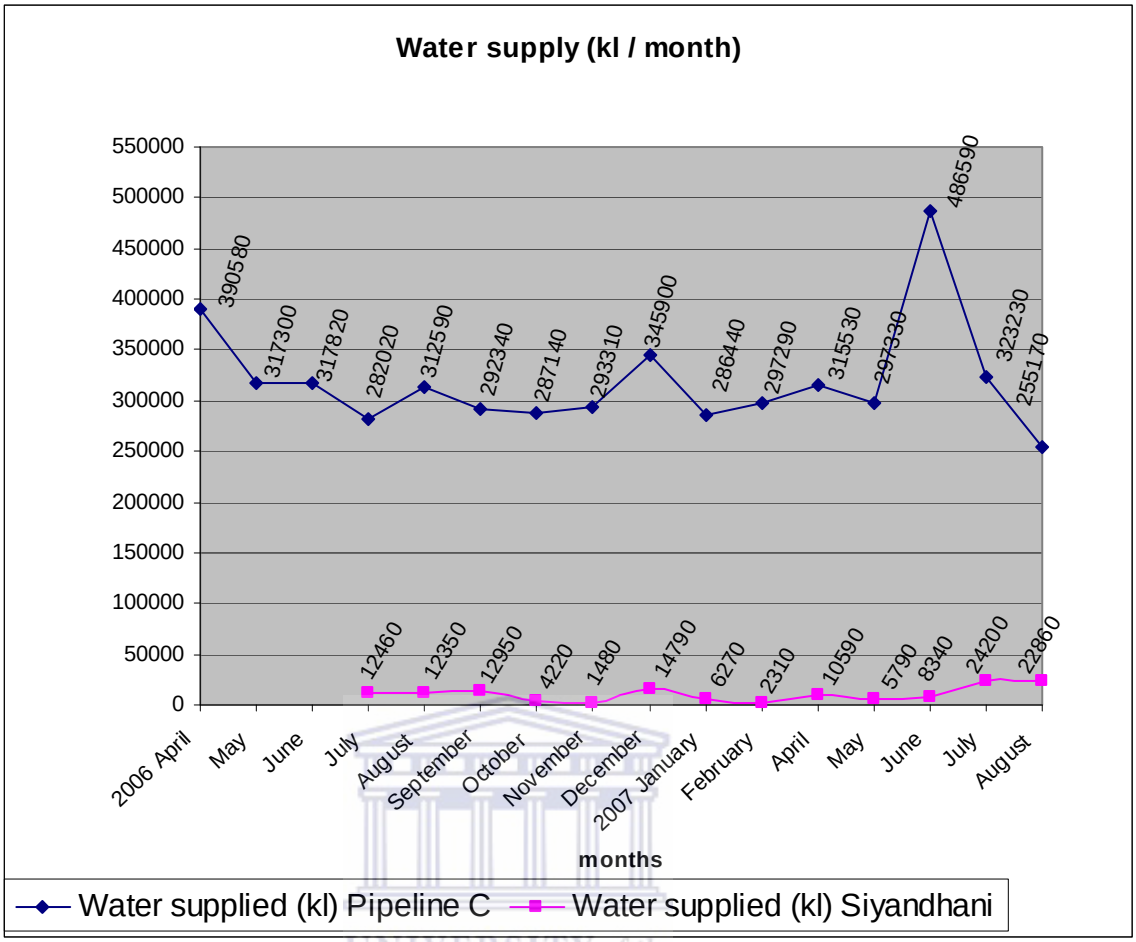

Figure 10: Water supply from system C Siyandhani Village

The consumption figures for Siyandhani village for April to June 2006 are missing from the source documents and a DWAF official mentioned that "*maybe the meter was not working; that is why we don't have figures for those months*". Figures for March 2007 were also not available. Water supplied per month at Siyandhani is in kilo litres and the water allocation per capita per day was derived from the water supplied per month and from the known population of the village. The kilo litres were converted into litres per day by multiplying by a thousand and dividing by the number of days in each of the months. To get litres allocated per capita per day, the total litres per day were divided by the population of Siyandhani, which was 7,374 in 2006 as stated in Mopani District Municipality's Water Services Development Plan, substantially higher than the figure of 5,414 used during the design of the water supply scheme in the village. Water allocation per person per day (in litres) ranged from 7 to 65 from July 2006 to February 2007 and reached 100 and more in July and

August 2007. Figure 7 shows that the water supplied as per design of the scheme (65 lcpd) has only been met in the month of December 2006 and that not even the RDP standard of 25 lcpd was met in October and November 2006 and February 2007.[15]

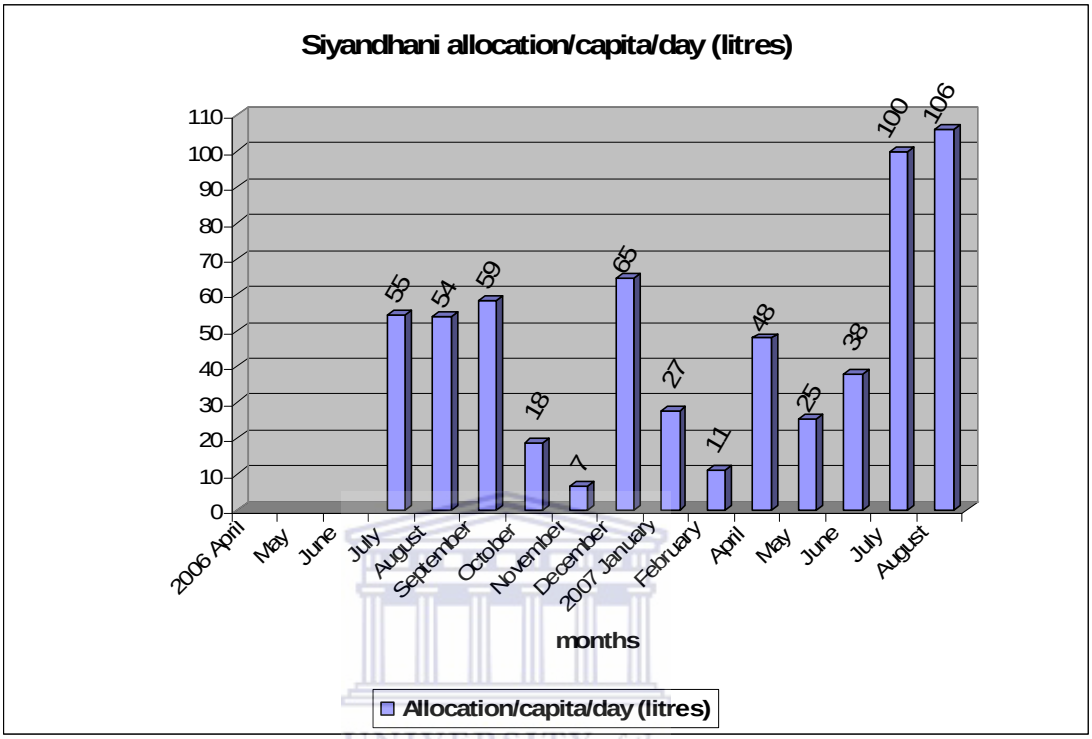

Figure 11: Water allocation at Siyandhani village (lpcd)

5.3 Water use at household level

This section looks at different responses to scarcity at village level by drawing on findings from research at Siyandhani village. The first part of the section scales down to household level and covers issues such as household composition, occupations of members and income sources of the households studied; the second section gives a general description of all the water sources in Siyandhani village, and the third part covers water use at household level, including water sources; water availability; water collection; water use per household; productive use of water at household level; and the level of service by the local municipality.

[15] Water allocated (in lpcd) was 18 in October 2006, 7 in November 2006, and 11 in February 2007.

5.3.1 Household description

This section covers issues such as household composition, occupation, and income sources of the households studied.

5.3.1.1 Respondent and household composition

All the respondents in the household survey were females. This was because they were the ones that were available at home during the time of interviews and water use for domestic purposes is usually associated with women. There were two cases where men were initially interested in the purpose of the interview but they did not respond to the questions and left women to respond when the learned that they were about water collection at household level, which is widely seen as the responsibility of women and not men. The age of the respondents ranged from 24 to 71 years. Eight of the respondents were aged between 16 and 30, two were aged between 31 and 39, six were between 40 and 55, six were 56 and 65, and three were aged above 66 years.

Respondents were asked about the number of people who lived in their households. The average number of people per household was six, with a minimum of two people and a maximum of 11 people. The total number of all people in the 25 households surveyed equalled 159. Out of this total population of 159, 40% were males and 60 % were females. Thirty percent (30%) of the population were aged between 0-14 years, 26% aged between 15-24, 17% aged between 25-34, 11% aged between 35-49, 11% aged between 50-64, 4% aged between 65-79, and 1% were above 80 years of age (see Table below).

Table 27: Household composition at Siyandhani

Household no	No of people in household	Male	Female	0-14	15-24	25-34	35-49	50-64	65-79	80 +
1	3	1	2	1		2				
2	7	4	3	2	3		2			
3	10	4	6	3	1	4		2		
4	2	1	1					2		
5	5	1	4	2	1	1	1			
6	7	3	4	1	3		1		2	
7	10	4	6	4	3	1		1	1	
8	7	4	3	1	1	2	1	1	1	
9	7	2	5	2	2		1	1	1	
10	4		4	1	1		1			1
11	9	5	4	4	4			1		
12	6	2	4	1	2	2			1	
13	5	1	4	1	1	2		1		
14	8	6	2	2	1	3		2		
15	6	2	4	3		2	1			
16	7	3	4	2	3		2			
17	4	2	2	1	2		1			
18	4	2	2	1	1		1	1		
19	11	5	6	5	3	1	1	1		
20	9	3	6	2	4	1	1	1		
21	8	4	4	2	2	2	1	1		
22	5	1	4	3		1	1			
23	6	1	5	3		1	1	1		
24	5	2	3		3	1		1		
25	4	1	3	2		2				
Total	**159**	**64**	**95**	**49**	**41**	**28**	**17**	**17**	**6**	**1**

5.3.1.2 Sources of household income

Respondents were asked about all sources of income coming into their household. A total of fourteen households had more that one source of income and the remaining eleven had just one source of income. The sources of income included wages, child support grants, old age grants, wage remittances, etc. Most households (44%) depended on child support grant as a source of income, 40% depended on wages and 32% depended on old age grants. The high dependence on the child support grant is linked to the household composition, where the highest proportion of the population, of the surveyed households, (30%) is aged 0-14 years. The child support grant in South Africa currently covers poor children up to their 14th birthday. Seventy percent

of the wage income is earned by males and 30% by females. The Table below gives detailed information about sources of income.

Table 28: Household income

Income source	No of households	Percentage (%)
Wages	10	40
Child support grant	11	44
Old age grant	8	32
Remittances	2	8
Day care	2	8
Piece jobs	1	4
Self employed	1	4
Domestic worker	1	4
Farm labourer	1	4
Sale of ice juice and snacks	1	4
Sale of firewood	1	4
Sale of cool drinks	1	4

5.3.2 Water sources at Siyandhani village

As described above, Siyandhani village is in a semi-arid area which currently has a poor domestic water supply but relatively abundant water for irrigation. As indicated in section 5.2.2 above that water supply from Giyani Water Works is not enough to meet household requirements and Siyandhani community members have to use other sources of water to meet their basic needs. The untreated water from the irrigation system in Siyandhani village is not only used for the irrigation of crops, but for a whole range of domestic and other purposes as well. This is called multiple use of irrigation[16] water and is recognised internationally as having both positive and negative effects on human health and rural development (Boelee *et al*, 2007). Many households depend on the irrigation system to provide them with their drinking water. Water from the irrigation systems is also used for laundry onsite (i.e. along the canal) while water for other domestic purposes is collected and used within the home. Often this water is used for cooking and drinking without treatment. Next, all the sources of water used by the community members are discussed.

[16] Multiple use of irrigation water is the use of water, which was assigned to agriculture, for other purposes, such as domestic uses or small scale industry (Boelee *et al*, 2007).

5.3.2.1 Yard Taps

Most of the households in village have yard taps but the taps are dry most of the time. Water for the yard taps was supposed to come from the purification plant at Nsami dam. Most of the households that are situated on the western side of the village have not had water from the taps for seven years or more. Chief Siyandhani mentioned that *"I have a tap in my yard but I am not sure that if I try to open the tap, whether a snake will come out of the tap"*. The households that are situated next to the booster pump station, at the centre of the village, are the ones that sometimes get water from the yard taps. These households often allow others to collect the water for free because they themselves do not pay for the water. Every morning the water collectors go to the yards where they usually collect water and place their water containers in a line, hoping that water will be available sometime during that day. The water collectors then go back to their own homes to do other things while they wait for the water to become available. When water is available in the taps the word spreads very fast and whoever has placed containers in a line must rush to the particular yard to fill their containers. If no water is available that day, the water collectors go back in the evening to collect their empty containers and start the whole process over again the following day. On such occasions, these households are obliged to make use of one of the other water sources in the area.

Sometimes water is available from these yard taps at night and people go to the various households to collect water. Sometimes the households tell the water collectors to go away because it is late and that they want to sleep, or else they just lock their gates to keep them out.

There are some households that can access water from their yard taps only after the area has had some rain and these also allow access to other community members. The village had rain for three days in the first week of April 2007, and after the rains these household members were able to access water from their taps: "*the water stopped coming out of our tap on the week of 30 April 2007 and now I collect water from other people's taps"*. One woman who had hired builders to build a wall mentioned

that *"this lack of water hinders the progress of the building because the builders do their work based on how much water I'm able to collect a day"*.

5.3.2.2 The Siyandhani Primary School

The Siyandhani Primary School is another source of water for the village. All households that are located close to the school are allowed to collect water from the school. If the households who access water from their yard taps do not have water, then the school does not have water because they are supplied by the same reservoir in the village, which is supplied in turn with water from the purification plant at Nsami Dam.

The school gate opens from early morning until 14:30 and people cannot access water after this time. The school and households that have water from the yard taps usually get water from 9am, and by 3pm the water is usually finished. The water can come out two or three days in succession, but after that they might not have water from the same tap for up to a month.

5.3.2.3 Kheto Nxumalo Agricultural High School Farm

The Kheto Nxumalo Agricultural High School has its own farm that is used by students to do practical agriculture. The school is situated approximately 500 meters east of Siyandhani village. The school is also supplied by pipeline C. In February 2007 there were three points at the farm, which had no taps but a pipe on the ground. Local people had to use the small pipe on the ground to collect water. The local people have been using this source for some time but in February 2007 the school principal stopped people collecting water from this source because he complained that some of the people were vandalising the pipes. The principal closed the gates so that people from Siyandhani village could not access this water source.

Community members pleaded with the principal to allow them to collect water. One community member who is employed by DWAF installed taps at the three points so that people could access water easily towards the end of February 2007. After the

installation of the taps community members were allowed back in to access the water in these taps.

It takes 15 minutes for those people who live close to the school (eastern village section) to walk to the source, collect the purified water from this source, and go back home, and it can take up to four hours for those who live far from the source. Water from this source is used for drinking, cooking, washing and bathing. Community members also take their clothes to the school for washing but they are not allowed to wash their clothes inside the farm yard; they are obliged to fill basins and carry them outside the school perimeter. The people in Siyandhani village are puzzled that the high school seems to always have water when they do not have water in their taps, even though both are supplied by water from the same purification plant at Nsami Dam. This indicates a case of socially constructed scarcity whereby the school gets clean purified water while the village does not.

5.3.2.4 The B4E Pump station

The pump station is located next to the chief's home. The pump station is managed by a pump station operator from the Department of Agriculture. The pump station receives water from the Middle Letaba Canal to supply irrigation water to the B4E irrigation scheme. There is a hose pipe that is connected from the pump station to the chief's house and the community members can access the canal water from this pipe to meet their basic human needs. When the current pump operator (Mr Hlungwani) was stationed at B4E in 1999 the pipe to the chief's household was already connected.

Apart from the safety and health issues of using untreated water for domestic purposes, this is not a reliable water source for the community because of the following reasons:

1. The pump station operator decides when to open and close the pipe connection for local people to collect water. The chief's household is given first priority;

after water collection by the chief's household other people from the village are allowed to collect water from the same pipe.

2. The pump station operator does not work on Saturdays and Sundays and the villagers do not have access to the water from the pump station on these days. Weekends are important for water collection because children are not at school and other members of households are not working.

3. Women have to wake up early in the morning (around 3am) to place their 25 litre water collection containers in a queue at the pump station. The owner of the containers that are first in the row will be the one to get a first chance to collect water when the tap is opened. The tap is usually opened at 6 am and closed at 4.30pm because it is the operators knocking- off time, even though he sleeps in the pump station. When the operator decides to close the tap he does not care whether all people have collected water or not. The pump station operator said that "*Sometimes one person brings 20 collection containers and it happens that my closing time comes before all households have collected water and I close the pipe when the time comes. If I open the water till late, local men complain that I am taking their wives"*.

4. Arguments can lead to closure of the pump station for long periods. There was a time when local people were not allowed to collect water from the source for a period of three weeks because one of the village women had an argument with the pump station operator and he decided to deny local people access to water from the source. Community members at Siyandhani complained about water closures at the pump station. When the pump operator was asked about the fact that the community was denied access to the water he said "*it is true that I closed water and that the community complained to the Department of Agriculture that I am closing water for them. The department told the community members that it is not responsible for household water supply, so it doesn't see any wrong-doing by me*. *Sometimes I close off the water for a week*

because of what the community members say to me". When the water is closed for the village, the chief's household is, however, still allowed to use this water.

Water from the pump station is used at household level for cooking, drinking, washing, bathing and cleaning. The water from the pump station looks clean but it is not potable water because it is not treated but is supplied from the irrigation canal. Mostly this water is subsequently used without any further treatment by the households. The community members mentioned that they used to get water treatment (purification) packs from the Department of Health in the past, but not any more. Members also complained that people are throwing waste such as disposable nappies from adults with HIV into the canal; animals also drink from the canal and local people bath in it upstream from the pump station. Thus, from a health point of view, it is an extremely unsafe source.

5.3.2.5 "A Bobomeni"

There is a pipe line which runs to the north of the village that supplies untreated water from the Middle Letaba Canal to the B4E pump station. The local people have opened this pipeline (via a manhole) in order to access water. The locals call this place "A Bobomeni" (which means a dipping place) because they have to lower their water containers into the pipe to collect water.

During the early hours of the morning the water looks very clean because all the dirt has sank down to the bottom during the night, but after many dips the water changes to a green colour.

This source is used daily as a main water source for those households that are close to the source. Households that use this source are in the section of the village which is known as "A gangeni". One of the women collecting water from this source complained that "*my household drink this water and sometimes I find frogs from the pipeline in my containers for drinking water"*. This source is also used by local women, mainly on Saturdays, to wash clothes because it is difficult for them to carry

a lot of water to their households for washing. One woman who was washing clothes in the shade not far from the pipeline mentioned that "*I always tell people not to wash their clothes too close to the pipeline because the dirty water with soap flows back to the pipeline and that this is the same water that we drink; but they do not listen"*.

The water from this source is also used for bathing by the community members. One lady mentioned that "*when I use water from "A Bobomeni" I am scared that the water might enter my mouth and after bathing with this water I scratch my body a lot because the water is dirty"*.

The households that use the B4E pump station as a water source also use "A Bobomeni" as a water source when they are not allowed to collect water from the pump station. Waiting time to collect water at "A Bobomeni" then increases because all households that use the pump station as their main water supply go to "A Bobomeni". Some people spend up to three hours walking to 'A Bobomeni' collecting water and going back home.

Community members mentioned that sometimes the water level from the pipe can be so low when there are many people collecting water from the source that they are not be able to collect any water. When that happens the people must wait for the water level to go up again so that they can be able to collect water.

The users of this source mentioned that there are often times when they cannot access water from this source. This was confirmed by a field visit on Friday the 16th March 2007, when there was no water at "A Bobomeni"; the locals were of the opinion that this was because the water supply was closed at Ka Magesheni pump station. Sometimes the people cannot access water from this source for one or two weeks when the Middle Letaba canal is being cleaned. On the 9th of May 2007 the people of Siyandhani did not have water from this source; according to field observations, there had been no water since Friday the 4th of May 2007.

5.3.2.6 “Ka Magesheni”

“Ka Magesheni” is a fenced pump station that pumps water for irrigation from the Middle Letaba Canal to the B7 irrigation scheme in Siyandhani village. Water from “Ka Magesheni” is available seven days a week except when the canal is being cleaned.

This source is used daily as a water source, often by the same people who use the “A Bobomeni”, especially those that are close to these sources. People that use this source are in the section of the village which is known as “A gangeni”. A tap has been connected at the irrigation pump station to allow local people to collect water from this source. Local people believe that this water is clean because it is collected from a tap, and they usually drink this water without treating it. “*We drink water from Ka Magesheni because it comes from a tap and because we don’t see all the dirt in the canal. But we cannot drink water from “A Bobomeni” because we see all the things that people do to contaminate the water (washing clothes, bathing, defecation, animals drinking, dirty things thrown in)*”. “Ka Magesheni” is typically used to collect water for drinking, while water for bathing and washing is collected from ‘A bobomeni’, but the water is the same as it all comes directly from the Middle Letaba Canal. Local women who sell food at local schools collect (untreated) water from this source to prepare food to sell to school children.

5.3.2.7 B4E Irrigation Scheme

In parts of the village, people go to the fields on the B4E irrigation scheme to collect water for domestic use. The water is accessed through the in-field irrigation hydrants. The households that are close to the scheme collect water at the scheme in the late afternoon when most of the farmers have gone home.

There is one plot owner at the scheme who allows community members to access water from his hydrant at R10/ per annum. All households who pay the R10 are allowed to collect water for the whole year and there is always a woman at the plot to guard against those who did not pay. The woman is not paid but she is allowed to use

parts of the plot to plant her own crops and irrigate them. Sometimes young boys aged around 10 years miss school because they have to collect water for bathing. Young boys who live close to the scheme are refused access to water because their households did not pay the R10 to collect water. This is what they had to say about their situation "*we usually go to school but today we did not go because there was no water at home and we were told that our households has not paid the R10 to collect water from the plot. That is why we are not allowed to collect water, while other people were collecting water at the plot".*

5.3.2.8 Klein Letaba River

The Klein Letaba River is commonly used for washing clothes and sometimes for drinking water. The households that are situated near the river use this source but they complain that they were used to having water in yard taps or communal taps and now they have to go back to using the river. They say that it is difficult for them to now go back to using the river which they have not used in a long time. *" I had no problem using the river before I was introduced to taps, because the river was the only water source I knew since I was born, but now I have been introduced to something nicer (better and improved water source) which is now taken away from me".* This source is not reliable all year round. In winter the river is normally dry since there are no rains and can also be dry during summer since Giyani is a low rainfall area. The river is normally used for washing clothes and for bathing.

5.3.2.9 Water Vendors

If people do not want to use water from the canal they often have to buy water from water vendors. The water vendors are local men who have cars. The water vendors collect empty water containers from the different households that want to buy water and go and fill the containers with water and return the containers with water to the owners for payment. Households give as many as fifteen empty 25 litres containers to water vendors.

The water vendors collect water from Mapuve purification plant, or Giyani Central Business District, or Kheto Nxumalo agricultural high school, or from 'A Bobomeni' and also from the irrigation fields in the irrigation scheme. Local people can tell whether the water is treated or raw by the price of the water that they pay: R2 per 25 litres for untreated water, and R3 per 25 litres for purified water.

5.3.2.10 Households with own boreholes

There are households in the village that have their own boreholes. These households sell groundwater at R1 for 25 litres. Water is only available, however, when these households have electricity to pump the water.

There is also a project named Hluvukani Fence Making Project, an income-generating project for the blind. This project has its own building and a borehole. The project also sells water at R1 for 25 litres to the local people.

The water from the boreholes is very salty, but otherwise appears to be relatively clean. One woman who uses borehole water says that "*when I use borehole water to bath I have to use powder soap because when I use bath soap I do not become clean*".

5.3.3 Water use at household level

This section scales down to household level and considers issues such as choice of water sources; water availability; water collection; water use per household; productive use of water at household level; and the level of service by the local municipality.

5.3.3.1 Household water sources

Respondents were asked about the main water sources for their household, and the distance to the sources (walking time in minutes).

Different households in the villages use different sources, as outlined above, and each household has more than one water source it could access. People spend between five minutes and six hours to collect water from these sources. The time includes walking from home to the water source; waiting for water, time spent collecting water, and time spent walking back home. Accessing other people's taps had the highest maximum walking time (360 min) with an average walking time of 130 min, followed by the Kheto Nxumalo High School water source with maximum time of (300 min) and average of 170 minutes. The walking time to source (in minutes) is affected by the household's proximity to the source, the number of people at the source collecting water, and the water pressure at the source. Other people's taps has the highest maximum (360 min) walking time because these taps are in the village and when water is available at these households the word spreads fast and many people take their water collection containers to queue for water with a very low pressure, thereby increasing waiting time.

Kheto Nxumalo High School water source has the second highest maximum walking time (300 min) because the school is a few kilometres away from the village. People are willing to walk that long because the water from this source is purified and the water is always available. Even in times when the few households that access water from their taps cannot do so, the water from Kheto is available and most people go there to collect water. Even water vendors collect water with cars full of water containers from here, and this increase the waiting time for water collection. The B4E pump station water source has the lowest minimum (5 min) and maximum (60 min) walking times. The Table below gives detailed information on water sources.

Table 29: Household water sources and walking time to source

Source	Water supplied from?	No of houses using source	Average walking time (minutes)	Minimum walking time (minutes)	Maximum walking time (minutes)
'A Bobomeni'	Middle Letaba Canal	9	55	30	180
B4E pump station	Middle Letaba Canal	5	37	5	60
B4E scheme	Middle Letaba Canal	5	132	60	240
'Ka Magesheni'	Middle Letaba Canal	3	60	60	60
Kheto High School	Nsami Dam purification plant	8	170	45	300
Siyandhani Primary School	Nsami Dam purification plant	3	20	15	30
Yard taps	Nsami Dam purification plant	3	-	-	-
Other people's taps	Nsami Dam purification plant	15	130	15	360
Hluvukani Project	Borehole	2	22.5	15	30
Water vendors	Nsami Dam purification plant, Mapuve purification plant, and Middle Letaba Canal	14	-	-	-

Respondents were asked if there were water sources that they cannot access in the village. Ten respondents mentioned that they cannot access other people's taps because gates are locked.

5.3.3.2 Water collection

The respondents were asked who collects water within the household, how much water is collected, how often the water is collected, and walking time to sources.

Water is always collected in 25 litre plastic containers and carried back to the household either by hand, wheel barrow or by motorised transport. The 25 studied households had a population of 159, and 39% of the population collect water from time to time: 81% of those that collect water regularly are females and 19% are males. Most (64%) of the males that collect water are aged between 0-14 years. The 0-14 age group typically collect water during weekends when they are not going to school.

The Table below indicates the number of people collecting water in different age groups; average, minimum and maximum water collected by each age group; how often the water is collected on average by each age group; and average, minimum and maximum walking time to source in minutes.

The 15-24 age group has the highest number of people collecting water; and households that have their water collected by people in this age group also have the highest average volume of water collected.

The amount of water collected for all collectors is between 20 and 225 litres. The 225 litres of water is typically collected by one person that goes to the source three times a day, collecting 75 litres every time.

Most people collect water every day, with the exception of the 50-64 and 65-79 age group which collects water 0.8 times a day and 0.1 times a day respectively. The older people are not generally the main water collectors in the households, however, which explain why they collect water so infrequently. The highest average daily number of trip for water collection in Siyandhani is 1.45 per household.

Table 30: Who collects water, how much water is collected, how often and distance to source

Age group	No of people	%	Average water collected (litres)	Minimum water collected (litres)	Maximum water collected (litres)	Times a day (average)	Average walking and collection time to source (minutes)	Minimum walking and collection time (minutes)	Maximum walking and collection time (minutes)
0-14	11	16	62.5	25	100	0.5	84	30	300
15-24	23	37	83.3	50	150	0.8	84	30	180
25-34	13	21	98.1	75	225	1.4	88	30	240
35-49	10	16	80.0	50	100	1.1	135	30	300
50-64	4	6	62.5	25	100	0.8	41	15	60
65-79	2	3	35.0	20	50	0.1	22	30	60
TOTAL	63	100							

Respondents were asked if the amount of water collected varied seasonally, and how and why it varied.

Twenty two households (87%) out of the 25 interviewed mentioned that the amount of water collected for domestic purposes varies seasonally, and the rest said there was no difference in the amount of water collected between seasons. Some respondents mentioned that they collected less water in summer, while other said that more water is collected in summer.

Different reasons were mentioned as to why water collection varies. Ten (46%) of households said they collect less water in summer (the rainy season) because they harvest rain water at their homes (see Table below). Rain water harvesting is possible for the people who own houses that have gutters and a bit of a challenge for households that live in huts without gutters, hence the low number of households that harvest rain water. Rain water is collected from roofs using 100 litre containers for domestic uses.

Table 31: Water collection seasonally

Does collection vary seasonally?	No of households	%	How does collection vary?	No of households	%	Why does collection vary?	No of households	%
Yes	22	87	Less water collected in summer	16	73	More water collected because more is used in summer	2	9
No	3	23	More water collected in summer	5	23	Cannot harvest rain water in winter because there is no rain, so more water is collected in winter	1	4
			More water collected in winter	1	4	Collect less in summer because rain water is harvested	10	46
						Collect less in summer because it is too hot	2	9
						Collect more in summer because they bath twice a day	2	9
						Collect less water is summer because they get water from their yard taps when it rains	5	23

5.3.3.3 Water availability at household level

Respondents were asked if they always have water for domestic use in their households from their main source, the reasons, if any, for not having water and the number of days that they were without water in their households in the past three months. Respondents were also asked what they do in order to have water in their households, how much they spend to buy water, where the money they use to buy water comes from, and what they would do with the money if they were not buying water.

Most (88%) of the households mentioned that in the past three months, they did not have water for domestic use in their households sometimes. The Table below shows why households do not have water for domestic use and the total number of days without water over the last three months, averaged for the group concerned and a complete range from the shortest time any household in the group was without water to the longest.

Table 32: Reasons for not having water and number of days without water

Reason for lack of water	Number of households	(%)	Days without water (Range)	Average no of days in the past three months
Locked gates	1	4.5	2	2
Lots of people at source	1	4.5	7	7
No container to store water	4	18	1-7	5
No water from source	11	50	1-30	11.1
Source is too far	3	14	7-30	14.5
Did not collect water	2	9	1-30	15.5
TOTAL	**22**	**100**		

The reasons for lack of water included no water from source, no container to store water and too great a distance to the source. The number of days without water from source ranged from two to thirty.

If there is no water from the main sources, household members must do something else in order to have water in their households. The things that households do to access water include buying water from water vendors or from Hluvukani project. Other respondents mentioned that they do nothing to have water in their households. Most respondents (60%) buy water from water vendors if their main source is not available (see Table below for household members' options to access water). Only three households had option two and this included buying water from the Hluvukani Project, collecting water from Kheto school, and collecting water from the Klein Letaba River, while their first option for all the three households was buying water from water vendors.

Table 33: What households do if there is no water from main source?

Option 1			Option 2	
What households do to have water	**No of Households**	**Percentage (%)**	**No of Households**	**Percentage (%)**
Buy water from water vendors	15	60	1	25
Buy water from Households with boreholes	4	16		
Buy water from Hluvukani Project	5	20	1	25
Collect at Kheto School			1	25
Collect at Klein Letaba River			1	25
Nothing	1	4		
Total	**25**	**100**	**4**	**100**

As indicated in the above Table, 24 households buy water from either water vendors with cars, Hluvukani project or households that have boreholes if water is not available from their preferred (primary) source. On average, households spend R8.26, a day to buy water if there is no water from their main source: with a minimum of R1 and a maximum of R36 per day. Forty-two percent of households use wages to buy water, 13% use money from the old age grant, 16% use money from the child support grant, 21% use money from other sources which include sale of cool drinks, selling at local school, sale of firewood, and the remaining 8% use remittances to buy water.

Money for water comes out of funds that would otherwise be used for food and other essentials. About 18% of the households indicated that they would buy bread with the money they use to buy water, 60% said they would buy other food, 9% would buy soap and other household items, 4.3% would use the money for school fees, 4.3% would buy things that they could sell to earn some income, and the remaining 4.3% would buy cement to make bricks to complete building a house.

5.3.3.4 Water use at household level

The term water use here refers to the amount of water required to meet a specific need or to accomplish a specific task. Respondents were asked how much water does

the household actually use per day, what is the water used for, how much is used and how often water is used, irrespective of the water source.

Estimate of water used per day by households included water used for laundry, bathing, drinking, cooking, house cleaning, and washing household utensils. Most of the households cook once a day, with a few cooking twice a day.

Laundry is often done just once a week, so the amount of water used weekly was divided by seven to get an amount for daily use. Only thirteen respondents were able to tell how much water they use for laundry; the rest could not tell how much water they use for laundry because they do it at "A bobomeni" and others at Klein Letaba River - because it is much easier for them to take laundry to the source than to carry home large amounts of water. Laundry at source does not consume a lot of water as noted by Boelee *et al* (2007), but may damage irrigation infrastructure and could influence water quality downstream. After washing, the clean wet clothes are then taken home and hung to dry.

Actual water use by households per day for different activities ranged from 2 litres to 250 litres, with an average of 201 litres. On average households use approximately 19 litres for cooking, 23 litres for laundry, 87 litres for bathing morning and evening, 9 litres for house cleaning, 18 litres for washing household utensils, 30 litres for washing household utensils and cooking, and 15 litres for drinking.

Using an average household size of six people and average water use of 201 litres per day, this shows that on average each household member uses 33.5 litres a day, which is slightly above the minimum RDP standard of 25 lpcd. The standard is met in terms of quantity but not quality and accessibility because these people are mostly using dirty irrigation water collected more than 250 m from their homes.

Table 34: Water use per household per day

Domestic use	Average water use (litres)	Minimum water used (litres)	Maximum water used (litres)	Times a day (average)
Cooking	18.7	2	50	1.1
Laundry	22.8	10.7	40	1
Bathing	87.4	25	200	1.8
House cleaning	8.8	1	25	0.7
Washing household utensils	18.3	10	25	1
Cooking & washing household utensils	30.5	25	60	1
Drinking	14.7	2	25	3.5

5.3.3.5 Use of water from the Middle Letaba Canal

Respondents were asked whether they used water from the Middle Letaba Canal, what it is used for, whether they treat the water before drinking it, and whether anyone in the household has suffered from diarrhoea, cholera or bilharzia in the past three months. The use of irrigation water for domestic and other purposes depends on the availability of water from other sources e.g. yard and communal taps. Canal water drawn from "A Bobomeni", "Ka Magesheni", B4E pump station, and B4E irrigation scheme, is used for laundry, bathing, drinking, cooking, house cleaning, washing household utensils, and laundry. The Table below indicates the activities that are undertaken by different households using water from the canal. A total of 17 households (68%) admitted to using use canal water within the home for laundry, cooking, drinking, bathing, house cleaning and washing household utensils within the past year.

Only eight households indicated that they drank water from the canal in the past year, but from the focus group discussions it was gathered that most people drink water from the canal but they are just ashamed it because the water is so dirty. It was found that 62% of the households that drink water from the canal do not treat the water before drinking it, and 38% boil the water before drinking. One of the respondents said that "*we are tired of boiling the water everyday; we just drink it as it is*".

One would expect this village to have lots of water-washed[17] and water-borne diseases. Only two households reported having someone in the house who suffered from diarrhoea, and two households reported bilharzia in the past three months. The study, however, did not go into detail on issues of health and illness, and it could be that such illnesses are seasonal or periodic. Dirty water results in high costs to families, communities and governments in the form of direct medical expenses, lost work time, lost education, lost economic productivity of sick workers, therefore contributing to household and community poverty (Calaguas, 1999). Unsafe dirty water is the major cause of water-related diseases that kill up to 5 million people annually (Calaguas, 1999).

Diarrhoea can be water-borne, through drinking contaminated water or via food (Boelee *et al*, 2007). Transmission within the household takes place when there is not enough water for people to wash their hands after defecation and before preparing food. Howard and Bartram (2003) argue that while the consumption of untreated surface water poses certain risks to human health, the higher availability of water (even if untreated) through the presence of irrigation systems may actually improve health. Dense networks of irrigation canals bring water closer to the people and make it easily accessible and often guarantee a reliable supply throughout the year, as is the case in Siyandhani. A study by Van der Hoek *et al* (as cited in Boelee *et al* 2007*)* in Pakistan found that the storage of irrigation water increased household water use and led to fewer cases of diarrhea.

5.3.3.6 Productive use of domestic water at household level

Respondents were asked what other uses of water, other than washing, cooking, bathing, cleaning and drinking, they undertake, how much water is used for these

[17] Water washed diseases are caused by water scarcity where people cannot wash themselves, their clothes or home regularly. They include scabies, skin sepsis, yaws, leprosy, trachoma and conjunctivitis.

activities and how often. These activities make use of either water from the irrigation system or purified water from Nsami Dam. Irrigation agriculture is excluded from this section because it will be dealt with in a separate chapter, but other water use activities such as garden production and commercial purposes, as distinguished by Boelee *et al* (2007), and other uses are included.

Only seven households undertake productive activities using water within their homestead. Some of the households undertook two productive activities e.g. three of the four households who made ice blocks for sale also made guava juice. Other productive activities included livestock watering, cooking maize porridge and meat for sale at local schools, vegetable gardening and brick making (see Table below).

Table 35: Productive water use at household level

Productive use	No of households	Average water use (litres)	Minimum water used (litres)	Maximum water used (litres)	Times a day (average)
Ice making	4	8.1	5	12.5	0.5
Juice making	3	14.2	10	20	0.6
Livestock watering	1	225	225	225	1
Porridge and meat	2	22.5	20	25	1
Vegetable garden	1	75	75	75	1
Brick making	1	300	300	300	1

The other eighteen households had not undertaken productive water use within the past 12 months. Households had various reasons why they don't use water for productive activities. Sixty-six percent mentioned that they don't use water for productive purposes because there is lack of water in the village and they can only manage to collect water for meeting basic human needs. Five percent said they have no time to do other things but collect water for household use, 11% said that they have no interest in using water for productive purposes, 27% said they lack funds to use water productively, and 5% said that there are already too many businesses in the village.

When asked what activities they would undertake should water be available, many respondents reported that they could use water productively. The Table below indicates some of the activities that could be undertaken if water was available. About 69% of household members wanted to improve their food security through vegetable gardening.

Table 36: Productive activities that could be undertaken at household level

Activity	No of households that would undertake activity	Percentage (%)
Ice blocks and juice	2	11
Vetkoek (dumplings) and fish	1	2
Vegetable garden	13	69
Beer making	1	5
Brick making	1	5
Porridge and meat	1	5
TOTAL	19	100

5.3.3.7 Level of service for domestic water since 1994

Respondents were asked whether they thought water supply has changed since 1994, what they thought government (at all levels) should be doing to improve water supply in the village, and how they perceive the quality of the water service provided by Greater Giyani Municipality.

Eighty four percent (84%) of the respondents were of the opinion that domestic water supply was worse in 2007 than it was in 1994; 12% stated there has been no improvement and only 4% reported that there had been some improvement in domestic water supply in the village.

Respondents made suggestions for improving the water supply in the village and some respondents were able to give more than one suggestion. Other respondents said they don't know why they were not getting water and so found it difficult to them to make any suggestions.

Table 37: Suggestion to improve water availability and quality

Suggestion	Percentage
Replace pipes	8
Install new yard taps	4
Install meters and charge for water	8
'Just give us water'	28
Go back to centralised domestic water supply system	8
Local councillor must inform DWAF about water problems	4
Inform the person who operates the water purification plant	4
Use boreholes to supply us with water	8
Water should be supplied for at least one hour everyday from our yard taps	4
No suggestion	24

When asked how they rated the municipal service in terms of water supply, 96% of the respondents mentioned that the service that they get from the municipality was not good because they didn't have water. This is what some of the respondents had to say:

- *"The service is bad; we don't know why they don't give us water".*
- *"The service is bad, nothing is changing; we use to get water in 1993 and 1994 and now the water supply is much worse".*
- *"The level of service is very low. It seems like we are going back to the apartheid era where we used to collect water from the rivers".*
- *"We don't see the service because we are thirsty people; we need water everyday for many things but we don't have the water".*
- *"We don't have water and we think our rights are not fulfilled".*

5.4 Conclusion

This chapter provided key findings of the research undertaken at Siyandhani village regarding domestic water allocation and use. The chapter has showed how much

water is allocated to household members at Siyandhani and how the water is used at household level.

The following are the main points that can be drawn from this chapter:

- There is too little clean water reaching the village, due to insufficient supply (or poor management) and/or excessive extractions higher up the pipeline at the Township and Giyani CBD.
- Clean water that reaches the village is unequally distributed. Kheto Nxumalo High School farm always has clean while the households in Siyandhani do not have the clean water.
- DWAF officials have argued (as indicate at the beginning of the chapter) that it was illegal taps in the yard that produced the water shortage in the village. No effort has been made by same officials or local leaders to restore supply to yard/street pipes, to deal with illegal connections, or to maintain the infrastructure. This leads to people using a range of unsafe sources, all of which originate in the irrigation canal.
- The problem of plentiful irrigation water within a situation of general scarcity is not being addressed.
- Officials are actually assisting in providing unclean water to villagers, at the two pump stations, rather than addressing the underlying water problems.

CHAPTER 6: IRRIGATION WATER ALLOCATION AND USE IN LETABA CATCHMENT: THE CASE OF BLOCK 4E (B4E) OF MIDDLE LETABA IRRIGATION SCHEME

The previous chapter provided key findings of the research undertaken at Siyandhani village on domestic water allocation and use. The chapter showed how much water is allocated and how the water is used at household level.

One of the objectives of this study was to investigate the practice of allocation and use of agricultural water. In this chapter the results of a study of block 4E (B4E) of Middle Letaba irrigation scheme are presented. This chapter is divided into eight sections, which cover land allocation and plot holders in B4E scheme, characteristics of farmers, agricultural production, problems and challenges facing farmers, water use, water management institutions, the Revitalization of Smallholder Irrigation Schemes (RESIS) programme in B4E, and assistance from the Department of Agriculture.

The B4E scheme is part of the Middle Letaba irrigation scheme (MLIS). MLIS was originally envisaged to comprise an area of approximately 5,400 ha in three areas, namely: Homu, Hlaneki and Bend (GDAF, 1991:21), and was to be developed in two phases. During the first phase an area of 2,800 hectares (ha) was completed by 1991. The 2,800 ha of the MLIS are distributed as follows: Homu, 240 ha; Hlaneki, 1,200 ha; and Bend, 1,360 ha (GDAF, 1993:12). The Bend component was started in 1985 and completed in 1991. The Bend irrigation scheme is, in turn, divided into ten blocks. Blocks one to seven are located at Mapuve and Siyandhani villages, and blocks eight to ten are located at Xikukwani and Makoxa villages.

6.1 Land allocation and plot holders in B4E scheme

The land at the Bend portion of the MLIS was allocated to local farmers and some was allocated to agri-business companies such as Sapekoe and Anglo-American. Out of a total of 1360 ha at Bend, an area of 255 ha was allocated to Sapekoe and an area

of 345 ha was allocated to Anglo American for short term uses. All these hectares were in B4E.

The two companies left the area several years ago. Sapekoe left in 1987, after which the 225 ha were abandoned, and equipment was stolen at B4E as a result. Anglo American left the area in 1999, leaving behind crops of litchis, mangoes, potatoes, and Lucerne (Shivambu, 2006). Anglo American was employing people from surrounding areas who were retrenched when they left. The Land that was used by Anglo American was then used by Gary Harrison, a white commercial farmer, who leased the land from the government until 2006.

In 2002, Mr M.W Shivambu, who was one of the retrenched employees of Anglo American, and who resides in Siyandhani village, approached chief Siyandhani about the land at the scheme which was not used since 1999 when Anglo American left the area. Mr Shivambu asked the chief if community members could use the land for farming. An announcement was subsequently made by chief Siyandhani that land would be allocated at the scheme and interested people should contact Mr Shivambu. About 18 interested people contacted Mr Shivambu.

Before the plots were allocated, it turned out that certain people had already been involved in fencing portions of block 4E but they were not yet farming there, and these people were given first priority during the allocation of plots. All those who showed interest were temporarily allocated land through the chief and the Department of Agriculture in 2003, but they were not issued with any written proof of their permission to occupy. Five of the new plot holders in B4E had previously been allocated plots in B1 irrigation scheme in Mapuve village. These farmers moved to B4E in 2003 because B1 did not have hydrants for irrigation, because they had been stolen; in addition, their crops were being stolen from their fields at night.

Currently an area of 83.6 hectares has been allocated to 18 plot holders. The Table below indicates that five of the plot holders (28%)are women and the rest are men; one of the plot holders is aged 25-34 years, 10 (55%) are 35-49 years, 6 (33%) are 50-

64 years and one is 70 years. Most of the plot holders have been allocated plots of five hectares with the exception of four[18] plot holders. There is one plot holder who holds a plot in B4E and another 2 ha plot in B4. Approximately half (ten out of 18) of the plot holders are from Siyandhani village and the others are from Giyani Sections A, D, E, and F, Kremetart and Nkuzana village.

Table 38: Profile of plot holders at B4E

Plot No.	Gender of plot holder	Age	Hectares	Home of plot holder
1	M	34	5	Giyani
2	M	45	5	Siyandhani
3	F	44	5	Siyandhani
4	M	57	5	Siyandhani
5	M	44	5	Siyandhani
6	F	52	5	Giyani
7	M	40	5	Siyandhani
8	M	51	5	Siyandhani
9	M	35	5	Giyani
10	M	70	5	Siyandhani
11	F	58	5	Giyani
12	M	36	5	Nkuzana
13	M	55	4.5	Giyani
14	M	56	5	Siyandhani
15	M	45	2.5	Kremetart
16	M	47	3.73	Siyandhani
17	F	39	2.83	Siyandhani
18	F	45	5	Giyani

Some plot holders, mainly those who are not from Siyandhani village, do not work the plots themselves but employ labourers to work on their plots. The employed labourers only plant a few lines of crops. The plot holders employ these labourers so that their plots are kept in use and so are not allocated to other people. Most of the farmers from Giyani Township said they were actively producing at the scheme in 2003 and 2004, but by 2005 they were less interested in farming and some even stopped coming to the field's altogether. Their absence impacts negatively on the other farmers as each plot holder has been given a portion of the fence which they are suppose to fix when the cattle damage it. The absent farmers don't care about fixing

[18] The four plot holders are allocated 2.5, 2.83, 3.73 and 4.5 hectares.

the fence because they have not planted anything and the cattle manage to come into the plots and eat other farmers' crops.

6.2 Characteristics of farmers at B4E

As mentioned before, the researcher intended interviewing all 18 plot holders at the scheme but only 11 farmers[19] could be found at the scheme during the period of data collection. Eleven farmers were thus interviewed by the use of a questionnaire (see Appendix B for a copy of the questionnaire). The researcher made individual appointments with the farmers to interview them at their own plots at the scheme.

The Table below indicates the household composition of the farmers at B4E. The Table indicates that 27% of the respondents were females and 73% were males. The average number of people in households was six with a minimum of three and a maximum of 11 people in a household. Twenty six percent of household members are aged between 0-14, 25% aged between 15-24, 12% aged between 25-34, 12% aged between 35-49, 15% aged between 50-64, 8% aged between 65-79, and 2% aged 80 years and above. The farmer with 2.5 ha of his own is also leasing land from two other plot holders who do not use all land allocated to them. The constitution of B4E irrigation scheme states that before land can be sub-leased to other farmers, the plot holder must first write a letter to the B4E management committee stating how many hectares will be leased and for how long. The farmers that have leased land to the farmer with the 2.5 ha have followed this procedure.

[19] 'Farmers' are understood here as people who are actively engaged in the farming enterprise through investment or direct labour and make decisions related to crop production and marketing. They can be active on their own land or on land where someone else has the right to occupy (Denison and Manona, 2007).

Table 39: Household composition of plot holders

Respondent Gender	Size of land	Total no of people in household	No of people aged 0-14	No of people aged 15-24	No of people aged 25-34	No of people aged 35-49	No of people aged 50-64	No of people aged 65-79	No of people aged 80+
M	5	5	1	1	1		2		
F	4.5	11	2	5	1	1	1	1	
F	5	6	2	1	1		1	1	
M	5	6	2	2		1	1		
M	5	6	1	1	2		1	1	
M	5	7	1	3		2			1
M	5	3	1		1	1			
M	5	4	1	1		1		1	
M	4.5	7	1	1	2	2		1	
M	2.5	6	4				2		
F	5	4	1	1			2		
Total	**51.5**	**65**	**17**	**16**	**8**	**8**	**10**	**5**	**1**

Household income

Respondents were asked about main sources of income coming into their household, but not the precise amounts from each source. Farming is not the only source of income for these farmers. A total of three households had three sources of income (including agriculture) and the rest of the households had two sources of income. The sources of income included wages earned from employment in the public service and from shops and employment in urban areas, child support grants, old age grants, remittances and farming. Household members employed by the public service are employed as a teacher, an agricultural officer, a cleaner and a boiler operator. Farming accounted for (36%) of all sources mentioned; child support grant accounted for 24%; and old age grant accounted for 12%.

The Table below shows the various sources of income and number of earners within each category for 11 households in the survey.

Table 40: Household income

Income source	No of earners / income source
Wages (Government employee and shops)	6
Child support grant	6
Old age grant	3
Remittances	1
Farming	9

6.3 Production at B4E scheme

This section presents findings on agricultural activity at B4E for the agricultural year 2005/2006, including land usage, methods of ploughing, crops grown, crop output, labour usage, agricultural extension services, crop sales and marketing and transportation of produce.

6.3.1 Land usage at Block 4E

The plot holders were asked how much land is allocated to them and how much of their land they had cultivated during the agricultural year running from November 2005 to October 2006. Land usage at the scheme varies considerably between farmers, varying between 0.25 ha and 8.75ha[20] in the period covered by the study (See Table below).

[20] The farmers who plough more land than allocated ploughed the same land twice in one year. See farmer two and eight on the Table below.

Table 41: Area of land cultivated Block 4B 2005/2006 (Ha)

Farmer	Land allocated (ha)	Total land cultivated (ha)
1	5	0.25
2	4.5	6.99
3	5	1
4	5	0.75
5	5	4.5
6	5	2.5
7	5	1.25
8	5	8.75
9	4.5	3.75
10	2.5	4
11	5	0.75
Total	**51.5**	**34.49**

The plot holders were further asked why they don't use all land that has been allocated to them. Thirty one percent of the plot holders said they don't use all land allocated because they do not have a tractor to plough, 19.5% said they don't have money to purchase seeds, fertilizer and chemicals, 12 % said they don't have money to hire a tractor and 6% said they don't have pipes to irrigate (see Table below).

Table 42: Reasons for not using all land allocated

Reason for not using all land allocated	No of farmers	Percentage
Lack of funds for seeds, chemicals and fertilizers	3	19.5
No money to pay labourers	3	19.5
Non-reliability of tractor owner	2	12.0
No tractor to plough	5	31.0
No money to hire a tractor	2	12.0
No pipes to irrigate	1	6.0
Total	**16**	**100.0**

Lack of a tractor to plough is the major problem reported by plot holders. None of the plot holders own a tractor, and so they have to hire one at prices of R400 to R550/ha for ploughing, R300-R350/ha for disking[21] and R300-R350/ha for furrowing.

6.3.2 Methods of ploughing at B4E

At the beginning of the scheme in the mid 1980s ploughing services were provided by the state but the state services in the former homelands of Limpopo province deteriorated dramatically in the early 1990s. Plot-holders were obliged to turn increasingly to the hire of privately-owned tractors which are sometimes unreliable because they do not turn up when they are booked.

Soil preparation by tractor is usually done in three phases: ploughing, disking, and furrowing. Each process is charged for separately by the different providers and plot holders generally use all the three services. Animal traction is forbidden by the management committee of the B4E irrigation scheme. No reason is given for this in the constitution of the B4E irrigation scheme, other than that it a rule of the Department of Agriculture. The unreliability of the hired tractor service was stated as one of the main reasons why all land allocated to the plot-holders was not ploughed. It seemed the demand for tractors is high in the area and there only a few people with tractors. The farmers mentioned that sometimes the tractors break down and there are lengthy delays in effecting repairs.

6.3.3 Crops grown at Scheme

The availability of irrigation water at block 4E has allowed plot-holders on the scheme to extend the range of crops and extend the growing season compared to dry land farmers in other parts of Giyani. In the early 1990s crops such as maize, wheat, tomatoes, groundnuts, okra, wheat, potatoes and dry beans were reportedly grown at the irrigation scheme. Obtaining detailed and accurate information on current crop

[21] Disking is the vertical slicing of ploughed soil by using a tractor attachment of sharply-edged disks. The disks break up clods into smaller pieces.

production and disposal - including areas planted, yields, and sales revenues - presented many practical difficulties. Most farmers do not keep records of production despite the fact that their constitution states that every farmer must keep a record of how much was spent on inputs of production, and how much was made from crop sales. There is very little involvement of extension officers at the scheme so no independent estimates of crop output were available.

Areas of crops planted and harvested at B4E were, however, estimated by individual plot-holders for the purposes of this study. The single most important crop in terms of area planted is maize, the local staple food, which accounts for 53% of the total cultivated area on the irrigation scheme. Following this a group of six crops between them account for around 42% of the production namely onions, pumpkin, okra, tomatoes, beetroot and spinach. Other crops such as Chinese spinach, green pepper, green beans, and cabbage account for small areas (in the range 1-2 % each).

The following section draws together information on the main crops grown at B4E based on plot-holders survey results.

Maize was grown by every plot-holder in the sample that planted a crop. The planting season for maize extends over a lengthy period, running from May to November, and a minority of plot-holders (18%) planted two crops in the year on different land in May/June and again in August/September. Growing time in the cool, dry winter season is longer than in the relatively warm, wet summer months, with the result that the maize harvest is largely concentrated in the period December to March, with small volumes harvested as early as October and as late as April.

All farmers at the scheme make their maize crop available for harvest by customers, as green cobs, and keep the cobs that were not sold for grain. Plot holders in B4E have a comparative advantage over those in dry land areas in the production of early (or winter) maize. Early maize is either sold or consumed within the household, as fresh cobs (green mealies, or *swifaki*), rather than being milled for meal. Later in the season (February onwards), the demand for fresh maize in the area diminishes as the

dry land crop is harvested, and summer maize (*mavele*) is mostly sold or retained for home consumption (as maize meal). Winter maize tends to be grown largely for sale.

Summer is the traditional maize season in the area, when yields are higher and more reliable than in winter. The farmers in B4E mentioned that the demand for *mavele* has declined because people now buy their maize meal from shops and it is economically better for them to sell early fresh cobs. Typical maize meal requirement is in the order of one 80kg bag for a household of six persons. Those who buy *mavele* to make maize meal have to stamp it in the traditional fashion by hand. Small volumes of dry mealies are sold locally for R150 per 80kg bag compared to R80/bag in the mid 1990s as noted by Lahiff (2000) in Tshiombo Irrigation Scheme.

Green mielies are generally sold directly to households within the village, to hawkers who come to the field, and to supermarkets such as SPAR, Boxer and Friendly in Giyani Town. The typical price for the green mielies is R1 per cob.

Tomatoes have been cultivated in Middle Letaba irrigation scheme since the early 1990s, and have over the years become a significant source of income for plot-holders in irrigated land. A large informal market for tomatoes exists. Tomatoes can be grown throughout the year, but most planting occurs between March and June with harvesting concentrated between July and August. Tomatoes sent to the Johannesburg Fresh Produce Market through RSA agents were yielding very low returns, farmers were getting as little as R5 deposited to their bank accounts for the tomatoes possibly on grounds of quality or because the tomatoes were spoiled when delivered to the agent.

Currently, the tomatoes are generally sold directly to households within the village, to hawkers who come to the field, and to supermarkets such as SPAR, Boxer and Friendly in Giyani Town. Better prices are obtained on the formal market, where plum tomatoes sell for R40 per crate.

Spinach is widely grown in B4E and constitutes an important element of the local diet. Spinach is a winter crop in the area and is planted in April to July. Prices for Spinach were reported to be R2.50 per bundle of 20 leaves. The spinach is sold locally to hawkers, supermarkets and households.

Beetroot is also one of the most important crops in terms of area planted. Beetroot is planted in the period April to June and harvested in August to November. The plot-holders extend the planting time to take advantage of the Christmas festive season when the demand for beetroot goes up. The reported price was R3.00 per bunch (four beetroots).

Onions are mainly planted in the period April to June and harvested between August to November. The prices were R2.50 per bunch of four fresh onions and R10 for a 5kg bag. The onions are sold to households within the village, to hawkers who come to the field, and to supermarkets such as SPAR, Boxer and Friendly in Giyani Town.

Pumpkins and okra are grown throughout the year. Pumpkin leaves, which are often dried for later use, constitute an important element of the local vegetable diet. These crops are mainly sold to households within the village and to hawkers who come to the field. The hawkers sell the pumpkin leaves in Giyani town and there is a great demand for this throughout the year.

Other crops

Chinese spinach is a winter crop planted in April to July. It has a short growing season, from sowing to the end of the vegetable stage it takes six weeks for early maturing cultivars and eleven weeks for late maturing cultivars. The marketing of Chinese spinach is controlled by hawkers, especially for those plot holders who do not own a ‘bakkie’ (pick-up truck) to transport the produce.

The hawkers visit the scheme on a daily basis in search of Chinese spinach; they go to different plots and harvest the vegetable themselves and pay the farmers on the

spot. They transport the spinach to their trading places (normally Giyani CBD) using public transport. Practically this means that those who produce this vegetable and do not have their own transport could expect to sell at least a part of their produce without having to actively seek for a market or be concerned about transport. Farmers with their own transport sell their Chinese spinach to supermarkets such as SPAR and Friendly Groceries.

Green peppers and green beans are sold to local supermarkets. Cabbage is grown at a very small scale at the scheme, even though according to Van Averbeke et al (2007), it is the most commonly produced and consumed leafy vegetable among black people in South Africa.

This section has provided an overview of crop production at B4E as a whole and the next section looks at production at household level using information gathered through the farmer survey.

6.3.4 Crop output

The estimation of crop yields at B4E was problematic (as also noted by Lahiff, 2000), for reasons connected with local farming practices. None of the plot holders in the survey kept written records and many were unable to provide precise estimates of past harvest volumes. Most farmers could, however, recall the area planted to various crops, usually in terms of number of hectares. When dealing with harvested volumes, farmers use different units for different crops e.g. bags (80 kg maize meal sack) for dry maize, crates for tomatoes, 2kg buckets for pumpkin leaves and bundles (of various size) for beetroot, spinach, and onions.

Attempts to estimate yields were further complicated by the fact that perishable crops tend to be harvested over a prolonged period, whether for sale or for household consumption. Although crops are divided between household consumption (subsistence) and marketed share (surplus) the exact breakdown between is difficult

to ascertain. Crop quality rarely featured in the discussion of yields, although it influenced the prices that could be obtained by producers.

An attempt has been made to calculate the gross crop income per household on the basis of information provided by the plot-holders, bearing in mind the limitations outlined above. This involved putting a monetary value to each crop produced and sold, over the course of the year on the scheme, based on prevailing farm gate prices at B4E. The gross crop income excludes the value of crops consumed within the household and does not take into account the cost of inputs.

The Table below provides a breakdown of households in the survey according to estimated total gross crops income. The income earned by farmers in the survey for the year 2005/2006 varied enormously from R250 to R25,000 and the mean value per farmer was R5,683. Approximately 36% of farmers earned a gross crop income of less than R2,000 and only two farmers earned a gross income of more than R10,000.

The Table below indicates that the farmers who cultivated more hectares are the ones who have a higher gross income.

Table 43: Estimated gross crop income per farmer, 2005/2006

Crop Value in Rands	No. of farmers	Percentage of farmers	Average land holding	Average land cultivated
0-1999	4	36	5	4.94
2000-4999	3	27	4.2	2.33
5000-9999	2	18	4.75	9.24
10 000+	2	18	4.75	9.38

It was difficult to find out what were the most productive crops (in terms of gross return per hectare) given the widely different yield estimates by growers for the same crop and the difference in area planted per crop. Highest reported returns came from green maize, tomatoes, onions and spinach.

Farmers were asked how they spend the money that they get from the sale of crops. The Table below shows the main category of expenditure for farmers in the sample, with the number of farmers in each category. As shown, 81.8% of the plot holders use the money mainly to buy seeds chemicals and fertilizers, 27.2 % use it mainly to pay labourers, and 18.1% to hire a tractor to plough the fields to be able to plant new crops.

Table 44: Main use of crop income

Use of income from sale of crops	No of farmers	Percentage
Buy seeds, chemicals and fertilizers	9	81.8
Pay labourers	3	27.2
Buy food	3	27.2
Save the money	2	18.1
Hire a tractor	2	18.1
Pay for transportation to and from scheme	1	9.0
Pay school fees	3	27.2
Buy electricity	1	9.0

6.3.5 Hired and household labour

Most farmers, but not all, said that they are assisted on their plot by other members of their household. The number of household members that assisted at the plots ranged from zero to three with an average of 1.5.

The Table below indicates the number of household members that assist in the plot, their gender and tasks that they do. The numbers of people that assist exclude the respondent who, in all cases, is the one that usually does most of the farming activities at the plot.

Table 45: Tasks of household labour

Farmer No	Gender of farmer	No of household members assisting	Male	Female	Planting	Weeding	Irrigating	Harvesting	Management	Fencing
1	**M**	**0**								
2	**F**	**3**	**3**		**x**	**x**				
3	**F**	**2**	**1**	**1**	**x**	**x**	**x**	**x**		
4	**M**	**1**		**1**	**x**	**x**	**x**	**x**		
5	**M**	**3**	**1**	**2**	**x**	**x**		**x**		
6	**M**	**0**								
7	**M**	**1**		**1**		**x**	**x**			
8	**M**	**1**		**1**					**x**	
9	**M**	**2**		**2**				**x**		
10	**M**	**2**	**1**	**1**	**x**	**x**				**x**
11	**F**	**0**								
Total		**15**	**6**	**9**						

All the farmers that were interviewed hire labourers either permanently or seasonally to assist with their farming, in addition to any household members that assist on their plots. Six farmers reported employing one worker at a time, and the highest number employed by a single farmer in the past year was seven. A total of 12 labourers are employed permanently by the farmers. Three of these workers are paid R400 a month, seven are paid R360 a month and two are paid R300 a month. At least 15 seasonal workers are employed and they are paid R20 a day.

Most of the labourers at B4E are Shangaan-speaking Mozambicans, and one farmer reported hiring labourers from Zimbabwe. None of the workers had their own land in the irrigation scheme but they had land for residential purposes in the village and the neighbouring village of Mapuve. One of the labourers mentioned that the money that he was getting can only buy him an 80 kg bag of maize meal per month. The hired labourers carry out the most labour-intensive tasks such as planting, irrigation, weeding and harvesting. No reliable statistics are available for agricultural wage rates in Limpopo province but, in 2003, Nkuzi (2003) found that farm wages in Limpopo fall in the range of R100-R300 per month. The wages paid at B4E are far below the

legal minimum wage for farm workers. In 2006, the minimum wage for farm workers in rural areas was R885 per month and R994 in urban areas, and expected to increase to R989 for rural and R1,041 for urban farms in 2007 (Department of Labour, 2006). There would appear to be little awareness of the statutory provisions for minimum wages among either employers or workers at Siyandhani, and no monitoring or enforcement by the Department of Labour.

6.3.6 Agricultural extension service

The Department of Agriculture appoints agricultural officers to advise farmers on aspects of crop production, both in their fields and through organised sessions when specific topics such as use of fertilizer, pest control are discussed. The farmers in this survey were asked to evaluate the extension service, in terms of training and information they receive from the extension officer and whether they are satisfied with the services that they receive. Opinions in this area were varied. Six farmers said they had received training on what crops to plant at what time and what fertilizers and chemicals to apply to the crops. One farmer said that 'farmer days' were organised for them from time to time and different agricultural issues were discussed on these occasions.

Overall, more than half of the plot-holders in the survey (54%) pronounced themselves dissatisfied with the extension services that they receive from the agricultural officer. The most common source of dissatisfaction was that the officer did not visit the plots on a regular basis, which is similar to the findings by Lahiff (2000) in Tshiombo irrigation scheme in the mid 1990s. This is what the farmers had to say about the agricultural officer and the services:

- *"In 2003 we had an extension officer that was good and he was giving us good advice about farming. He left in 2006 and we were allocated a new extension officer in the same year, but we only see him once in a while; he can take up to three months without coming to us and we don't get any service from him".*

- *"The extension officer used to train us up to 2005, but nothing happened in 2006 after he left".*

- *"I have not received any assistance or advice since I started using this plot in the beginning of 2006".*

- *"I have never seen the extension officer in my plot".*

6.3.7 Crop sales and marketing

All the plot-holders at B4E sell some portion of their agricultural produce every year and relatively little is reserved for household consumption. Crop sales are through informal and formal channels in the form of direct sales to the public in and around Siyandhani, to traders who visit the plots and to supermarkets such as SPAR, Friendly and Boxer in Giyani. Other traders collect the produce from the plot holders' homes because it is a distance for them to walk to the scheme. The most important destination for marketed produce from B4E is the Bend shopping complex, whether brought there by producers themselves or by merchants.

Informal crop-marketing takes a number of forms. It involves carrying small volumes, on the head or in wheel barrows for sale to neighbours and to hawkers. Hawkers, who are generally women, also go to the scheme to buy as much as they can carry and take it to Giyani CBD for sale to the public. Plot holders with their own vehicle, or the means to hire one, transport produce to the Giyani CBD, for sale to hawkers or directly to the public or supermarkets and to social grant pay points. Taxis are also used to carry produce from the plot to the plot-holders homes by those that do not live in Siyandhani village.

The most important crops marketed at B4E (in terms of value) are green mealies, tomatoes, onions, beetroot, spinach, okra and pumpkin. Other crops grown largely for sale, but on a smaller scale, include green beans, green pepper, cabbage and china

spinach. The farmers at B4E are not different from other smallholder farmers, where the problem of market access is linked to price risk and uncertainty, inability to meet standards, physical market access like physical infrastructure such as roads, market facilities (Magingxa & Kamara, 2003). In the past few years, the farmers tried sending their fresh produce to the Johannesburg Fresh Produce Market through Premium Trucking, to be traded by a market agent. The market is approximately 520 km away from the scheme and the Premium Trucking depot is approximately 110 km away. These farmers were getting as little as R5 deposited into their bank accounts after the transport and agent costs are deducted, which caused them to stop sending produce to this market. More recently, the farmers at B4E have been in the process of forming a cooperative, which they hope will assist them with marketing their crops.

6.4 Problems and challenges facing the farmers at B4E

Farmers were asked what problems or challenges they were facing. The problems or challenges mentioned by the farmers included the following:

1. Fencing: the poles that are used to hold the fence at the scheme are not steel. Farmers just cut branches from trees to hold the fence and it is easy for cattle to damage the fence and get into the scheme;
2. Lack of a tractor;
3. Lack of funds to purchase good quality seeds, fertilizers and pesticides;
4. Irrigation infrastructure: some farmers said that they don't have pipes to irrigate;
5. Theft: community members go to the fields to collect water when the farmers have gone home and they steal some of the crops. Some of the hired labourers also steal other people's crops;[22]
6. Lack of participation by farmers who do not go to the fields;
7. Low crop output;

[22] There was a case in August 2007 where a labourer was found by another farmer stealing mielies from his plot, who demanded that the employer of the labourer fire him. The labourer was said to be stealing in order to sell to the local people and it was confirmed by other community members that he had been doing it for sometime.

8. Natural disasters such as floods, droughts, and heat.

Plot holders at B4E are farming under very difficult circumstances. The plot holders would benefit from assistance by the state and private sector agents in the supply of agricultural services. The challenge of lack of a tractor could be solved more effectively through partnership with private owners and farmers themselves.

6.5 Agricultural differentiation

There were some differences between the farmers at B4E but no single factor or set of factors explains the wide differentials in the value of crop output found amongst farmers in the survey sample, although type (and area) of crops, source of income of producers and the sex of plot holders appeared to play a part.

Plot holders with high crop output tended to concentrate on high value crops such as tomatoes and green maize, and to plant larger areas of each crop, typically from half a hectare upwards. Small producers tended to produce just as wide a range of crops as larger producers, but on a small piece of land. Typically, one hectare of land would be planted with more than four crops. Amongst the top six producers, three of the farmers earned off-farm wages themselves as an additional source of income and they were using some of their income for farming.

The Table below summarises information on key aspects of agricultural production for six plot-holders with crop output worth at least R4, 000 for the year in question.

Table 46: Top six crop producers

Respondent No.	1	2	4	5	8	9
Land Holding (Ha)	5	4.5	5	5	5	4.5
Age of Plot holder	55	52	51	70	49	47
Off-farm income (per month)	2,000+	5,000+	0	1,830[23]	6,000+	1,190
Household size (persons)	5	11	6	6	4	7
Labour employed (no. of workers)	1	2	1	6	7	1
Main crops by value	Onion, green maize, green beans	Okra, tomato, green and dry maize	Beetroot, green pepper, spinach	Green and dry maize, tomato, spinach	Spinach, tomato, green maize	Green maize, beetroot, spinach
Crop income (annual) R	4,140	9,295	4,688	6,650	20,000+	12,200

Most of the six plot-holders shown here concentrated on the production of either maize (summer and winter), tomatoes or spinach, with smaller areas planted to green beans, okra, onion, green pepper and beetroot. Only two of the larger six producers had access to less than 5 ha of land (4.5 ha). All but one plot-holder in this group were men and four of the six were effectively full-time farmers, although No. 5 was also in receipt of a pension. Two of the farmers that are not full-time are full-time employees of government: one is employed as a teacher at the local school and the other one is an agricultural officer at the Department of Agriculture in Giyani, making them the highest earning household in the sample in terms of off-farm income. All farmers except farmer No. 4 had a source of off-farm income earned by the actual plot holder's themselves.

Farmers in this group varied considerably in terms of their household size, ranging from four to eleven persons, but size did not appear to relate directly to the scale of crop output. Of greater importance was the role of hired labour. The largest producer of crops - No. 8 - employed seven full-time workers all year round, while No. 5 employed one permanent worker and five seasonal workers for various periods during

[23] The figure R 1, 830 is due to two persons with state old age pensions, which paid the amount of R820 per month, and one person with child support grant which paid R190 a month in 2006.

the year. No. 2 employed one permanent worker and one seasonal worker during the year. In the case of producer No. 9, the majority of labour was supplied by household members. Farmer No.1 does not get any assistance from household members and relies on hired labour for various periods during the year. This farmer is based in Giyani section E and it is a not easy for his household members to assist him.

All six farmers depended on hired tractors for ploughing. In terms of forward and backward linkages to agricultural markets, four out of the six farmers differed from the majority of the farmers in the sample because they owned their own vehicles and all combined a range of strategies to dispose of their produce. The largest producer (No. 8) does not sell produce to hawkers and people who come to the field but mainly sells to supermarkets around Giyani. All farmers in the top group used purchased seed, fertilizer and pesticides in varying quantities and travelled to specialist suppliers located in Tzaneen and Mooketsi for their seeds and seedlings while small producers tended to be more dependent on retained seeds. The example of these large producers and the rest of the findings presented in this section provide some indication of the range of agricultural activities on the B4E irrigation scheme.

6.6 Water use at B4E

This section looks at water supply and water use at the scheme. It covers sources of water for irrigation, water allocation, and irrigation systems used.

6.6.1 Water Supply at Block 4E

Water used for irrigation in the scheme is supplied from the Middle Letaba Dam (MLD), through the Middle Letaba Canal (MLC). There is a pump station at B4E that is supposed to pump water from the MLC to the B4E irrigation fields. The supply of water from the dam to the pump station is the responsibility of the Department of Water Affairs and Forestry (DWAF) while the Department of Agriculture (DoA) was responsible for pumping the water to the fields.

The B4E pump station is managed by the DoA which has employed a pump station operator since the scheme started. The pump station has not been operating since 2000, however, when the electricity was cut off because the DoA stopped paying the bill. According to Mr Shivambu, who is one of the farmers at B4E, the pump station now has an outstanding bill of approximately R30,000 which the farmers were told they would have to pay before the supply of electricity can be restored. The lack of electricity reduces the amount of water that is supplied to the farmers in B4E scheme, but farmers continue to have access to as much water as they need via the pipeline even without pumping because the demand of water is low due to low production. The pump was only necessary in the 1990s when Anglo American and Sapekoe were producing intensively. The farmers are continuing to irrigate without a pump because water demand is low, one farmer said that "*we have a lot of water and do not need a pump at the moment because water usage is low and not all of us have sprinklers, most farmers are using furrow irrigation*".

There are times when farmers do not have water for irrigation when there is a burst pipe. The farmers mentioned that this happens frequently because the pipes are old. They mentioned that sometimes they can go without irrigation water for two weeks while the department of Agriculture is fixing the pipes. There are also times when water is cut off at the canal and the farmers say that they do not know who cuts the water off because when DWAF has to clean the canal, they always inform the farmers in advance. When the canal is being cleaned the farmers do not get water for a week and they do not have tanks to store irrigation water for use during the time when the canal is closed.

6.6.2 Water allocation

There is no formal system of water allocation at scheme level and there are no meters in the fields to measure the amount of water used by individual farmers. The farmers irrigate their fields anytime they want, depending on whether the soil is dry or not. Since the farmers were allocated plots in 2003, they have not been paying any irrigation charges.

6.6.3 Irrigation systems

Every five hectares in the scheme is fitted with four hydrants, and each hydrant can irrigate approximately 1.5 ha of crop land. The hydrants are supplied by the Department of Agriculture and farmers have to buy their own in-field sprinklers. Current irrigation methods used by farmers are furrow (36%) and sprinkler (64%). Only three farmers use a combination of the two irrigation methods.

6.7 Water management institutions

The National Water Act (NWA) recognises the need to establish suitable water management institutions (WMIs) in order to achieve its objectives. The purpose of establishing WMIs is to delegate water resource management to regional or catchment level and to involve local communities, within the framework of the National Water Resource Strategy (NWRS). The Act defines a WMI as a Catchment Management Agency (CMA), a water user association (WUA), a body responsible for international water management or any person who fulfils the function of a water management institution in terms of the Act.

Farmers were asked what are the institutions involved in water management in the area, if there is a water user association (WUA) in the area, if they were involved in the formation of the WUA, if they are members of the WUA, what are the benefits of the WUA, whether they are aware of any water management legislation in South Africa, whether they are aware that a CMA will have to be formed and whether they are involved in the process of the formation of the CMA.

It was apparent that farmers did not understand what a water management institution (WMI) was in terms of the definition of the NWA. When asked about water management institutions farmers mentioned institutions such as the Middle Letaba WUA, Siyandhani farmers association, the Department of Water Affairs and Forestry,

Department of Agriculture, local government, and the B4E scheme management committee. These institutions will be discussed in more detail below.

Approximately 63% of the farmers were of the opinion that a WUA existed in the area, and 37% said that they are not sure. Only three farmers (27%) mentioned that they were involved in the formation of the Middle Letaba WUA and the rest of the farmers were not. The farmers who said they were involved in the formation of the WUA are farmers that have been selected as representatives of the B4E farmers in 2005, when officials from DWAF came to explain about the formation of the WUA.

Two farmers (18%) mentioned that they were members of the WUA and the rest said they are not members. Only one farmer mentioned a benefit from the WUA: she said that the WUA cleans the canal. This statement is an indication that the farmer is confusing the WUA with DWAF because DWAF is responsible for the maintenance of the Middle Letaba Canal.

None of the farmers in B4E are aware of any water management legislation in South Africa. When asked about the legislation for water management in South Africa, some farmers said that they only know about DWAF.

None of the farmers at B4E knew what a CMA was or were aware of the process of forming a CMA. The farmers mentioned that local leaders do not play any role in the management of water. There are no local informal groups/ associations which are formed for the purpose of managing allocation, distribution or storage of water.

The farmers were also asked about the benefits of being a member of the Siyandhani Farmers Association. Six of the farmers did not mention any benefits from the Siyandhani Farmers Association. One farmer was not sure what the benefits were. One farmer said that a benefit of the SFA was that it used to supply the tractor for ploughing at a reduced rate. Members of the association only paid R300/ha for ploughing, and non members were paying R400/ha. This farmer had this to say about the tractor *"We (as SFA) bought a starter for R10,000 to fix a tractor that belonged*

to government, when no one was using it. When the tractor was fixed the Department of Agriculture brought someone to operate the tractor; we used the tractor for sometime until one of the extension officers from DoA took the tractor away and left us with nothing".

Two farmers said that the SFA assists them to access funds by writing letters to the banks and other financial institutions confirming their membership of the association, and one farmer said that the association informs the farmers about government programs that exist to help farmers like them.

6.8 The RESIS programme in B4E

The B4E irrigation scheme was one of the schemes selected to be part of the Revitalization of Smallholder Irrigation Schemes (RESIS) undertaken by the Department of Agriculture in Limpopo Province. Two private companies, LDVA and Nyeleti Consulting Engineers, were appointed to help revitalize the Siyandhani B4E scheme in June 2005 (Shivambu,2006 and Baloyi, 2007). On the 1st of June 2006, Irricon consultants replaced Nyeleti Consulting Engineers as the consultants for the revitalization of the scheme (Baloyi, 2007). During a field visit in January 2006 the farmers mentioned that they were informed about RESIS sometime in 2005, but nothing had happened since then. In another field visit in February 2007 (a year after the first visit) the RESIS programme had not started in B4E and the farmers said they were tired of hearing about the Department's promises.

A DoA official from Polokwane made a presentation about the RESIS programme to the B4E farmers in March 2007. He stated that through the RESIS programme, the underground pipes supplying water at the scheme and from the canal to the scheme would be repaired, the scheme would be fenced, and the plots will be used to plough different crops to what farmers were ploughing before the RESIS programme. The farmers at B4E were not part of the development of the proposal for the revitalization of B4E and do not understand how they will be operating after the RESIS programme.

In April 2007, the farmers at Siyandhani were told that the RESIS programme would be starting at B4E some time in May or June. The farmers were told to stop production from May and that who ever plant crops would be doing so at their own risk because, when the RESIS Programme started, all the crops in the fields would be destroyed. Many farmers had concerns about the RESIS programme, but they were told that they must not ask too many questions because if they do the programme will be taken to another scheme. Different farmers reacted differently to the message: some farmers stopped production completely; others continued planting a mix of crops on a small piece of land, and others planted crops like they normally did as if they did not get the message (or did not believe that work would actually begin that year).

The author contacted the RESIS contact person in DoA Giyani on the 3rd of May 2007. The DoA official said that the RESIS programme has not started at B4E because they are still waiting for a budget from Head Office (Limpopo Province Department of Agriculture in Polokwane), and that he was not sure how long it will take for the budget to be allocated (it might be in June or later). He also mentioned that farmers had selected which crops would be planted after revitalization and that the Department's objective was to transform the farmers from 'smallholders' to 'commercial farmers'.

Farmers waited for two months for the RESIS programme to start, and on the 7th of July 2007 the farmers at B4E were informed that there was no money to start the RESIS programme. The farmers were not happy about the news and they wrote a letter to Limpopo Provincial Department of Agriculture informing them of their dissatisfaction about the programme.[24]

[24] In an attempt to understand the RESIS programme being implemented at B4E, the author contacted the Department of Agriculture in Polokwane asking for the proposal and was told to do that in writing and also submit a proof of university registration. The letter was written and submitted together with proof of registration on the 9th of September 2007 with follow up emails after that for two months. No response was received from the Department.

Overall, the whole process of RESIS has been very unsettling for the farmers at Siyandhani. The DoA gave the impression of having very definite plans for the rehabilitation of the scheme and how farmers would have to farm in the future, but there was no evidence of consultation with the farmers on these important matters. Moreover, many farmers interrupted their production for the year, seemingly for nothing, for which they will not be compensated. To date, the DoA has not provided the farmers with detailed or reliable information about their plans for the scheme.

6.9 Assistance from the Department of Agriculture

When the plots were allocated in 2003, the plot holders contacted the Department of Agriculture in Giyani for assistance. The farmers were assisted with R19,000 to purchase valves for the hydrants at a cost of R250 per valve.

The farmers claim that, since then, they have not received any assistance through the state's Comprehensive Agricultural Support Programme (CASP) or other programmes. According to the farmers only R1.5 million was allocated for the whole of Greater Giyani for 2005 under CASP, and they had to apply for it as a group and not as individuals. In 2006, the extension officer contacted the farmers and asked them to make a budget of the things that they need for the year so that provision from CASP could be made, but the farmers never heard any more about this and thus did not received any assistance from CASP in that year.

6.10 Conclusion

This chapter has provided the key findings of the research undertaken at Block 4E of Middle Letaba irrigation scheme, focussing on agricultural water allocation and use. The next chapter discusses the findings of the two case studies.

CHAPTER 7: DISCUSSION OF THE RESULTS OF DOMESTIC AND IRRIGATION WATER USE STUDIES

The main objective of this study was to explore the allocation and use of water for domestic and irrigation purposes in the context of the current water reform in South Africa through a detailed study of the village of Siyandhani. The specific objectives of the study were to:

- Establish water resources availability in the Letaba/Shingwedzi sub-region, specifically surface and groundwater and establish water uses by different sectors (e.g. agriculture, industry, domestic, forestry etc.). This part of the study was not intended to provide new information about water availability but to illustrate the existing inequities in water allocation and use in the sub-region;
- Explore the dynamics of existing formal and informal institutions for water resources management and water services provision and the relationship between and among them;
- Understand the practice of allocation and use of domestic water, and its outcomes;
- Understand the practice of allocation and use of agricultural water, and its outcomes.

The study was informed by an analysis of post-apartheid government policy responses to access to water for domestic and productive purposes since 1994. These policy responses included an analysis of post 1994 policies in terms of the extent to which they were designed to increase access to water by the people of South Africa. The policies included the Constitution of the Republic of South Africa 1996 (Act No. 108 of 1996), the White Paper on Water Supply and Sanitation Policy of 1994 by DWAF, Water Services Act (WSA) (Act No. 108 of 1997), National Water Act (NWA) (Act No.36 of 1998), Municipal Structures Act (Act no 117) of 1998, Municipal Systems Act (Act no 32) of 2000 and so forth.

In this chapter the results of the study of domestic water use at Siyandhani Village and irrigation water use at block 4E (B4E) of Middle Letaba irrigation scheme are discussed. The first section discusses issues arising from the domestic water allocation and use study and the second section discusses issues arising from the agricultural water allocation and use study.

7.1 Domestic water allocation and use

7.1.1 Water services infrastructure at Giyani and the sub-region

In chapter four I demonstrated that there is great inequality in access to and control over water resources in the Giyani area and the Letaba/Shingwedzi sub-region; this has to do with the distributional and relational aspects of water scarcity. The scarcity in the Giyani area is not felt by all sectors and all people the area. In the Kremetart area, water consumption is 505 litres per capita per day while taps in Siyandhani (and other villages in Greater Giyani municipality) are dry and consumption can be as little as 11 litres per capita per day. The inequities are even greater when comparing the Groot Letaba and Klein Letaba sub-areas, in Groot Letaba DWAF (2004a) recorded a consumption of 1,200 lpcd (including municipal uses and losses) in Tzaneen. Chapter four also demonstrated that in the same village farmers in the irrigation scheme are irrigating (using untreated water) every day for as long as they want. In the sub-region as a whole, water is still, in effect, managed the same way it was managed during the apartheid era, where basic human need for water were given less priority than water for irrigation. In the sub-region in 2005, water required for irrigation was set at 67% of the total water requirement, leaving little water for other purposes such as urban and rural household water requirements.

Chapter four has indicated inequities in access to water exist in the former white areas and the homelands. Lack of water in the former homelands is due to the design of the water supply system and the continued preference for irrigators. This was clearly expressed in an interview with one of the DWAF officials at the Tzaneen dam. The official was of the view that there were too many people in the former homeland

areas of Gazankulu and Lebowa and that these people were using more water than was allocated for them. My view is that water allocated should be adjusted to meet basic needs of these people and also adjusted in relation to the population in these areas. The view of the DWAF official made me to conclude that the water scarcity in these areas is due to human intervention. Turton and Ohlsson (1999) define first-order resource as natural resources that are either scarcer or more abundant relevant to the population over time. The transition from apartheid in 1994 brought a massive shift in the first-order resource. Previously 'hidden' scarcity was suddenly 'discovered' by the simple fact of granting black people equal rights/entitlements to water. This unleashed a very huge demand on the overall system which cannot be under-estimated (and remains largely unmet). While we can say that this realignment has taken place at the theoretical level, the second-level adjustments required by policy implementers have fallen far short of what is required by either failing to act at all, or acting inadequately, as demonstrated very clearly by the Siyandhani study.

The matrix developed by Turton and Ohlsson (1999), which shows possible variations of type of resource and quantitative aspects of the resource, can be adopted to define the study area as having structurally-induced social scarcity**,** which Turton and Ohlsson (1999) define as the condition that exists when a social entity has both first-order resource abundance and a second-order resource[25] scarcity simultaneously. Under these conditions of social resource scarcity, relative water abundance may still result in social instability. This definition holds that people everywhere can be affected by water scarcity, even those living in areas with plenty of rainfall or freshwater. For example, former 'white South Africa' is somewhere between category 1 and 2 (primary scarcity ameliorated by [positive] resource allocation decisions); while former black South Africa is somewhere between 1 and 3 (primary scarcity exacerbated by [negative] allocation decisions).

[25]Second-order resource is the set of potential adaptative behaviors that are drawn upon from the broader social context that can be used by decision making elites, either legitimately or illegitimately.

7.1.2 Water services infrastructure at Siyandhani

Chapter five, sections 5.1 and 5.2, demonstrated that the village reservoirs at Siyandhani are rarely filled, the amount of water allocated per person per day is too little, and the result has been to 'starve' villagers of clean water.

The broken communal taps and dysfunctional water scheme in Siyandhani village are indicative of bad management practices and failure to create supportive institutional arrangement to govern water supplies. Chapter five also demonstrated that there is a scarcity of trained people, a reluctance to make demands for more water and, in general, a broad acceptance of water scarcity at all levels. This is indeed hard to reverse.

Water scarcity is often compounded due to poor institutional arrangements governing water, as noted by Mehta (2003:4). In the Giyani area, water scarcity is generally attributed to poor governance of the resource. The people in the village believe that there is enough water to supply the town and surrounding villages of Greater Giyani municipality. They see the water problem as unnatural and something to do with human agency, even though rainfall and drought patterns are characterised by high degrees of uncertainty and variability.

The water scarcity in the Giyani area might not be constant and permanent but people living in the semi-arid village of Siyandhani have come to accept the water scarcity as constant and permanent because it has been going on for more than seven years.

7.1.3 Water allocation at Siyandhani Village

In chapter five I demonstrated that household water needs are not met and household members go to the canal and other unprotected sources to access water, and also buy water from water vendors.

7.1.4 Water sources at Siyandhani village

Chapter five demonstrated that water supplied from the Giyani Water Works is not enough to meet the basic human needs at Siyandhani. The Siyandhani community members therefore use other sources of water to meet their basic needs. The community members of Siyandhani use 10 water sources, including the ones supplied by the Giyani Water Works, to meet their basic water needs. The untreated water from the irrigation system in Siyandhani (which is extracted from the Middle Letaba Canal) is not only used for the irrigation of agricultural crops, but for a whole range of domestic and other purposes as well. Three of the ten water sources supply purified water from Giyani Water Works, four of the ten water sources supply raw water from the Middle Letaba Canal meant for irrigation, and the final water source is the Klein Letaba River. Community members also buy water (bought water can be treated or untreated) from water vendors and other households in the village where there are boreholes at a price.

7.1.5 Water collection

Women continue to be the main collectors of water in Siyandhani and Africa as a whole.

According to Howard & Bartram (2003) water supply reliability influences quantities of water collected although there is very limited data to establish what relationships exist. If the interruption in supply is predictable, then it may be mitigated to some extent as the predictability can allow households to develop coping strategies for water collection. The amount of water collected at Siyandhani varies seasonally. Water is abundant in summer but the people do not have the capacity to store the water for use in the dry season. Howard & Bartram (2003) indicates that low income families are likely to be at greatest risk from poor water supply continuity as they have limited resources and they might be less able to store large volumes of water at home.

7.1.6 Water availability at household level

The United Nations (2003) applies the following factors in all circumstances in terms of adequacy of water, namely: availability, quality and accessibility. Chapter five has demonstrated that the required standards of availability, quality and accessibility are not met at Siyandhani. Water supply at Siyandhani is not sufficient or continuous for personal and domestic uses such as drinking, personal sanitation, washing of clothes and food preparation. The quality of water used at Siyandhani is not safe, the colour, odour and taste are not acceptable and it poses a threat to people's health. In terms of the accessibility, physical accessibility is not met because water facilities are not adequate and they are not within safe physical reach for all sections of the population.

Economic accessibility is not met because water and water facilities and services are not affordable for all. Household members have to pay for water which is supposed to be provided free for the first 25 litres per day of clean, potable water. Villagers are being denied their basic rights to water which can only be met if water allocation priorities are changed.

The study demonstrated discrimination against people in villages around Greater Giyani Municipality. People in Kremetart are allocated more than 500 litres per capita per day while villagers get as little as 4 litres per day.

7.1.7 Water use at household level

Water use refers to the amount of water required to meet a specific need or to accomplish a specific task. Amounts of water used for basic needs vary according to quality and proximity of the water supply and the size and wealth of households.

Actual water use by households per day for different activities ranged from 2 litres to 250 litres, with an average of 201 litres. On average households use approximately 19 litres for cooking, 23 litres for laundry, 87 litres for bathing morning and evening, 9 litres for house cleaning, 18 litres for washing household utensils, 30 litres for

washing household utensils and cooking, and 15 litres for drinking. Using an average household size of six people and average water use of 201 litres per day, this shows that on average each household member uses 33.5 litres a day, which is slightly above the minimum RDP standard of 25 lpcd. The standard is met in terms of quantity but not quality and accessibility because these people are mostly using dirty irrigation water collected more than 250 m from their homes.

It is worthwhile to examine standards and estimates for how much water is really needed for different tasks and how Siyandhani compares. In Siyandhani village the minimum amount of water used for cooking per household was 2 litres with a maximum of 50 litres and an average of 18.1 litres. Most of the households cook once a day with a few cooking twice a day. Converting water used for cooking per household at Siyandhani to water use per person gives an average water use per person of 3 litres. Gleick (1996) suggests that water use for food preparation in wealthy regions ranges from 10 to 50 litres per person per day, with a mean of 30 lpcd. Other studies in both developing and developed countries suggest that an average of 10 to 20 lpcd appears to satisfy most regional standards and that 10 lpcd will meet basic needs (Gleick, 1996). Howard & Bartram (2003) citing Thompson *et al* (2001) indicated that in East Africa only 4.2 lpcd were used for both drinking and cooking for households with a piped connection and 3.8 lpcd for households without a connection.

Average water used for cooking and cleaning household utensils equals 30.45 litres per household with a minimum of 25 litres and a maximum of 60 litres. Cleaning of household utensils is done on average once a day. Converting the average of 30.45 litres per household to per capita, using an average household size of six people gives five litres for both cooking and dishwashing. This seems to be less than half the international standards of basic water requirements; for example, Gleick (1996) noted that California uses an average of 11.5 lpcd for cooking with an additional 15 litres used for dish washing.

The study results indicate that the minimum amount of water used for drinking was two litres per household with a maximum of 25 litres and an average of 14.7 litres. Dividing this by the average number of household members shows that each person uses 2.45 litres a day for drinking. International standards for drinking water are thus not met; Gleick (1996) estimated about three litres per person day under average temperate climatic conditions and argued that it is necessary to increase this figure to five litres due to the fact that substantial populations live in tropical and subtropical climates and this water should be of sufficient quality to prevent water-related diseases.

The average amount of water used for laundry is 22.8 litres per household with a minimum of 10.7 litres and a maximum of 40 litres. Boelee *et al* (2007) noted that laundry washed at water sources does not consume a lot of water but may damage irrigation infrastructure and could influence water quality downstream.

Average water used for bathing per household equals 87.4 litres with a minimum of 25 litres and a maximum of 200 litres, and on average it is done once a day. This converts to 14.5 litres per person, with a minimum of 4 litres with a maximum of 33 litres per person. Gleick (1996) recommends a basic level of 15 lpcd for bathing in developing countries or regions with no piped water, close to what is used at Siyandhani.

Average water used for cleaning equals 8.8 litres per household with a minimum of 1 litre and a maximum of 25 litres. Cleaning is done on average 0.68 times a day. Gleick (1996) recommends a minimum of 20 lpcd to account for the maximum benefits of combining waste disposal and related hygiene, and to permit for cultural and societal preferences.

Use of water from the Middle Letaba Canal

The use of irrigation water for domestic and other purposes depends on the availability of water from other sources such as yard and communal taps. Water from

the Middle Letaba Canal is used for laundry, bathing, drinking, cooking, house cleaning, washing household utensils, and laundry. If people have to go to an irrigation canal to collect water for domestic uses, this is an indication that there is water scarcity because people know that it is not suitable for all the basic needs.

7.1.8 Productive use of domestic water at household level

Pérez de Mendiguren Castresana (2004) argue that the initial target of 25 lpcd in South Africa reflects a definition of needs that assumes domestic water supply is only about health and hygiene, for drinking, cooking, sanitation and washing. According to Pérez de Mendiguren Castresana (2004) the national human needs reserve does not cover water for productive purposes that help income-poor women and men to improve the harvests of their vegetable gardens, their poultry and livestock enterprises, for example.

At Siyandhani, the minimal productive activities that are undertaken use either water extracted from the irrigation system or purified water from Nsami Dam. Research by Pérez de Mendiguren Castresana (2004) has shown that a wide range of water-dependent productive activities such as vegetable gardens, beer brewing, brick making and livestock take place in South Africa and usually exceed the targeted basic need of 25 lpcd. Studies carried out in Limpopo Province relating to productive water use at household level revealed that between 18% and 45% of the respondents' reported irrigating vegetable garden crops with domestic water supply in the dry season (Hope and Garrod, 2004; Pérez de Mendiguren Castresana, 2004).

In Chapter five (section 5.3.3.6) I have demonstrated that there is very minimal productive use of water at Siyandhani and households would like to increase domestic water use for productive activities such as vegetable gardens. It is increasingly recognised that productive uses of water have particular value for low-income households and communities and have health and well-being benefits (Howard and Bartram, 2003). Direct health benefits are derived from improved nutrition and food security from garden crops that have been watered (Howard and

Bartram, 2003). Indirect health benefits arise from improvements in household wealth from productive activity.

7.1.9 Level of water supply service for domestic water since 1994

Accessibility of water is a function of service level. Adopting the service level descriptors by Howard and Bartram (2003), which can be interpreted in terms of household water security, shows that service level at Siyandhani can be described as between no access and basic access. The no access group effectively does not have any household water security as the quantities collected are low, the effort taken to acquire water is excessive and quality cannot be assured.

Almost all households at Siyandhani have stand pipes but water supply systems and services no longer function properly. This forces poor families to collect water from unprotected sources or to buy it from private water vendors. The reliability of piped water supplies has declined in the village since 1994, in part because of the inability of local authorities to provide adequate services and because rising populations impose extra stresses on supplies.

Howard and Bartram (2003) argue that increases in quantities of water used will only be achieved through upgrading of service level (Hope & Garrod, 2004). Thompson, 2006 go further to say that upgrading ground water supplies to street taps will provide little additional welfare to rural households but a change from ground water to house tap or yard taps will greatly enhance people's lives, provided that the services are sustainable. This has significant implications for domestic water policy in South Africa which is broadly based on delivering 25 lpcd of potable water within 200 m of the home.

7.2 Irrigation water allocation and use

7.2.1 Land allocation and land usage at the scheme

Chapter six section 6.1 has demonstrated that the farmers at B4E have the desire to farm because they approached the chief (who still play a big role in land allocation) and asked him to allocate the abandoned land at the irrigation scheme. The study also indicated that 28% of the plot holders were female and the rest were male. It was also shown that despite the farmers' desire to farm, the farmers at B4E are faced with many challenges such as the low land usage. In terms of low land usage, the farmers face the following challenges: there are few people who own a tractor at the village or even around Giyani and the demand for tractors during ploughing time is higher than the supply for those who can afford it and there are poor farmers who cannot afford to plough more that one hectare. Farmers also lack funds to purchase seeds, fertilizers and other inputs.

7.2.2 Methods of ploughing at B4E

The study demonstrated that all producers, whether small or large, were reliant on hired tractors for ploughing since none of them owned a tractor. Lack of access to affordable tractor ploughing is hindering poorer producers (and even larger ones) to sustain production under difficult circumstances. Tractor ploughing costs R1,150 per hectare and, despite the problems with securing tractors, animal traction is forbidden by the management committee of the B4E irrigation scheme.

7.2.3 Crops grown at Scheme

In chapter six section 6.3.3, I have demonstrated that farmers at the scheme generally plant the same crops at the same time. There is no diversification and this poses a problem during harvesting time for those farmers who do not have their own transport. They battle with the selling of their crops and rely on hawkers to come to their plots to purchase their produce.

7.2.4 Crop output

The lack of records posed a challenge during the estimation of crop yields at B4E but this problem is not unique to B4E; it was also the case at Tshiombo irrigation scheme as noted by Lahiff (2000), for reasons connected with local farming practices. Plot holders with high value crop output in the sample were all men aged between 47 and 72. The sex of plot-holders cannot be separated from the fact that men are in a much stronger position with regard to their ability to command household labour. Size of land does not have an impact on crop output for farmers in survey because almost everyone has the same size of land (5 ha) except for two farmers with 4.5 ha and one with 2.5 ha. In chapter six, I demonstrated that agriculture is less self financing for the 45% of farmers earning less than R3, 000 from one year's production, and it is more self financing for the six farmers earning R4, 140 or more, of which part is reinvested to the following year's production. In chapter six I also demonstrated that more than 58% of the income generated from farming is invested back into farming through the purchase of inputs (81.8%), payment of labourers (27.2 %) and the hiring of a tractor (18.1%) to plough. Smaller producers tend to consume a higher proportion of their produce, and therefore, rely more on transfers from other income-generating activities to finance agricultural production.

7.2.5 Hired and household labour

The study demonstrated that 60% of household members who assist at the plots are females; 72% of the male plot-holders in the sample were able to draw on the labour of their wives and other women in the household, whereas women plot-holders received little or no assistance from their husband (if they had one) or other men in their households. The study further demonstrated that all farmers use hired labour on either a permanent or seasonal basis, but face a challenge of meeting the minimum wage for farm labourer. The largest producer hired a total of seven permanent workers as a means of expanding the area under cultivation.

7.2.6 Agricultural extension service

In chapter six (section 6.3.6) I have demonstrated that extension services from the Department of Agriculture are non-existent at the B4E Irrigation Scheme.

7.2.7 Crop sales and marketing

In section 7.2.7 I have demonstrated considerable variation in marketing strategies between plot-holders in the sample. The farmers at B4E depend on both informal and formal channels. The chapter demonstrated that larger producers were more likely to own their own vehicle and to make use of formal and informal marketing opportunities. Smaller producers tended to have fewer options of disposing of their produce, typically through selling to hawkers or to neighbouring households.

The farmers at B4E are not different from other smallholder farmers, where the problem of market access is linked to price risk and uncertainty, inability to meet standards, physical market access like physical infrastructure such as roads, market facilities as noted by Magingxa & Kamara (2003). The chapter also demonstrated that farmers have attempted to reach other markets such as the Johannesburg Fresh Produce Market using transport facilities of Premium Trucking but the farmers were faced with price risk and uncertainty and the inability to meet quality standards.

7.2.8 Water supply and use at B4E

In chapter six I have demonstrated that contrary to the water scarcity problem at Siyandhani, the farmers at B4E have access to more water than they need for the irrigation of their crops, and at no cost to them. The abundance of the water for irrigation is also demonstrated by the fact that no one allocates the water and no irrigation routine is followed; each and every farmer irrigate as and when they feel like irrigating. However, despite the availability of water it is very difficult for most households to farm due to labour costs and the costs of inputs.

7.2.9 Water management institutions

In chapter 6 I have demonstrated that a key objective of the National Water Act to establish suitable water management institutions (WMIs) to involve local communities in water management is not met in the Giyani area. This was demonstrated by the fact that farmers do not even know what a water management institution is; they confused WMIs with the Department of Water Affairs and Forestry.

I also demonstrated that none of the farmers at B4E were aware of any water management legislation in South Africa. This situation is not unique to the study area: The results in the study area indicate that there is a challenge of ensuring full participation by local communities in water management. This difficulty was also noted by Schreiner *et al. (*2004) and Anderson (2005).

Even though the establishment of Catchment Management Agencies requires the participation of stakeholders in the management of water resources at ground level, none of the farmers at B4E knew what a CMA was or were aware of the process for forming a CMA. This indicates that all the farmers at B4E are not being reached in the process of establishing a CMA. The challenge of lack of participation was raised by Van Koppen *et al* (2002) where they noted that a key challenge for CMAs is how they will deal with the fact that only a limited group of water users in a particular water management area will be reached in the process of establishing the CMA.

According to Faysse (2004), South Africa has set very ambitious goals in terms of involving the users, especially small-scale users, in the management of water resources. For Nicol & Mtisi (2003), the rolling out of the institutional reforms has been affected by local level complexity in determining who should be represented on the new structures and how they can become self-financing in practice.

7.2.11 The RESIS programme in B4E

The B4E irrigation scheme is one of the schemes selected to be part of the Revitalization of Smallholder Irrigation Schemes (RESIS) undertaken by the Department of Agriculture in Limpopo Province. To the farmers, it seems like RESIS was just a programme that was meant to disturb the livelihoods of the poor farmers in former homeland irrigation schemes. To make matters worse, in August 2008, it was announced that the Limpopo Department Agriculture has discontinued the RESIS programme in the whole province due to the lack of funds. Irrigation revitalisation investment costs in three provincial programmes in South Africa were found to be between R30,000 and R59,000 per ha. This forced crop production strategies with high returns per hectare, leading to an explicit commercialisation agenda focused on sales to external and more distant market (Denison and Manona, 2007).

The next chapter, which is the concluding chapter, provides a synthesis of the key findings of the study.

CHAPTER 8: CONCLUSION

One of the objectives of the study was to illustrate the existing inequities in water allocation and use in the sub-region. Chapter four has indicated that inequities in access to water exist between the former white areas and the homelands. The study concludes that the study area is faced with the problem of water scarcity in all the sub-areas of Letaba/Shingwedzi sub-region. However, the scarcity in the former white area of Groot Letaba has been overcome by the building of dams, diversion of water for irrigated commercial agriculture and the assumption that water should not be made available to black communities except for drinking water (although this was slightly altered for the apartheid-era irrigation schemes). It can be concluded that the Groot Letaba sub-area has structurally-induced water abundance because this area has both first-order resource scarcity and second-order resource abundance simultaneously. The Groot Letaba sub-area has managed to adapt to water scarcity by means of coping strategies such a building and investing in water infrastructure. The Klein Letaba sub-area has structurally-induced social scarcity because this area has both first-order resource abundance and a second-order resource scarcity simultaneously. Under these conditions of social resource scarcity, relative water abundance may still result in social instability.

Causes of water scarcity in Giyani

After careful data analysis and the demonstrated complex reasons for water scarcity, I conclude that the water scarcity in the study area is caused by a number of factors, notably growth in population and financial and institutional obstacles.

The population of Giyani Town was only 2500 when the purification plant that supplies water to Giyani Township and surrounding villages started operating in 1978, but the population grew to 23,562 by 2006. Water use inevitably increased as the population grew and this changed the initial water abundance into a condition of

water scarcity, to the point where demographically-induced demand overtook the prevailing level of supply.

Financial and institutional obstacles also cause water scarcity in the area. Water that is potentially available is not being fully captured because of the way in which water provision is organized and managed. Institutional obstacles in the study area include the lack of commitment by both DWAF and the Water Service Authority in terms of transferring water infrastructure and the management of the infrastructure. The lack of commitment has been demonstrated by changing the deadline for the establishment of an entity in the three local municipalities that do not have the capacity to become water service providers. Financial obstacles include the lack of funds that are needed to upgrade the water purification plant that was constructed in the 1970s by the former Gazankulu Homeland Government.

The fact that available water is not fully captured is demonstrated by the farmers at B4E who irrigate at any time they want without charge; while community members in the same village (including the irrigators own households) do not have enough water to meet their basic human needs. This indicates that the apartheid-era practice of giving priority to irrigation over basic human needs policies still continues. Even though democracy was supposed to bring change and improve the standard of living for the rural poor, this study demonstrated that the people of Siyandhani actually became worse off in terms of water supply since 1994.

The nature of scarcity in the Giyani area and Letaba/Shingwedzi sub-region

The evidence of this study suggests that water scarcity in the Letaba/Shingwedzi sub-region is not natural but anthropogenic in nature. In chapter 4 I have demonstrated that there is sufficient precipitation in the sub-region but yet people do not have access to water because of human action, hence the concept of manufactured scarcity, which is manifested in different ways.

A primary area where water scarcity can be observed is the unreliable nature of the infrastructure feeding the domestic water systems that causes periodic water scarcity. The people of Siyandhani village refer to this situation as water scarcity due to the frequency of the occurrence.

Politically induced scarcity is another distinction that can be drawn under manufactured scarcity. Although scarcity may have its roots in water shortage, water scarcity in the Giyani area is constructed by political actors, often to meet political ends. Access to and control over water is linked with prevailing social and power relations which influence how it is used or abused (see Mehta, 2003:1). The scarcity in the Giyani area is not felt by all sectors and all people the area. In the Kremetart area (a former white town currently occupied by the affluent people in Giyani), water consumption is 505 litres per capita per day while taps in Siyandhani village are dry and consumption can be as little as 11 litres per capita per day. The phenomenon also exists between Klein Letaba and Groot Letaba sub-areas. In chapter four it was demonstrated that rural water requirements were estimated at 55 lpcd and urban water requirements estimated at 127 lpcd, with actual consumption of 1,200 lpcd in Tzaneen. This can be described as resource capture, which Turton and Ohlsson (1999) define as a process by which powerful social groups (whites in this case) shift resource distribution in their favour over time. This is particularly relevant under conditions of water deficit[26] where access to a critical natural resource like water gives considerable advantage to those who control access and allocation of that resource.

Another objective of the study was to explore the allocation and use of domestic water. Chapter five indicated that the water supply in Siyandhani is not reliable and it is interrupted frequently. Service hours are often erratic and unreliable, and users do not know whether they will get water from the tap or for how long they will have to queue.

[26] Water deficit is the prevailing condition that exists when the consumption of freshwater within a social entity exceeds the level of sustainability (Turton and Ohlsson, 1999).

The use of irrigation water for domestic and other purposes depends to a large extent on the availability of water from sources such as yard taps, tanks at Siyandhani Primary School and the street taps. At present the people from Siyandhani use alternative sources for drinking water and other domestic uses. However, most of the sources, such as Bobomeni, B4E pump station, Ka Magesheni, and B4E irrigation scheme, are all directly linked to the irrigation system. The supply of water to the irrigation scheme may also be interrupted and the dependency on irrigation water in Siyandhani becomes obvious during the closure of the irrigation system for a week or more when the canal is being cleaned or for other unknown reasons.

Water allocated per capita per day can be as little as 7 litres. This study has indicated that the water scarcity in the Klein Letaba sub-area cascaded down to household level. Women in the village are the ones that are mostly affected by the water scarcity because they are the main water collectors who have to spend many hours collecting water. The increasing duration of time spent by women on water collection is a clear indication of the problem of water scarcity.

Human rights are binding obligations that reflect universal values and entail responsibilities on part of governments. The human right to water according to the UN (2003) entitles everyone to sufficient, safe, acceptable, physically accessible and affordable water for personal and domestic use. Ensuring that every person has access to at least 20 litres of clean water each to meet their basic need is a minimum requirement for respecting the right to water. The people of Siyandhani village do not have adequate water in terms of availability, quality and accessibility. The quality of water used by Siyandhani villagers is a cause for concern and a public health hazard. The amounts of water used for basic household activities such as cooking, drinking, bathing etc., are similar to findings of studies in other developing countries but the main concern here is the quality of water used for household activities. Ensuring that every person has access to at least 20 litres of clean water each to meet their basic need is a minimum requirement for respecting the right to water. Because the people at Siyandhani sometimes have less than 20 litres and the water that they use most of the time is not suitable for human consumption, I conclude that their

human right to water is violated. The judgement by the high court on the case of Mazibuko vs. City of Johannesburg marked a key turning point in the struggle of South Africa's historically marginalised groups for their right to water. For the first time, a court in South Africa has affirmed the right to sufficient water for basic daily requirements. The judgement has created a platform for the people of Siyandhani to hold the water service authority accountable for the violation of the human right.

Another objective of the study was to explore the allocation and use of irrigation water. Chapter six indicated that there is enough water for irrigation at B4E irrigation scheme located at Siyandhani village. While scarcity is a widespread problem, it is not experienced by all sectors.The farmers at the scheme can irrigate as much as they want any time of the day and they are not paying any irrigation costs, this indicates that the underlying cause of water scarcity is not a physical deficiency of supply. This again is an indication that irrigation is still given a priority above meeting human basic needs and it also manifests in manufactured scarcity in the village of Siyandhani. The abundance of water for irrigation, and the availability of land for production, together with relatively low levels of agricultural production, shows that access to reliable water is an essential, though not sufficient condition for poverty reduction.

They study also found that farmers are not using all land allocated to them due to lack of funds to hire tractors. The study indicated that different crops are produced at the scheme but the farmers are facing challenges in terms of the marketing of the crops. The farmers are mostly dependent on informal marketing channels and only those with their own transport access formal marketing channels at local level. Farmers also face challenge in terms of accessing extension services, as they do not receive any extension services from the Department of Agriculture.

Another objective of the study was to explore the dynamics of existing formal and informal institutions, and their relationships, pertaining to water management. Chapter five showed the challenges in ensuring full participation in institutions such as the lack of participation and awareness by local communities. Due to this I

conclude that new power holders (local and district level officials and politicians) have been ineffective in challenging the interests of older interest groups or water users. Commercial farmers and irrigation boards are in a potentially strong negotiating position to influence the direction of the CMA while the disadvantaged communities continue to suffer from significant power imbalances in knowledge and expertise and they are left out in the process. Because people in Giyani in general don't participate in the CMA, they will not be able to influence water management and allocation. This is unfortunate since the new dispensation for DWAF is intended to provide water for those who really need it.

It should be clear from my discussion that people in Siyandhani have in part given up and they have learned to live with the water scarcity and therefore their voices are lost. Local people seem incapable of holding local officials and politicians to account, or making them serve their needs, and/or the politicians and officials are spectacularly useless at their jobs. The people of Siyandhani can break out of their water scarcity situation and the violation of their human right through the mobilisation of residents in this village and other rural areas, and broader civil society to institute a legal action against Mopani District Municipality as the Water Service Authority through courts, in order to ensure that the desired real changes on the ground are realised. The courts, human right commission, as well as human rights activist can monitor government progranmmes and thereby help government realise their obligation to fulfil the right to water.

Finally, the study was interested in water reform, but it seems water reform for both domestic and productive purposes is not happening in Siyandhani and many other villages around Giyani. It is useless having all sorts of high level and progressive processes in Pretoria if nothing is happening on the ground. This calls into question the reform process and the people leading it.

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Online Resources

http://www.dwaf.gov.za

http://www.issafrica.org

http://www.historicalvoices.org/pbuilder

http://www.limpopo.gov.za

ANNEXURE A: DOMESTIC WATER USE STUDY QUESTIONNAIRE

INTERVIEW SCHEDULE FOR HOUSEHOLD/INDIVIDUAL

Date:	Questionnaire No:
Person interviewed:	
Respondent gender	
Respondent Age (Yrs)	
House Number	

HOUSEHOLD COMPOSITION, OCCUPATIONS

Who lives in the household, some or all of the time and what do they do?

M/F	AGE	MARITAL STATUS	OCCUPATION
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			

What are the sources of income for this household?

WATER SOURCE

What is the household's main water source in the rainy / dry season?

Bobomeni (C)		Yard tap	
B4E Pumpstation(C)		Water vendor	
Kheto School		Magesheni(C)	
B4E scheme(C)		Other peoples' tap	
Siyandhani Primary School			
Other: Specify			

NOTES:

Are there other water sources in the village which you do not have access to? Why?

How far it is to the above mentioned water sources from the household? (Metres) / walking time in minutes/hrs

Source	Distance

If household use water from the canal: What would you say about the quality of water collected?

What is water from canal used for?

What do you do before drinking water from the canal?

Has anyone in the household suffered from diarrhoea or cholera in the last three months?

WATER AVAILABILITY

Is the water always available for domestic use from source?
What is the reason for not having enough water?

Number of days without water from the source in the past three months?

What do you do to get water if there is no water from your source?

How much do you spend to buy water per day?

Where do you get the money to buy water?

What would you do with money you use to buy water?

WATER COLLECTION

Who collects the water? How much? How often?

WHO	AGE	GENDER	HOW MUCH?	HOW OFTEN?	DURATION/ TRIP
1.					
2.					
3.					
4.					

Does collection vary seasonally? How and Why?

What are your suggestions to improve the problems of water quality and availability?

DOMESTIC WATER USE

How much water does the household use per day?

What is the water used for? How much is used and how often?

Activity	LITRES USED / ACTIVITY	HOW OFTEN
1.		

2.		
3.		
4.		
5.		
6.		
7.		
8.		

PRODUCTIVE USE OF WATER

1. What are the other uses of water except washing, cooking, drinking and cleaning?
2. How much water is used for these productive activities?
3. How often are activities undertaken?

PRODUCTIVE USE	LITRES USED / ACTIVITY	HOW OFTEN
1.		
2.		
3.		
4.		
5.		
6.		

If no productive activities are undertaken, ask why?

What productive activities would you undertake if you had access to water?

SERVICE BY GOVERNMENT

How is the quality of the service provided by GG Municipality?

Do you think domestic water supply has changed since 1994 (accessibility of source, in terms of the maintenance of the resources, continuity of water supply)?

What do you think the government (all levels) should be doing to help people access water in this area?

Thank the respondents sincerely for his/her/their contribution and cooperation.

ANNEXURE B: AGRICULTURAL WATER USE QUESTIONNAIRE

INTERVIEW SCHEDULE FOR FARMERS

Name of Plot holder	Gender	Date
Plot Number		
OBSERVATIONS – Location, land, services, general appearance, status		
How much land do you have on scheme, what other size of land does your family have access to? When and how did you obtain it?		

HOUSEHOLD COMPOSITION, OCCUPATIONS AND SOURCES OF INCOME

Who lives in the household, some or all of the time and what do they do?

M/F	AGE	MARITAL STATUS	OCCUPATION
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			

What are the main sources of income for this household?

CROPS

How have you used your land from November 2005 to October 2006 – crops planted, crops harvested. How much was sold, and at what price; how much was consumed within the household?

MONTH	CROPS	AREA PLANTED	CROPS HARVESTED	VOLUME CONSUMED	VOLUME SOLD AND WHERE?	INCOME
November						
December						
January						
February						
March						
April						
May						
June						
July						
August						
September						
October						

If not all land allocated was planted, ask why?

How do you spend money earned from sale of crops?

How many of your household work on your land, and what tasks do they do?
Do you employ anyone from outside the household to work on your land?

How often do they work, what tasks do they do and how much do you pay them?

WATER USE

What is the source of water for irrigation?

Who allocates water?

Do you have access to as much water as you need? Could you use more water than you have access to at present on the same area of land?

Current crops planted: How often to you irrigate which crop for how long?

Crop	Area planted	How often	How long (min/hrs)

What irrigation method do you use?

WATER MANAGEMENT INSTITUTIONS

What are the institutions concerned in water management?

Are there any water user associations in the area?

Are you involved in a water user association?

Are you a member of a WUA?

How effective is the WUA?

What benefits does a WUA provide?

Do you participate in the WUA? HOW? If not, Why not?

Are you aware of the legislation about water management in South Africa?

Are you aware of the CMAs establishment in your area?

Have you been involved in the process? (Information, meetings ….)

Are you a member of any farmers associations?

What benefits does a WUA provide?

GENERAL

What assistance/ advice or training do you receive from the agricultural officers on the scheme?

Are you satisfied with the service they provide?

If there is no government extension officer allocated? Who provides extension services?

What are the main problems facing farmers here today – list three

1.
2.
3.
4.
5.

What do you think the government (all levels) should be doing to help people in this area?