Responding to water demand strategies: a case study in the Lower Orange catchment management area (LOCMA)

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> It's a great thing when you realise you still have the ability to surprise yourself.
> *Lester Burnham narrating (American Beauty)*

ABSTRACT

This study is an investigation into water management policies in South Africa, their effect on water users and the perceptions users have of these policies. The investigation begins with an exposition of concepts such as water demand management (WDM), as well as integrated water resource management (IWRM). A sub-discourse of the main theme is the societal tendency to neglect its common property. Garret Hardin's groundbreaking observations on the "tragedy of the commons" (1968) are explored in an effort to locate issues of relevance in effective water management strategies. In contemplating the commons, it is evident that aspects of morality and ethics are involved. The morality of a society, be it in a global or national context, seems to manifest itself in legislation and policies, and in the way these are implemented. The relevance of good governance, hydropolitics and sustainable development is also discussed to provide the necessary theoretical background to an understanding of the relationship between consumers and the water commons.

Access to safe drinking water is protected in the *Constitution of the Republic of South Africa Act*, 108 of 1996. Flowing from the government's obligation to take reasonable legislative and other measures to achieve the progressive realisation of fundamental human rights stipulated in section 27(2) of the Constitution, the challenge since 1994 has been to provide access to water for all inhabitants and to manage the available water resources effectively. Furthermore, the objective of subsequent water legislation such as the *National Water Act*, 36 of 1998 and regulatory plans, like the National Water Resource Strategy has been to incorporate international trends in water governance.

The Department of Water and Environmental Affairs (DWEA) divided South Africa into 19 regions, called water management areas (WMA). In this study, attention is focused on what constitutes a catchment and how a catchment management agency (CMA) governs its water resources. A description is provided of the functions of water user associations (WUAs) and how the Internal Strategic Perspective (ISP) of

the Lower Orange Catchment Management Area is, for example, the blueprint from which stakeholders develop their goals.

In this study, the water situation in the Lower Orange Water Management Area is under scrutiny. The focus is on the three main institutional components of water management (the Lower Orange catchment management, the Upington Islands Water User Association [UIWUA] and the //Khara Hais Local Municipality). The progress of the establishment of the Lower Orange Catchment Management Agency is outlined over a period of five years. Meanwhile, the Upington Islands Water User Association was developed and this has grown in stature. The work being done by these institutions is investigated by looking at grassroots effects, especially in respect of irrigation activities. The unique water management circumstances of the //Khara Hais Local Municipality are then investigated along with the plans outlined in their Integrated Development Plan (IDP) and their Water Services Development Plan (WSDP).

Because local irrigation operations consume most of the available surface water in the Lower Orange Water Management Area, irrigation farmers and their activities warrant closer attention. A historical overview is given of the development of irrigation in the region followed by an assessment of the role of two of the most prominent historical figures in Upington, Reverend Adriaan Schröder and Abraham "Holbors" September. Ultimately, however, the focus falls on the current state of irrigation in the area. It is possible to distinguish between the approach of large commercial farming operations and that of smaller irrigation farming units to irrigation. Specific attention is given to the perceptions of irrigation farmers as far as the policies and legislation pertaining to water issues is concerned.

This study will hopefully provide the Department of Water and Environmental Affairs (DWEA), //Khara Hais Local Municipality and organised agriculture with some recommendations on efficient integrated water management strategies. It might well be of value to other municipalities who are experiencing similar problems. The aim has been to identify typical problems and potential disputes between water management institutions and relevant role-players.

Keywords: Water demand management, Integrated water resource management, commons, Tragedy of the commons, sustainable development, Lower Orange water management area, Lower Orange catchment management area, Water user association, Upington Islands water user association, Orange River, policy implementation, policy formulation, Internal strategic perspective, irrigation practices, municipal water management, policy implementation perceptions, hydropolitics, hydro-social contract, good governance, //Khara Hais Local Municipality.

OPSOMMING

In hierdie studie word ondersoek ingestel na waterbestuursbeleid in Suid-Afrika, die uitwerking daarvan op watergebruikers, asook hul persepsies. Die ondersoek begin met die verduideliking van konsepte soos die bestuur van die vraag na water (WDM), asook 'n geïntegreerde benadering tot die bestuur van waterbronne (IWRM). 'n Subdiskoers van die tema handel oor die vraag na waarom die samelewing geneig is om die eiendom van die gemenebes ("commons") te verwaarloos. Garret Hardin (1968) se ingrypende waarnemings oor die "tragedie van die gemenebes" (the tragedy of the commons) word verken in 'n poging om te bepaal watter kwessies toepaslik is by doeltreffende strategieë vir die bestuur van die vraag na water. In die besinning oor die gemenebes, blyk dit dat moraliteit en etiek van belang is. Dit wil voorkom asof die moraliteit van 'n gemeenskap, hetsy wêreldwyd, of binne die bestek van 'n nasionale entiteit, na vore kom in wetgewing en beleid asook in die toepassing daarvan. Terselfdertyd word die relevansie van hidropolitiek, goeie regering en volhoubare ontwikkeling bespreek as teoretiese benaderings wat dit moontlik maak om die verhouding tussen watergebruikers en die water-gemenebes beter te verstaan.

Toegang tot veilige drinkwater word in die *Grondwet van die Republiek van Suid-Afrika*, *Wet* 108 van 1996, beskerm. Sedert die aanbreek van 'n nuwe, veelrassige, demokratiese regeringsbestel in 1994, het die uitdaging ontstaan om toegang tot water aan almal te verskaf en beskikbare waterhulpbronne doeltreffend te bestuur. Waterwetgewing wat hieruit voortgespruit het, soos die *Nasionale Waterwet,* 36 van 1998, en regulatoriese strategieë soortgelyk aan die Nasionale Waterhulpbronstrategie, stel hul ten doel om internasionale tendense in waterregulering te inkorporeer en dan water aan alle bewoners van die staat te voorsien.

Die Departement van Water en Omgewingsake het Suid-Afrika in 19 streke verdeel, wat wateropvangsgebiede genoem word. In hierdie studie word aandag geskenk aan 'n verduideliking van wat 'n opvangsgebied is en hoe 'n opvangsbestuursagentskap sy waterhulpbronne bestuur. 'n Beskrywing word gegee van die funksies van watergebruikersverenigings en hoe die Interne Strategiese Perspektief van

byvoorbeeld die Laer Oranje-Opvangsgebied die bloudruk is van waar belanghebbendes hul doelstellings ontwikkel.

In hierdie studie word die watersituasie in die Benede Oranje-waterbestuursgebied (LOWMA) uiteengesit. Die drie belangrikste institusionele komponente van die regionale waterbestuur (te wete die Benede-Oranje-opvangsbestuursgebied, die Upington Eilande-Watergebruikersvereniging en die //Khara Hais Plaaslike Munisipaliteit word dan in diepte bespreek. Die vordering van die vestiging van die Benede Oranje-opvangsbestuursagentskap (LOCMA) word uiteengesit oor 'n tydperk van vyf jaar. In dieselfde tydperk het die ontwikkeling van die Upington Eiland-Watergebruikersvereniging (UIWUA) plaasgevind. Die werk wat deur hierdie instansies gedoen word, word ondersoek deur die beskouing van die gevolge daarvan op grondvlak, veral met betrekking tot besproeiing. Dan word die unieke waterbestuursomstandighede van die //Khara Hais plaaslike munisipaliteit bespreek aan die hand van planne, soos uiteengesit in hul geïntegreerde- ontwikkelingsplan en hul waterdienste-ontwikkelingsplan.

Aangesien plaaslike besproeiingswerke die meeste van die beskikbare oppervlakwater in die Laer Oranje-waterbestuursgebied verbruik, word die aandag op besproeiingsboere en hul bedrywighede in hierdie studie gevestig. 'n Historiese oorsig word gegee van die ontwikkeling van besproeiing in die streek. Klem word gelê op die rol van twee van die mees prominente figure in Upington, naamlik eerwaarde Adriaan Schröder en Abraham "Holbors" September. Uiteindelik val die fokus op die huidige stand van besproeiing. Dit was moontlik om 'n onderskeid te tref tussen die benadering van die groter boerderybedryf en die benadering van kleiner besproeiingsplaaseenhede ten opsigte van die beleid en wetgewing met betrekking tot watersake. Gevolglik word besondere aandag aan die persepsies van die boere gegee.

Die doel van die studie is om die Departement van Water- en Omgewingsake, die //Khara Hais Plaaslike Munisipaliteit en georganiseerde landbou in hierdie streek te voorsien van voorstelle vir die implementering van 'n strategie vir geïntegreerde waterbronbestuur in die streek. Hierdie voorstelle mag ook van waarde wees vir ander instellings met soortelyke knelpunte. Die doel was om tipiese probleme en dispute tussen waterbestuursinstellings en relevante rolspelers te identifiseer.

Sleutelwoorde: Waterbehoefte-bestuur, Geïntegreerde waterbehoefte-bestuur, gemenebes, Tragedie van die gemenebes, volhoubare ontwikkeling, Benede Oranje-waterbestuursgebied, Benede Oranjewaterbestuursagentskap, Watergebruikersvereniging, Upington Eiland-Watergebruikersvereniging, Oranjerivier, beleidsimplementering, beleidsformulering, Interne strategiese perspektief, besproeiingspraktyke, munisipale waterbestuur, beleidsimplementering-persepsies, hidropolitiek, hidro-sosiale kontrak, goeie regering, //Khara Hais plaaslike owerheid.

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GLOSSARY OF SOME ABBREVIATIONS AND TERMS USED

//Khara Hais	Name of the local municipality serving the town of Upington. The name means "big tree", referring to the tree under which Chief Lucas had his kraal.
AU	African Union.
BEE	Black Economic Empowerment.
Catchment	A land surface area from which rainfall will drain into the watercourse through surface flow to a customary point (South Africa, 1998).
CMA	Catchment Management Agency: statutory body approved by means of a formal government notice.
Commons	Natural resources such as water, which is the common property of all and crucial for the survival of all (Hardin, 1968).
DWEA	Department of Water and Environmental Affairs.
EU	European Union.
Good governance	(The) delivery of political goods to citizens: the better the quality of that delivery and the greater the quantity of the political goods being delivered, the higher the level of governance (Rotberg, 2008).
Hydropolitics	(Hydropolitics) aims to achieve conflict resolution between parties regarding matters of water, through collective and co-operative action (Turton, 2002:14).
Hydro-social contract	(The) unwritten contract that exists between the public and the government with regard to water (Turton & Ohlsson, 1999:2)
ISP	Internal Strategic Perspective.
IWRM	Integrated Water Resource Management: a progressive, interactive process which promotes the co-ordinated planning, improvement and management of water, land and related resources in order to maximise the ensuing economic and social welfare in an equitable manner without compromising the sustainability of ecosystems (Uys, 2003:12).
Lasering	(T)o construct the incline of a piece of land in such a manner that water flowed freely over land by gravity flow to wet and infiltrate the soil (Badenhorst, 2005).

LOCMA	Lower Orange Catchment Management Agency.
LOWMA	Lower Orange Water Management Area.
Orange River	The Orange River is the largest river in South Africa. It originates in the Drakensberg Mountain in Lesotho and flows over a distance of 2200 km westward through South Africa to the Atlantic Ocean (South Africa, 2004).
Pers. comm.	Personal communications (interviews).
SADC	Southern African Development Community.
Sustainable development	(The) relationship between dynamic human economic systems and larger, dynamic, but normally slower changing ecological systems, such that human life can continue indefinitely, human individuals can flourish, and human cultures can develop...(Norton 1992:1).
Tragedy of the commons	(C)oncern about the degradation of the natural environment, especially when many individuals own a resource, such as water, which is the common property of all (Hardin, 1968).
UIWUA	Upington Islands Water User Association
UN	United Nations
Upington	A town in the Northern Cape province of South Africa, served by the //Khara Hais Local Municipality. It was named after Sir Thomas Upington who was a British administrator in South Africa between 1884 and 1886 (//kharahais.co.za).
WDM	Water Demand Management: adaptation and implementation of a strategy (policies and initiatives) by a water institution to influence the water demand and usage of water in order to meet any of the following objectives: economic efficiency, social development, social equity, environmental protection, sustainability of water supply and services, and political acceptability (SA, 1991:25).
WUA	Water User Association: A grouping of water users in a demarcated section of a catchment management area, working together towards a common goal (South Africa, 2002).

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND

This study is an investigation of water management policies in the Lower Orange Water Management Area in South Africa, and more specifically the area under the jurisdiction of the //Khara Hais Local Municipality. It examines the effects of these policies on water users, and their perceptions of such policies. The investigation begins with an explanation of concepts such as Water Demand Management (WDM), Integrated Water Resource Management (IWRM), sustainable development and hydropolitics. Furthermore, there are references to water legislation. Some of this legislation, for example the *Water Services Act,* 108 of 1997 (Water Services Act), *The National Water Act*, 36 of 1998 (National Water Act) is discussed against the backdrop of the National Water Resource Strategy.

The study investigates three main levels of institutional development relevant to water management in South Africa. The first is legislation and national policies; the second is catchment management, in which a greater focus is placed on a regional approach to water management; and the third is a focus on micro-management institutions such as water user associations and irrigation boards.

WDM is a key component of integrated water resource planning, which is in turn the precondition for sustainable water management. WDM refers to controlling the consumption of water rather than having a supply-oriented approach (Abrams, 1996:1). For the purposes of this study, it is imperative to work from a well-founded framework and to consider the official definition of WDM, which is a corollary of sustainable development. The definition of WDM, as formulated by researchers of the Department of Water and Environmental Affairs (DWEA), is that it involves the:

> adaptation and implementation of a strategy (policies and initiatives) by a water institution to influence the water demand and usage of water in order to meet any of the following objectives: economic efficiency, social development, social equity, environmental protection, sustainability of water supply and services, and political acceptability (SA, 1991:25).

In other words, WDM focuses on the way water is used, instead of merely supplying the demand (Turton, 2002:3). By implication, this means that management of the resource is framed within the context of supply and demand. Demand is a crucial factor. By encouraging consumers to use water more efficiently, a participatory environment is created, in which personal concerns with efficient management become a responsibility of the individual consumer.

Within the framework of WDM, the concept of Integrated Water Resource Management (IWRM) was developed. Currently, WDM policies are considered the most effective mechanisms through which WRM is practically implemented. In South Africa, IWRM could only take hold once the WDM principles were more or less established. The paradigm shift that WDM introduced (that of better management of the resource rather that merely supplying the demand) had to take place before the integrated approach to water resource management could take hold (Anon, 2010:1).

Successful IWRM requires that different groups of stakeholders co-ordinate their efforts to realise the primary ideals of WDM. Support can only be achieved by the involvement and participation of the communities from the initial planning phase to the implementation. Community education, community involvement and acceptance, community ownership and responsibility for IWRM issues are prerequisites for the satisfactory solution of such issues. The need for effective community participation in the IWRM process cannot be over emphasized. IWRM is thus an approach that seeks to reach an equitable balance between the need to protect and sustain water resources on the one hand, and the need to develop and use them on the other. This is a "progressive, interactive process which promotes the co-ordinated planning, improvement and management of water, land and related resources in order to maximise the ensuing economic and social welfare in an equitable manner without compromising the sustainability of ecosystems" (Uys, 2003:12). The importance and manner in which public participation takes place, is further discussed in chapters 3 and 4.

IWRM has in recent years been subjected to considerable criticism. It is argued, for example, that similar to adaptive management, IWRM tends to show certain inconsistencies. Authors such as Wietske, Macintosh & Jeffrey (2008) thus recommend that because of challenges in the definition of the concept, its evidence and the availability of sufficient capacity, it may be necessary to give greater attention to the effective translation of research into practice, science into policy and ideas into accomplishments (Madema, *et al.*, 2008). IWRM is a strategy followed within the water sector and forms part of efforts to achieve sustainability in the development and management of this vital resource.

According to Voinov & Smith (2008), there was initially no substantive definition for sustainability until the publication in 1987 of the famous Brundtland Commission report entitled *Our common future*. The United Nations World Commission on Environment and Development held a conference from 8 to 19 June 1987 in Nairobi and the report, compiled for the General Assembly of the UN was named after the chairperson of the commission, Gro Harlem Brundtland. The report revived interest in sustainability. Subsequently a plethora of definitions emerged. According to Voinov & Smith (2008) most definitions of sustainability stem from the relationship between human beings and the natural resources they use. The Brundtland report (WCED, 1987:7) supports this view by stating:

> sustainability requires views of human needs and well-being that incorporate such non-economic variables as education and health enjoyed for their own sake, clean air and water, and the protection of natural beauty (WCED, 1987:1).

Sustainability also relies on discourses in ethics for its content. Norton (1992:1), claims that

> sustainability is a relationship between dynamic human economic systems and larger, dynamic, but normally slower changing ecological systems, such that human life can continue indefinitely, human individuals can flourish, and human cultures can develop – but also a relationship in which the effects of human activities remain within bounds so as not to destroy the health and integrity of self-organizing systems that provide the environmental context for these activities (Norton 1992:1).

In other words, humankind needs certain resources to continue to develop and flourish, but this should not be at the cost of the environment. The concept of sustainability and that of sustainable development are closely linked. In recent years there has been increasing emphasis on the issue of sustainable development. A widely-used definition is that provided by Bergh & Van der Straaten (1997:23) who describe it as:

> development which meets the needs of the present without compromising the ability of future generations to meet their own needs.

Integral to sustainable development is the issue of a sound environment where nature comes into its own right and can justifiably claim to be respected, and not exploited. IWRM then has to perform a strategic balancing act between promoting development while at the same time preserving the environment. When we speak of modern irrigation and available water resources, the fine line between the two becomes somewhat more complex. Within this context, IWRM is essential for the maintenance of the sustainability of water resources and the environment, as well as economic efficiency and social development (Voinov & Smith, 2008).

The move towards an integrated resource management approach takes considerable time, effort and commitment. Players at various levels in the institutional and political sector need to be informed. It is also imperative to be aware of prevalent international trends in water policy strategies, the first of which is the international influence on water policy (Turton, 2002). In this study, some of these international tendencies toward IWRM, and subsequently the South African answer to the call to improved water management, are examined. These trends, together with the statutory framework, will receive comprehensive attention in Chapter 2.

1.2 INTERNATIONAL TRENDS IN WATER POLICY FORMULATION

At the 1992 United Nations' Conference on Environment and Development (UNCED), also known as the Rio Earth Summit, an action plan and blueprint for sustainable development, called Agenda 21, was adopted by representatives of almost 200 governments from all parts of the world. It was stipulated in this document that by the year 2000 all countries should have national action programmes for water management, based on catchment basins or sub-basins, and

efficient water use programmes. These would possibly also include the integration of water use and other resource planning development, as well as the conservation, demand management through pricing, regulation, conservation, re-use and recycling of water (Abrams, 2000:3).

Ten years later, on 2 September 2002, collaboration between the African Union (AU) and the European Union (EU) saw the launch of the declaration on the 'Strategic Partnership on Water Affairs and Sanitation'. This plan was announced at the time of the World Summit on Sustainable Development held in Johannesburg, South Africa, in 2002.

At the summit it was recognised that water resources, good-quality water-related ecosystems, water supply and sanitation are all vital for food production, security, health and the wellbeing of people, and that their effective management can make a significant contribution towards sustainable development. Most importantly, it was stressed that water policy and water governance mean advancement on the three pillars of sustainable development, namely society, economy and environment. The AU/EU also welcomed the new strategic long-term partnership between governments and significant stakeholders (AEU, 2002:3).

Despite the fact that some significant plans have been mooted on both the international and national level for the implementation of WDM systems, little has been done at grassroots level. A case in point is that of the Lower Orange Water Management Area (LOWMA). It appears that distrust between certain stakeholders, such as irrigation farmers and the local municipality has hampered progress. This is discussed in greater detail below.

1.3 THE STATUTORY FRAMEWORK IN SOUTH AFRICA

In order to understand the changes in South Africa's water policies, it is essential to examine the national policy and regulatory context. *The Constitution* no. 108 of 1996 (the Constitution) forms the backdrop to this process.

Section 27 (1)(b) of the Constitution guarantees everyone the right of access to enough safe drinking water (South Africa, 1996:50). The right of access to water is however not the same as having a right to the water itself. The emphasis is on the

word 'access'. As laid down in the subsequent sections of the National Water Act, the Constitution appoints the state as the custodian of South Africa's water resources. Section 27 also declares that the state must take reasonable legislative measures to achieve the realisation of this right. Against this background, and in order to adhere to these stipulations, legislation on water use has been devised. Some of this legislation is discussed extensively in Chapter 2.

1.3.1 *National Water Act*, 36 of 1998

The principle that guides the National Water Act is that water is a national resource, owned by the people of South Africa and held in custodianship by the state. This allows the state, in theory, to take total control of the consumption of the resource (Glazewski, 2000:257).

The National Water Act (in section 2) provides for the establishment of 19 catchment management agencies, each with its own area of jurisdiction. Each agency must draw up a management strategy for the area and will have to perform vital functions in compliance with the National Water Act (South Africa, 1998). These agencies must actively promote community participation and try to eliminate potential areas of conflict between stakeholders.

Typically the stakeholders in these agencies are the Department of Water and Environmental Affairs (DWEA), local government, irrigation boards, industries and consumers in general. It is the constitutional function of local government to provide services to local consumers and the constitutional responsibility of the central government to ensure that this is done within the broad national policy framework and to acceptable standards.

Because it may take years before local government will be fully functional, especially in rural areas, the DWEA will play a role over the medium term in providing support to local government. It should thus be made clear that local government must oversee the business of the 19 catchment agencies until they are fully operational, but that the agencies remain 'employees' of national government. The challenge will be to manage this process in a way that neither builds a large central bureaucracy nor disempowers local authorities (South Africa, 1998).

With the management agencies in operation and able to constantly monitor the situation, legislators and key stakeholders assumed that a more effective system of management would become of the order of the day. However, from conversations held with some stakeholders in the irrigation business and the //Khara Hais Local Municipality, it appears that a number of problems are jeopardising the prospects of effective management.

Firstly, there is a tug-of-war between, local government and organised agriculture. This means that there is a struggle between these two sectors over the control and access to water as well the management of water. Secondly, there is a lack of infrastructure and management skills on the implementation level. Thirdly, circumstantial evidence suggests that organised agriculture is reluctant to accept a reduced water allocation. Lastly, local authorities now have to purchase water from the DWEA. In turn they have to allocate water supplies in a delineated hierarchical order. Domestic water allocation enjoys priority which means that a considerable amount of water is unavailable to consumers in the agricultural industry. An essential element of the IWRM strategy is therefore to establish a systematic and long-term initiative to enable irrigators and the regulatory authorities to improve the efficiency of water consumption (Malzbender *et al.*, 2005:5).

While the National Water Act governs the management of the national water resource, the Water Services Act outlines the responsibilities of municipalities in the process of delivering water and sanitation services.

1.3.2 *The Water Services Act,* 108 of 1997

The Water Services Act outlines in great detail the issues pertaining to the accessibility of water. It secures the right of access to safe drinking water, thereby codifying section 27 of the Constitution (1996). The Water Services Act specifies the responsibility of water services authorities. They have a duty towards all consumers in their respective areas of jurisdiction to ensure a continuous delivery of efficient, affordable and sustainable access to water services. The Water Services Act also outlines certain requirements on transparency, for instance the responsibility of each water services authority, usually the municipality concerned, to prepare a water services delivery report which states how this authority intends to deliver services. In

the case of //Khara Hais Local Municipality, the local Water Services Development Plan (WSDP) is the manifestation of this requirement and it is discussed in detail in Chapter 4.

1.4 //KHARA HAIS LOCAL MUNICIPALITY

//Khara Hais is the name of the local municipal authority of Upington that functions under the larger Siyanda District Municipality.

In terms of its water administration //Khara Hais falls under the authority of the Lower Orange Water Management Area (LOWMA). The biggest river in South Africa, the Orange River, flows through this district and communities have been building their livelihoods around this mighty river for many centuries (Bate & Tren, 2002:36).

The establishment of the Lower Orange Catchment Management Agency (LOCMA), as has been the case with the other 18 agencies, is a medium-term process, originally scheduled for completion within seven years (beginning in 2000). Several factors have influenced the project and numerous steps and planning procedures still have to be pursued (Conradie, 2004). The LOCMA can only be established once the *governing board* has been appointed. In the meantime, work is being done according to the so-called Internal Strategic Perspective (ISP). There is an overarching ISP for the Orange and Vaal River System and in addition, a specific ISP for the LOCMA. These documents represent the DWEA's view on how WDM should be practised. An ISP provides a framework for the DWEA's management of each water management area until it is possible to hand over the management functions to the established LOCMA. These procedures are supposed to ensure consistency when reacting to requests for new water licences and informing water users on how the DWEA will manage the water resource within the area of concern (South Africa, 2004:15).

The importance of creating public awareness was emphasised. Public participation was deemed invaluable in the process of establishing the LOCMA. Stakeholders and their specific needs had to be identified and capacity building and empowerment of stakeholders had to be dealt with. It was decided that the most important issue of empowerment was the transfer of DWEA-knowledge to leaders of different stakeholder groups and to make sure they became 'water literate'. It was found that

water services, poor communication and confusion about tariffs might become major stumbling blocks.

1.5 PROBLEM STATEMENT

As far as national policies in IWRM are concerned, and thus those of the LOWMA and the //Khara Hais Local Municipality, there are many disparities between the quantity of water the different communities are allowed to use and the purposes for which the water is used (Emmet & Hagg, 2001:315). Irrigation farmers are still using more water than any of the other interest groups, regardless of the fact that there are communities who do not have sufficient water supplies for domestic use. The reasons for these disparities are defined and examined in this study. Addressing them was problematic because communication between stakeholders proved difficult in a water management area that extends over an area of more than 100 000 square kilometres, of which 65 000 square kilometres comprises the vast Kalahari Desert, the Kgalagadi Transfrontier Park and the former Bushman Land. Furthermore, the various stakeholders, specifically local government and organised agriculture, appear suspicious of each other's motives and have reservations about the ways and means to deal with problems. There are also a lack of knowledge about water related policies and legislation. Public participation is a compulsory requirement in the implementation of water policies in South Africa as is evident in the discussions about legislation in chapter two. The problem is that the institutions such as Water User Associations (WUAs) rely on the participation of representatives of different groups of water consumers (stakeholders). These people are civilians and therefore not familiar with policy implementation, legislative concepts or the functions of institutions such as WUAs.

In view of the above-mentioned problems, the focus of this study is an investigation into the implementation of water demand management policy strategies; how stakeholders perceive these policies; and how these perceptions and the relationships between stakeholders that result from this, influence the effective implementation of policies.

To delineate this investigation a number of research questions and research objectives were identified.

1.6 RESEARCH QUESTIONS

The following research questions were posited:

- What is the internationally accepted policy on WDM and IWRM?
- What is meant by the concept sustainable development in WDM and IWRM in the context of the LOWMA?
- What does IWRM entail?
- What is the importance of IWRM in southern Africa?
- What is the current statutory and regulatory framework for IWRM in South Africa?
- What are the current IWRM strategies in the Lower Orange Water Management Area, //Khara Hais Local Municipality and organised agriculture in the region?
- What is the current climate of interaction between various stakeholders as far as IWRM is concerned?
- What recommendations can be made to the DWEA, the //Khara Hais Local Municipality and organised agriculture that are in line with current trends in IWRM?

These have formed the basic foundation for further detailed questions were formulated in the process of conducting the research.

1.7 RESEARCH OBJECTIVES

In an effort to answer the questions posed above, the following research objectives were identified:

- To provide an in-depth discussion of internationally accepted policy guidelines on WDM and IWRM;
- To provide a theoretical exposition of the concept sustainable development within the context of IWRM in LOWMA;
- To explain what IWRM entails;
- To show the importance of IWRM, specifically in southern Africa;
- To discuss the current statutory framework for IWRM in South Africa;

- To conduct an in-depth investigation into the current South African IWRM policy-framework;
- To conduct a micro-investigation of IWRM strategies in the Lower Orange Water Management Area, //Khara Hais Local Municipality and organised agriculture in this region;
- To investigate and report on the current climate of interaction between stakeholders as far as IWRM is concerned; and
- To provide //Khara Hais Local Municipality, the local DWEA agency and organised agriculture with a set of recommendations that are in line with current trends in public management and governance, specifically in respect of IWRM.

This study is intended to provide the DWEA, //Khara Hais Local Municipality and organised agriculture with recommendations on efficient water demand management and the successful implementation of such policies. It might well be of value to other municipalities who are experiencing similar problems. The aim was to identify typical problems and potential disputes between local government and other role-players.

1.8 LEADING THEORETICAL ARGUMENTS

The following theoretical arguments were formulated:

- Implementing policies within IWRM on local government level in South Africa is multi-faceted (Turton & Henwood, 2002:23). In the case of the Lower Orange Water Management Area and its local water consumers, there is a distinct breach of confidence as a result of apparent misunderstandings (Conradie, 2004).
- There are significant challenges in respect of effective communication, commitment and expertise among stakeholders (local government, DWEA, and irrigation farmers). It is therefore necessary to determine how an effective strategy of IWRM can be introduced in this region.

In view of the fact that considerable attention has been given to a qualitative approach many of the perceptions presented in the text could in their own right be interpreted as potential points of departure for further theoretical ideas.

1.9 METHODOLOGY

This investigation was conducted within the framework of the generally accepted methodological strategies pursued in Public Management. However, there is a greater emphasis on qualitative methods in the interpretation of aspects of IWRM.

1.9.1 Literature survey and databases

A comprehensive consideration was made of the available literature on the theme of IWRM, internationally and nationally. The following bibliographical resources were consulted:

- Sabinet Online and NRF Nexus;
- Catalogue of books: North-West University libraries;
- Catalogues of books from other South African tertiary institutions;
- Nexus database: Theses and dissertations of South African universities;
- Public Administration journals, national and international;
- All available electronic databases and,
- Published and unpublished documentation issued by relevant government departments.

For the purposes of this study a distinct bibliographical category (webliography) was created for sources consulted on the internet. It was also established that no similar study with the same title has been published.

1.9.2 Empirical techniques and methods of investigation

This study is qualitative in nature, and was conducted to explore the perceptions water users have about policies that affect their lives. Although this investigation is primarily situated in the field of the humanities, some information was generated as data and analyses in the field of social sciences.

Qualitative data collected for the purposes of this study was used to correlate and contextualise the existing data. For example, census information was available from the municipality on the number of households and their access to drinking water.

Qualitative research is conducted in an investigation that seeks answers to questions by:

- Systematically using a predefined set of procedures;
- Collecting evidence;
- Producing findings that were not pre-determined; and
- Presenting a set of generalised findings that are applicable beyond the confines of the study (Ospina, 2000:2).

At first, qualitative research can be used to understand a formulated research problem, but can evolve to highlight struggles beyond the confines of the proposed research problem. This research is useful in ascertaining information from people about their values, opinions, behaviours and social status. It is loose in content and can locate areas of relevance that could be overlooked by more determinist strategies of the collection of information in the field of non-tangible states of real awareness. Qualitative research can provide documented descriptions of how people experience a given research issue. The 'human' side of the problem thus receives attention. Qualitative research can also provide the substance of material to interpret quantitative realities of a situation at a human level (Mouton, 1996:20).

The analytical-descriptive method was also used. This is defined as a method where the detail of an event, process or phenomenon is considered in order to obtain a clear understanding of the whole (Mouton, 1996:36). This methodology was used because it allowed the researcher to describe and analyse IWRM. It was then possible to track its significance back in history to create a comprehensive background. It also linked findings to the specific situation in the LOWMA.

Official documentation on IWRM of water management institutions in the LOWMA was investigated. Semi-structured interviews were conducted with selected members of all interest groups, and a qualitative questionnaire was compiled to glean the opinions of stakeholders in the catchment management agency. According to Mouton (1996:36), semi-structured interviews make it possible to gather data by way of a flexible set of questions that form the backbone of the interview. The researcher then adapts the questions and takes careful notes on the answers provided by respondents. Additional classificatory questions may also be integrated into the interview.

The snowball-sampling method was used to select the sample from which the required data could be collected. This method allows the researcher to identify subjects, providing him/her with the names of other potential subjects (Vogt, 1999:56). Snowball sampling can be placed within a wider set of link-tracing methodologies which seek to take advantage of the social networks of identified respondents to provide a researcher with an ever-expanding set of potential contacts (Spreen, 1992:43). This process is based on the assumption that a 'bond' or 'link' exists between the initial sample and others in the same target population, allowing a series of referrals to be made within a circle of acquaintance (Berg, 1988: 529).

Irrigation water consumers, along with officials of the local government, the local Water User Association and the DWEA were interviewed for the purposes of this research project. Three main consumer groups were identified to highlight the contrast of how water is utilised; to what extent it is valued; and how the implementation of legislation is experienced. These groups were:

- Farmers operating small irrigation projects;
- The management of large local industrial irrigation operations; and
- The staff of these large irrigation operations.

From a governance and institutional management perspective, representatives of the following institutions were interviewed:

- Officials of the DWEA concerned with the LOCMA;
- Officials of the Upington Islands Water User Association; and
- Officials of the //Khara Hais Local Municipality.

The focus ultimately fell on the relationship between irrigation farmers and government institutions, since these farmers are using more water than any of the other consumer groups. They have a vested interest in the amount of water available. It is crucial for them, under conditions of extreme aridity and heat, to irrigate their lands. The purpose of this study is not to take sides, but to give a voice to each of these interest groups. Their perceptions about the water management

policies implemented in this region since 1998 were noted and accounted for in detail.

The last chapter provides the explicit problems identified in each area. Recommendations are then made on potential ways to address these problems.

1.9.3 Division of chapters

There are five chapters in this study.

Chapter 1: Introduction

This chapter outlines the problem statement; goals; motivation; methods; literature; and conceptualisation of this study. It provides an overview of the focus of this thesis.

Chapter 2: Theoretical underpinnings of the aquatic commons

General definitions and theories in WDM are analysed. Specific attention is given to the commons theory of Garret Hardin. Views of the international arena on WDM are examined with specific reference to the African Union (AU) and the European Union (EU). This chapter deals with global and international policies in Integrated Water Resource Management. These policies were accepted by the representatives of national communities at summits such as the World Summit for Sustainable Development in 2002, where the objective was to obtain consensus on the way countries reach agreement on certain modes of operation. Furthermore, the way South Africa applies these policies is examined.

Chapter 3: Catchment management, municipal water management and irrigation in South Africa

The role of Catchment Management Agencies and Water User Associations is discussed in this chapter. Institutional development and the role of stakeholders in establishing Catchment Management Agencies and Water User Associations are also discussed. In addition, the history and importance of irrigation in South Africa is investigated and lastly, the responsibilities of municipalities with regard to water management are highlighted.

Chapter 4: Empirical research findings

The history and importance of irrigation in the Lower Orange Water Management Area are discussed in this chapter, along with the perceptions of irrigation farmers in the area on water management policies and the implementation of these policies. Perceptions of the local DWEA officials and of the Upington Islands Water User Association are provided.

This chapter also investigates the water commons in //Khara Hais Local Municipality, management strategies that are followed and the perceptions of public officials on the implementation of these policies.

Chapter 5: Conclusion and recommendations

Recommendations in respect of effective WDM in the Lower Orange Water Management Area, //Khara Hais Local Municipality and organised agriculture are explained in this chapter. Typical problems that have emerged will be discussed here. Certain recommendations are made. These will be based on generic trends in WDM in other parts of South Africa. At the same time, there is an attempt at making certain qualitative recommendations. These are based on the unique environment of an arid region that is noted for its high output of agricultural production from irrigation farming activities, as well as its rapid urban growth. Finally, a basic training module is provided to help officials and other stakeholders to become more water literate.

CHAPTER TWO

THEORETICAL UNDERPINNINGS OF THE AQUATIC COMMONS

2.1 INTRODUCTION

In this chapter an exposition of global policies on water management is provided and recent legislative developments in South Africa in response to these international strategies are examined. Furthermore, the relevance of environmentalism and anarchism in the water management realm are explained. The final and most important section deals with an investigation of the concept of hydropolitics and the significance of this theory in the context of our understanding of modern water management. Certain underlying theoretical concepts such as the commons theory, hydropolitics, sustainable development and Integrated Water Resource Management (IWRM) also feature in this discussion.

In the current state of global overpopulation, there is a need to provide humankind with basic natural resources to secure survival. One of these resources is safe drinking water. The sustainable and efficient use of this vital resource is one of the major challenges facing governments in many parts of the world. All too often, science and technological solutions are hurriedly sought. Instead, this study proposes that IWRM – a management strategy directly related to effective governance – be used to meet this particular challenge. IWRM is suggested against the backdrop of society's tendency to neglect its common property.

When Garret Hardin's groundbreaking observations on the "tragedy of the commons" (1968) are explored to identify issues of relevance in effective water demand management strategies, it becomes clear that morality and ethics are

involved. The morality and values of society, be they global or national, are manifest in both legislation and policy. It must first be established just how effectively these morals and ideals are implemented.

Only relatively recently was access to water recognised as a viable human right in the national context. For example, South Africa was one of the first states in the world to stipulate in its Constitution (South Africa, 1996:57) that it is a basic human right for all people to have access to clean drinking water. This principle has been present in international law, albeit indirectly, for many years. The right to health, a crucial issue in combating societal disease and promoting sound principles of hygiene, is addressed in Article 25 of the Universal Declaration of Human Rights (1948), which stipulates:

> Everyone has a right to a standard of living adequate for the health and well-being of himself and of his family (UN, 1948).

At the Johannesburg Earth Summit for Sustainable Development in 2002, water itself was recognised as an independent right. This recognition ensured that sustainable management of water became a priority.

The concept of IWRM is a fairly recent one that outlines the most desirable primary approach to the sustainable management of water resources worldwide. At the onset of the twenty-first century, developing societies in all parts of the world were struggling with a major challenge: the provision of the necessary facilities to supply all people with access at least to safe drinking water (Glieck, 1998:85). Apart from the natural humanitarian right that winds like a silver thread through discourses on national water issues, indications of scarcity and security issues lurk. Water, a natural resource that should be accessible to all and sundry worldwide, has become scarce. Moreover, it may even carry health threats.

Safe drinking water is a priority in South Africa. Since the advent of a new multiracial democratic government in 1994, the challenge has been to provide access to water and manage available water resources effectively. Subsequent water legislation, like the *National Water Act,* 36 of 1998 (National Water Act) and policies such as the National Water Resource Strategy, have a dual objective. They must incorporate international trends in water governance and supply water to all the inhabitants of the country.

Way back in the 1960s, Hardin emphasised the need to protect natural resources to secure the survival of all the people on the planet. He also underlined the necessity of making the requisite institutional developments to ensure that these resources would be used in a sustainable manner. In discussing this theory, focus is placed on the depletion of water as a natural resource. He sees population growth as one of the reasons for this state of affairs and suggests that the crisis requires a sense of morality and individual commitment which should be actively guided by communities and the government. Hardin's observations will be discussed at some length in this chapter.

The ideology of anarchism and misconceptions about this are also discussed. The focus then moves to an examination of lawlessness as an occurrence in the aquatic realm; this is used to illustrate the tragedy of the commons. In addition, the theory of IWRM is discussed and attention is given to the place of hydropolitics. What role does hydropolitics play in IWRM as a means of dealing with the issues outlined above? Finally, international trends and South Africa's response to international policies and domestic needs is examined.

2.2 THE COMMONS THEORY

The commons theory stems from the idea that resources used in common will eventually degrade and be overexploited. This notion is therefore relevant to the study of water management. Because water is a finite resource, it is essential to motivate management strategies which strive to conserve it. In the context of water issues in South Africa, the commons theory is relevant since this theory places emphasis on equality. In South Africa, equal right to access to water did not exist before 1994 as far as access to municipal water and irrigation water goes. After the first democratic elections in South Africa in 1994 and the subsequent changes to water legislation, the most significant change was that of the abolishment of the concepts of "private owned" and "public" water. The emphasis now (as is evident in the discussions about water legislation in South Africa later in this chapter) is on access to water for all. Irrigation farmers in South Africa are not as accepting of these changes yet, as is discussed in chapter 5.

In his article, Garrett Hardin (1968:1243) introduced the expression "tragedy of the commons". It highlights his concern about the degradation of the natural environment, especially when many individuals own a resource, such as water, which is the common property of all. The tragedy of the commons has proved a useful concept for understanding how we have come to the brink of numerous environmental catastrophes. Society faces a dangerous situation, created not by malicious outside forces, but by the apparently benign and innocent behaviour of individuals acting on their own accord.

In his narrative Hardin depicts a pasture which is 'open to all'. He invites us to imagine that animals graze in fields that are part of the commons. Individuals are motivated to add to their flocks and increase their personal wealth. Yet, every animal contributes to the total degradation of small parts of the commons. Even if the degradation by an additional animal is relatively small in relation to the gain in wealth for the owner, this pattern of consumption and accumulation, if pursued by all the owners, could ultimately lead to the destruction of the commons. Being human, each owner is of course eager to add to his/her flock and therein lies the tragedy. Each person is locked into a system that compels him/her to increase their personal herd without limits – in a finite world. As Hardin (1968:1244) puts it: "Ruin is the destination toward which all men rush, each pursuing self-interest in a society that believes in the freedom of the commons". Further consideration will be given to the morality of the consumption and conservation of the water commons under the headings of population growth; community and individual responsibility; and government responsibility.

Population growth. The tragedy of the commons concept is a class of human problems that cannot be resolved by means of technical solutions. One of these is the 'population problem'. The role of population growth is especially controversial. Hardin (1968:1243) argues that people who are anxious about the population problem are generally individualists. They cherish this individualism because it implies freedom; they see freedom as a gift. However, this gift is restrictive because the more the population overburdens the capacity of the environment, the more freedom must be sacrificed.

The tragedy of the commons can also be described as a social trap, a conflict over resources between individual interests and the common good. The conflict arises when there is an inclination towards free access and a simultaneous unrestricted demand for a limited resource. Hardin argues that the population has a natural tendency to maximise, "to achieve the greatest good for the greatest number" (Hardin, 1968:1244). Merely surviving is simply not good enough. The population wants to consume as much as possible for maximum enjoyment.

The problem is that consumed resources are not maximised along with this process. The population grows, but natural resources, such as drinking water, do not. The supply is finite and it may also become contaminated. If used excessively water is exhausted before the supply can be restored to its original position in the hydrological cycle. At some point in time, the realisation dawns on a society that the prevailing trend of water consumption will not sustain the population indefinitely. This being so, the population would have to show zero growth to avoid depletion of this natural resource. No South African community has ever shown zero growth. Indeed, most have a significant growth rate. Hardin proposes that there is no technical solution for this problem; he suggests that basic morality has to be brought into play to find solutions (Hardin, 1968:1244).

Community and individual responsibility. According to Schultz & Holbrook the theory of the tragedy of the commons can be referred to as the "commons dilemma" which they describe as:

> a phenomenon in which the members of a social group face choices in which selfish, individualistic, or unco-operative decisions, though seeming more rational by virtue of short-term benefits to separate players, produce undesirable long-term consequences for the group as a whole (1999:218).

In other words, having the freedom to take as much water for one's own individual short-term benefit may in the end have a negative long-term impact on the particular society. Individuals must become their 'brothers' keepers'. The shared responsibility must grow into one where "I shall use less so that in the future we shall all have some water".

Hardin (1968:1245) uses the words "held in common", referring to the notion that the resource is owned by no one; instead it is owned collectively by the group, all of

whom have access to the resource. Resources held exclusively by individuals, even if the individual destroys the resource, are not an example of the tragedy of the commons. Hardin has in mind a natural resource, like water, which is not privately owned, but accessible to all. This is necessary for the survival of humanity.

In his analysis of the theory, Elliot (1997:1) claims that although it may be true that individuals who seek to maximise their material consumption contribute to the exploitation of the world's commons, it is also true that those who follow rarely question principles of humanitarian ethics. The ethics mentioned are to save lives; relieve human misery; prevent and cure disease; and foster universal human rights (Elliot, 1997:1). Is it then possible that human rights might turn against humanity, become detrimental to society as a whole? For instance, the right to live a healthier life by means of advances in technology ensures that humans in general live longer, which means that natural resources come under more pressure to cope with the demand.

Government responsibility. Water plays a vital role in the social and economic development of all societies. The demand for water is increasing and because of over-consumption, mismanagement and climatic change (in itself a humanly induced condition in the era of modernity), the relative scarcity only increases. Ultimately, the moral responsibility lies in the potential to recognise natural resources as common property. The result to this is that they require management. Various restrictions by means of legislation are placed on the use of resources, which detracts from the freedom of individuals, but will ultimately preserve and nurture other freedoms. Complete freedom will inevitably lead to tragedy. Herein rests the tragedy of the commons. By developing legislation to manage water resources on the planet, global organisations and governments alike are able to reduce consumption of the resource, which may terminate certain freedoms (like recreational use), but will preserve other freedoms, such as life itself (Schultz & Holbrook, 1999:218). To manage natural resources such as water, an understanding of the complex connection between global, national and local management regimes within a rapidly developing economic, political and institutional transformation, is necessary.

Another opinion about Hardin's theory is that of De Young (1999:1). He argues that the tragedy of the commons lies in the fact that each man is locked into a system

that compels him to increase his possessions without limit – in a world that in itself is finite. We all rush headlong into inevitable ruin trying to prevail in a society that believes in the freedom of the commons. De Young also claims that to avoid the inevitable tragedy, the nature of the resource must be kept in mind. For tragedy to be inevitable, the consumption of the resource must be depriving others of using it, and it must be possible to overuse the resource. The water commons certainly qualifies in this instance. Another precondition for an inevitable tragedy is the access to the resource. A tragedy is more likely to ensue in a situation where restraining access to the resource is costly, impractical or impossible (Feeny *et al.*, 1990:8). As argued earlier, restraining access to the water commons takes place by means of legislation and governance; both are attempts to protect and sustain the water commons. When implementation of legislation fails, however (because of cost, impracticality or improbability), we find a new addition to the concept of the tragedy of the commons: the tragedy within a tragedy. Lawlessness may then result, and if not effectively managed, this degenerates into anarchy.

2.3 ANARCHY AND ANARCHISM

These are two of the most misconstrued concepts in political science theory, conjuring images of chaos and violent protest. According to Hirshleifer (1995:19), anarchy does not mean without rules, but is a philosophy and social system without rulers. Some people incorrectly define anarchy as no rules or boundaries, but that most certainly would be a world of chaos and confusion. The distinction between rules and rulers is important. Likewise, anarchy does not mean a social system without leaders. In any group of people certain individuals will exhibit or demonstrate special or unique skills and abilities to lead others and to coordinate individual actions. Thus, anarchy is not barbarism. Anarchy is not Utopian or idealistic but a realistic logical conclusion to the principles of self and trespass. Anarchy as a social system contains a presumption of self-government. Anarchy depends upon the concepts of reciprocity, mutual benefit, free association, and voluntary exchange. Philosophical anarchists are not against law and order, but against the fiat legislation and rule of a privileged or self-appointed few. Philosophical anarchists oppose coerced, fiat, dictatorial law and social systems (Hirshleifer, 1995:20).

According to Brown (1993:12), the popular understanding of anarchism is that of "a violent, anti-State movement", but that anarchism has a much more subtle tradition than outright opposition to government power. Anarchism is a philosophy — a social system. Anarchism is a conscientious decision to honour the freedom to choose without fear of any unsolicited human action against another individual that deprives the offended individual of personal interpreted happiness. Anarchists oppose the idea that government is necessary for an ordered society and therefore advocate a more co-operative and non-hierarchical form of socio-political and economic organisation. Generally, the words anarchism and anarchy refer to 'chaos' and 'lawlessness'; they imply that anarchists desire social chaos. According to Ehrlich (1996), anarchism is primarily a "movement against hierarchy, which is the organisational structure that embodies authority".

Sheen (2009) argues that anarchism is "the absence of a master or sovereign", which can lead to anarchy (lawlessness and chaos). In other words, anarchism is a political theory that aims to create a society which has no political, economic or social hierarchies, and within which individuals freely co-operate as equals. Anarchism opposes all forms of hierarchical control, be they communist or capitalist. It is thus seen as harmful to the individual and his/her individuality and is perceived by some as unnecessary. The state is formed by the delegation of power into the hands of the few, so it is obviously based on hierarchy. This delegation of power means that elected representatives become isolated from the mass of people who elected them. The empowered representatives are now beyond the control of those who chose them in the first place. In addition, because the elected representatives are in a position of authority to take decisions, a bureaucracy develops around them to aid in the processes of decision-making. In other words, this bureaucracy (the administrative system), due to its control of information and its permanency, soon has more power than the elected officials. This means that those who serve the people have more power than those they serve, just as the politician has more power than the electorate that voted him/her into power. All forms of state-like (i.e. hierarchical) organisations inevitably spawn a bureaucracy. This bureaucracy soon becomes the *de facto* focal point of power in the structure, regardless of the formal rules. This empowerment of a bureaucracy and the accompanying marginalisation and disempowerment of ordinary people is the key reason for anarchist opposition to

the state (Willet, 2009). Willet also reminds us that political philosophers have been discussing the nature of man and the need to be governed. Yet, the main questions remain: Are we fundamentally bad and should we therefore expect to be treated as such? Machiavelli, as far back as the early sixteenth century, observed:

> It is necessary for him who lays out a state and arranges laws for it to presuppose that all men are evil and that they are always going to act according to the wickedness of their spirits whenever they have free scope (Machiavelli, 1513).

Or are we fundamentally bad but capable of good if we are properly governed? According to Willet (2009) we have a real tendency to co-operate whenever possible. Since this tendency is however not perfect, cheating is also a natural instinct – which can only be partially controlled by our inclination to co-operate.

It seems then, that in social contexts, anarchism relies on people to trust one another and not to cheat, therefore making the existence of government unnecessary. Since cheating and taking more than we deserve, is part of our nature, government is necessary to avoid chaos and lawlessness. When government puts forward legislation, those affected by it want to co-operate. But, importantly, if government does not have the capacity to implement its own laws, chaos and lawlessness ensue. However, in this instance, those who are supposed to adhere to the law are not to blame for the chaos; the blame for this parlous state of affairs then shifts to those who are unable to enforce the laws.

What is important for the purposes of this study, is to assume that anarchists (those who believe in the ideology of anarchism), are fundamentally pro-ecology. According to Sheen (2009), capitalism by its very nature must expand, creating new markets, increasing production and consumption, and so invading more ecosystems, using more resources, and upsetting the interrelations and delicate balances that exist within ecosystems. It is impossible, in principle, for capitalism to solve the ecological crisis, because 'grow or die' is inherent in its nature.

> As long as capitalism exists, it will necessarily continue its endless devouring of nature, until it removes the organic requirements for human life, of which water is a major component (Sheen, 2009).

With the explanation of anarchism and anarchy in mind, the section that follows describes the possible outcome of the absence of hierarchal systems in society.

2.3.1 Lawlessness in irrigation

Lawlessness ensues when the absence of a hierarchical institution leads to disorder. An example of existing lawlessness in irrigation is in the case of irrigation practices along the Liebenbergsvlei River in the Eastern Free State province of South Africa. It appears that irrigation farmers in this region have become anarchists (lawless) either by choice, but more likely from sheer desperation. They want to adhere to the legislation (the National Water Act), but the DWEA simply does not have the capacity to implement these laws effectively. This situation is discussed at length in Chapter 3 and illustrated further in Chapter 4. The main problem seems to be providing water licences in a timely manner to irrigation farmers who applied legally for these as required by law.

According to Smit (pers. comm., 2009) and Claasen (pers. comm., 2009), two lawyers who participated in semi-structured interviews, there is a specific process that must be followed when applying for a water licence.

The DWEA registers land which is to be irrigated. The moment this registration takes place, the farmer receives a certificate confirming that his/her irrigation property has been registered. This is, however, NOT a legal water licence. The farmer receives a monthly account from the DWEA, NOT for water used for irrigation, but as part of the department's service fee. The farmer must then apply for the water licence and wait for the DWEA to issue it before irrigation may commence.

During interviews with farmers it became evident that there is a great deal of misunderstanding about this entire process. For instance, Potgieter (pers. comm., 2009) is engaged in a dispute with the department because he refused to pay water bills on land that is not being irrigated. What he does not seem to understand (or what was not clearly conveyed to him) is that the moment he registered his property on the banks of a river, he would start to receive service bills from the department. He has been in an ongoing dispute with the DWEA for a period of five years and has even visited the head office several times to sort out the issue. Officials there, like Potgieter, do not seem to realise the true nature of the problem. These bills were not

in fact for water used in irrigation, but merely service fees that are levied on registered irrigation properties.

According to Claasen (pers. comm., 2009), the initial mistake can be laid at the door of the DWEA. They did not convey to farmers that they should register *only the property they intended to irrigate*, and not all property along the banks of the river without exception. The latter is what indeed happened. Farmers were then billed for service fees for all this land, irrespective of whether they planned to irrigate it or not. Trying to convince the DWEA afterwards that land which was not to be irrigated should be de-registered, appeared to be an insurmountable task.

Smit (pers. comm., 2009) also sheds some light on the licensing process. He claims that politics dictates the issuing of water licences to farmers. According to him there is a tendency to prevent water use by farmers. Furthermore, it seems that the DWEA refuses to transfer sold water rights unless the buyer of the water rights can prove that the water will be used for Black Economic Empowerment (BEE). Appeals against this ruling were lodged with the Water Tribunal but these take a long time to be settled. Furthermore, Smit claims that the department does not have the capacity to issue licences in a timely manner. Incessant delay of (in some cases) as much as five years for a legal water licence leads to desperation among irrigation farmers who have no choice but to resort to illegal irrigation. As indicated in chapter 4, this state of affairs is present in the LOWMA as well. This situation of anarchy is created by the government. It is suggested that in this case lawlessness has been caused not by the irrigation farmer (who is obliged to obey the law), but instead by those who are responsible for enforcing these laws.

Agri SA (one of the national agricultural organisations) has been negotiating with the DWEA for the past two years in an attempt to reach an acceptable arrangement for all parties in respect of the granting and transfer of water rights. The transferral process is a particular bone of contention; requests are refused, almost without exception. Agri SA is now contemplating legal steps against the DWEA and has subsequently requested all farmers' associations to provide Agri SA with information about their water transfer applications and feedback (if any) from the DWEA. The plan is to identify tendencies and patterns in these procedures and to gain an understanding of the scope of the problem.

It stands to reason that effective protection of the planet's ecosystems requires that ordinary citizens should be able to take part at the grassroots level in decision-making that affects their environment, if only because they are more likely to favour stringent environmental safeguards than the amorphous, polluting 'special interests' that now apparently dominate the 'representative' system of government. In short, a solution to the ecological crisis presupposes participatory democracy in the political sphere. As far as the aquatic realm is concerned, this takes place in the sphere of hydropolitics. The following section thus deals with the definition of hydropolitics and how it manifests in South Africa.

2.4 HYDROPOLITICS

Hydropolitics has only recently emerged as a recognised field of study and very few sources are available for further reading. Existing sources tend to focus on the international level rather than hydropolitical issues at micro level i.e. the relationships between local authorities, communities and government departments. It therefore remains an underdeveloped field of theory formation in the field of water studies and the definition of hydropolitics remains rather vague (Turton, 2002:13). The best way to formulate a definition of the term is perhaps to divide the concept into its main components and then discuss them individually.

Firstly, politics can be defined as "the activity through which people make, preserve and amend the general rules under which they live" (Heywood, 2004:4). Furthermore, "it is an activity inextricably linked to the existence of diversity and conflict, and a search for conflict resolution through collective and co-operative action" (Heywood, 2004:21).

Hydrology is the study of the movement, quality and distribution of water. It is also a recognised engineering field and in this area of study, focus falls on the technical aspects of the water commons (Anon, 2009). Social scientists have also entered the field of water studies, but they are primarily interested in water and its influence on society. Social aspects researched are for instance the human right to safe drinking water; the public sector's management of water resources; the power of groups and institutions over water resources, etc. Politics, being an ever-present part of human

life, lends itself to the study of this more social side of human interaction with the water commons.

From this it can be deduced that hydropolitics is the activity through which people make, preserve and amend the general rules under which they interact with the water realm. Hydropolitics as an activity, also "aims to achieve conflict resolution between parties regarding matters of water, through collective and co-operative action" (Turton, 2002:14). This basic definition of hydropolitics needs to be extended by the elements of scale and range. Scale may vary from the individual to the international level, whereas the range element can be divided into three clusters:

- The economic cluster, consisting of issues such as food security and water for the economy;
- The legal/institutional cluster, involving international as well as national laws and institutions; and
- The social cluster, including a range of issues related to poverty, health, gender and ecology (Turton, 2002:13; Hellberg, 2005:5).

Hydropolitics has become important because of the problems the world already faces as far as the availability of water is concerned. It is estimated that some 250 million people in 26 countries throughout the world are affected by water shortages. This estimate is relatively high, but experts anticipate that the number of people suffering conditions of water shortage will increase over the next 25 years, to the extent that one-third of the world's population will experience severe water scarcity by 2029 (Kitissou, 2004:4). Africa will certainly be hard hit by water stress because of its rapid population growth. This is one of the most telling factors that will see half of the countries on the continent being adversely affected (Kitissou, 2004:6).

The global impact of water shortages will be dramatic, affecting almost every aspect of human existence, ranging from food production to the socio-economic development of states and even entire continents (Elhance, 2000:202). With so much to lose, competition for this life-giving substance will also increase substantially. This will lead to situations of increased conflict among and within regions in states. It is with this in mind that the next section investigates some hydropolitical issues in southern Africa with specific reference to the Southern African Development Community (SADC).

2.4.1 A southern African perspective on hydropolitics

In the Southern African Development Community (SADC), water issues take centre stage in the field of development. The debate includes water ownership, management and use – three critical issues that the SADC community has to contend with. SADC serves a regional society in southern Africa, in an arid to semi-arid region where the basins of most of the larger perennial rivers are shared by between three to eight countries (SARDC, 1994:10). The region faces economic water scarcity. Soon the water problems will be:

> interwoven with deep-seated political, demographic, economic and even religious conflicts (SARDC, 1994:1).

Escalating crop failure; unilateral utilisation of water; reduced water flows; salination; constraints on irrigation; pollution and the like, are all coupled with unresolved border issues; population increases; and diminishing agricultural resources. These are likely to cause friction between regional countries that share a riparian system. Certainly water will become a political weapon and a bargaining tool. It will no doubt also become a legitimate target and a source of friction between regional states. Turton (2002:47) is of the view that militarisation of local water conflicts could potentially occur.

Water is southern Africa's single most shared resource (See Table 1). It occurs with varying abundance or scarcity at different times of the year and in different parts of the region. The SADC, a regional grouping of 15 sovereign member states, comprises Angola, Botswana, the Democratic Republic of Congo, Lesotho, Malawi, Mauritius, Mozambique, Namibia, the Seychelles, South Africa, Swaziland, Tanzania, Zambia and Zimbabwe. This regional body brings its member states together with the common goal of regional integration on the basis of balance, equity and mutual benefit for all the peoples of the region. The SADC was formally established through the signing of the SADC Treaty on 27 August 1992 in Windhoek, Namibia.

River Basin	SADC Riparian States	River Basin	SADC Riparian States
1. Congo	Angola, Democratic Republic of Congo, Tanzania, Zambia	**7. Ruvuma**	Mozambique, Tanzania
2. Zambezi	Angola, Botswana, Malawi, Mozambique, Namibia, Tanzania, Zambia, Zimbabwe	**8. Limpopo**	Botswana, Mozambique, South Africa, Zimbabwe
3. Cunene	Angola, Namibia	**10. Save**	Mozambique, Zimbabwe
4. Cuvelai	Angola, Namibia	**Buzi**	Mozambique, Zimbabwe
5. Okavango	Angola, Botswana, Namibia	**12. Pungwe**	Mozambique, Zimbabwe
6. Nata	Botswana, Zimbabwe	**13. Inkomati**	Mozambique, South Africa, Swaziland
		14. Maputo	Mozambique, South Africa, Swaziland
		15. Orange	Botswana, Lesotho, Namibia, South Africa

Table 1: Shared river basins in southern Africa

This treaty is the central document that outlines the vision, overall objectives and institutional framework of the SADC. Article 22(1) provides for member states to conclude a series of protocols that elaborate the objectives, scope and institutional mechanisms for co-operation and integration in the region. These protocols are to be developed, negotiated and agreed upon with the focus on various areas of co-operation as identified in article 21(3) of the SADC Treaty. After negotiation by member states and approval and signature by the Summit, the protocols become integral parts of the SADC Treaty (SARDC, 1994:10).

Water resources in Africa are limited, unevenly distributed and often over-exploited. Pollution of water resources is a growing concern, and water stress is expected to have a substantial impact on most African countries by 2025. Two southern African countries which are expected to experience increased water scarcity by the year 2025 are South Africa and Malawi. Lesotho, Tanzania and Zimbabwe will also become water-stressed in due time (Glieck, 1998:9). High rates of population growth, accompanied by continued increases in the demand for water, have resulted in several countries reaching the point where the scarcity of water supplies effectively limits further development. Ideally, each country's water-resource management strategy needs to be aligned with that of its neighbours if peace and prosperity are to be maintained and water-related conflict is to be avoided in the region (Ashton, 2002:3).

The need for water security is a human security issue. Recent events in southern Africa highlight the potential for conflict in this regard. Indeed, clashes over natural resources and environmental degradation have dogged southern Africa for decades and are likely to intensify, since there are few agreed mechanisms for their equitable resolution. The selection of recent water-related issues listed below indicates the potential for inter- and intra-state conflict over water between states and non-state actors at local, national and regional levels (Ashton, 2002:82).

- A hydro-electric dam project in the Cunene River in northern Namibia could displace as many as 2 000 of the Himba people.
- Namibia intends to drain water from the Okavango River, causing a diplomatic row between Namibia and Botswana.
- Three consecutive years of drought have forced the Tanzanian government to investigate alternative water resources.
- The first tranche of finance for the Maguga Dam Project in Swaziland, stemming from the Komati River Basin Development Project, a bilateral water development initiative between South Africa and Swaziland, has been raised.
- Botswana and Namibia awaited the outcome of the decision of the International Court of Justice in 1999 over the ownership of the nondescript Sedudu Island in the Chobe River in a period of massive military build-up in Botswana.
- Malawi's biggest river, the Shire, which supplies the state's hydro-electric power, is shrinking and may dry up as a result of falling water levels in Africa's third largest lake.
- A political confrontation looms over South Africa's plans to solve its water demands by obtaining supplies from the Zambezi River (Ashton, 2002:85).

Water disputes in the region have occurred between Namibia and Botswana over Namibia's proposed construction of a pipeline to extract water from the Okavango River, which flows through both countries and culminates in the Okavango Delta in Botswana. The pipeline seemed the most cost-effective option for the Namibian government (Hopwood, 1996). Botswana's citizens, however, especially the residents of Maun, close to the Delta, perceived this as a threat to their livelihood and to the tourist industry, should the Delta's ecosystem be damaged or even

destroyed (Nicoll, 1996). Adverse effects on the Delta would in turn impact negatively on Botswana's economy (James, 1996).

Another example listed above has a hydropolitical link and also involved Botswana and Namibia, this time touching upon the issue of territorial sovereignty. Trouble arose over ownership of the Sedudu/Kasikili Island and was resolved by the International Court of Justice in 1999. This dispute led to serious tensions between the competing governments after military occupation of the disputed island by Botswana (Ashton, 2002:79-86). Botswana acquired extensive military equipment at the time, and though not necessarily linked to the hydropolitical situation, this was seen as a warning to those opposing the interests of the country (a controversial move, given Botswana's peaceful domestic and international history until this time). This reaction seems to substantiate the argument that "national insecurity in one or more of the riparian states can create the potential for acute interstate conflict" (Elhance, 2000: 210).

It is also important to stress how water scarcity may have a detrimental economic and ultimately political impact, because of its negative influence on agricultural and industrial production (Baxter, 1996:1; Elhance, 1999:256). Several southern African states, such as Botswana, Namibia and Zimbabwe, rely heavily on agriculture and a shortage of water can therefore impact seriously on the national economy. If industrial growth, which is of great importance to developing countries, is impeded by a lack of primary and intermediate commodities and food for the industrial workforce, it may cause a slowdown or regression in economic development. The result can be domestic unrest, which in turn may increase national insecurity. In such cases the issue of water becomes politicised, although there is no inevitable link between water scarcity and acute conflict. It is necessary to take into account various intervening variables: historical, geographic, cultural, behavioural, political and strategic, to give an exact account of the hydropolitical situation in any international river basin (Elhance, 1999:257).

According to Turton (2002: 15) any hydropolitical situation can contain any one or a combination of the following elements: conflict, the environment, security, and society and culture. Each of these needs to be more specifically delineated.

- **Conflict**

Conflict refers to hostility between two or more parties. Conflict in this context does not only refer to armed conflict. It may be more holistic, referring to any substantial disagreement between two or more parties relating to water. It can also refer to judicial conflict or physical conflict.

- **The environment**

Hydropolitical situations in the environment can arise in two ways: Firstly, the natural environment itself can create a hydropolitical situation. This is especially true of the Middle East. Countries like Turkey and Syria are naturally endowed with more water sources than those downstream, such as Israel and Jordan, who depend largely on water entering from better-endowed upstream countries. In contrast, countries situated upstream have projects of their own to divert water for irrigation purposes and thus increase their agricultural production (Falkenmark, 1989:350). This may lead to a hydropolitical situation when downstream countries protest against the water practices of their upstream neighbours. Secondly, changes to the natural environment may also lead to hydropolitical situations. Water changes in the natural environment are usually induced by the building of dams and the diversion of rivers. These changes to the environment have a great impact on both the social and ecological make-up of an area and often lead to conflict with the inhabitants of that specific area (Falkenmark, 1989:351).

- **Security**

As mentioned earlier, water is a crucial source of life. Apart from the human need for water, government's also need water to sustain economic and social development. When the water sources on which a country relies for its development are threatened, the security of that country is also threatened. Such is the case in South Africa. Approximately 60% of the geographical area of South Africa is covered by four international river basins – Orange, Limpopo, Incomati (now Nkomati) and Maputo (Turton, 2001:11). The run-off from these basins supports the generation of 70% of the country's Gross National Product (GNP) (Basson, 1997:3). Furthermore, 90% of South Africa's electricity supply is generated in shared river basins. Additionally, almost all mining activities occur in these shared river basins (Basson, 1997:3). It is therefore apparent that any dramatic changes that might occur in any

one of these international river basins, will greatly affect the economic and social security of South Africa.

- **Society and culture**

The different approaches of cultures or societies to the management of water can cause conflict. Society has a bearing on populations of people with a comprehensive and highly integrated sense of cohesion. Culture refers to group-specific customs and practices that evolve under very specific circumstances (Thomson, 2008:34). This translates into hydropolitics in that a society which for instance has a time-based water management system, lives upstream from a society that has a volumetric based water management system. The time-based society draws as much water as it can from the water source in the time allowed. Because this society is not impaired by volumetric quantities, it can extract vast amounts of water. With so much water extracted upstream, the volume of water available to the downstream society will decrease significantly. Because the downstream society does not receive the volumes of water it once had, a conflict situation occurs between the two societies (Turton, 2002: 15).

The following table outlines areas of possible hydropolitical conflict in the SADC.

River	State	Total km^2	Potential conflict issues
Orange	Lesotho, South Africa, Botswana, Namibia	973 000	The Orange basin embraces four countries, but the Lesotho Highland Water project involves only South Africa and Namibia
Limpopo	Botswana, South Africa, Zimbabwe, Mozambique	423 000	South Africa, Botswana and Zimbabwe have plans to extract water from its tributaries. Mozambique has a minor share and an imbalance exists in this regard.
Save	Zimbabwe, Mozambique	104 000	Most of the water resources of the Save lie in Zimbabwe. As in the case of the Limpopo, this leaves Mozambique with an imbalance.
Okavango	Angola, Namibia, Botswana, Zimbabwe	586 000	Zimbabwe is not a member of the Okavango River Basin Commission (OKACOM). Botswana and Namibia are currently involved in a case in the International Court of Justice.
Cunene	Angola, Namibia	117 000	Local water demands are low, as the river lies in a sparsely populated area. Opposition to the hydro-electrical project in the Epupa scheme was voiced.
Zambezi	Angola, Zambia, Namibia, Botswana, Zimbabwe, Tanzania, Malawi, Mozambique	1 234 000	Runs through eight member states of SADC. The Zambezi River Authority (ZRA) involves only two (Zimbabwe and Zambia) of these states. Angola and Zambia did not sign the SADC Protocol on Shared Watercourse

			Systems.
Rovuma	Mozambique, Tanzania	155 000	Mozambique is denied most of the water of the Save and Limpopo. The Rovuma could be an important resource for development in this country.
Zaire	Democratic Republic of the Congo (DRC)	3 981 000	Forms the border between the DRC and Angola. Other countries in the basin are Cameroon, the Central African Republic and the Republic of Congo. Potential conflict could arise from its vast surplus of water (ten times that of the Zambezi). The Inga Rapids have the largest single hydroelectric energy potential in the world.

Table 2: Possible areas of hydropolitical conflict in SADC river basins (Turton, 2002)

A discussion is provided below on some of the strategies devised by the SADC to avert possible hydropolitical conflict.

2.4.1.1 Strategies to avert hydropolitical conflict in the SADC

To address the issue of water and the trans-boundary nature of water in the region, the SADC has built a framework to approach regional management of water in a comprehensive manner. To achieve this, several legal and non-legal water instruments were created.

2.4.1.1.1 The SADC Protocol on Shared Watercourse Systems (SADC 1995)

An example of a general water regime is the SADC Protocol on Shared Watercourse Systems (SADC, 1995). In the southern African region, there are also examples of more specific regimes. The Orange/Senqu River Basin Commission (ORACOM) is fairly well established and functioning despite border tensions between the two riparian countries, South Africa and Namibia. The regime may also help states to co-ordinate their behaviour so that they can collectively avoid suboptimal outcomes (Hasenclever *et al.*, 1997).

The SADC aims to achieve and maintain close co-operation between member states. It also sets out the rights and obligations of member states on shared watercourse systems in the region. This is an important part of the protocol, especially in relation to its implementation and the settlement of disputes. The SADC Protocol (1995) consists of the following nine principles:

i) ***Respect for the sovereignty of member states in the utilisation of shared watercourses***

This principle recognises the right of member states to develop the resources of shared watercourses within their territory (sovereignty). The principle stipulates, without necessarily being restrictive, the uses to which these shared watercourses may be put. These include agricultural, domestic, industrial and navigational uses (Ramoeli, 2002:108).

ii) ***Application of rules of general or customary international law, community of interest and equitable utilisation***

States that are parties to the Protocol undertake to apply existing rules of customary international law in their respective water laws, as well as to respect the community of interest in the equitable utilisation of shared watercourses. This is an important recognition of the responsibility of member states towards equitable utilisation of shared watercourses (Brew, 1998).

iii) ***Maintaining a proper balance between development and environmental protection and conservation***

This principle recognises that it is important for member states to develop their water resources in order to improve the lives of their citizens, on the one hand, while protecting the environment that yields this resource, on the other. Member states undertake to apply the principle of sustainable development (Ramoeli, 2002:108).

iv) ***Co-operation in joint projects and studies***

This principle supports the overall objective of SADC to foster co-operation among member states in different areas of economic development. This is an important measure to prevent potential conflicts that may arise as a result of uncoordinated development of shared watercourse systems and competing demands (Chenje & Johnson, 1996:12).

v) ***Information and data-sharing***

This principle is closely related to the one above and aims to level the playing field and create an enabling environment for negotiations on the equitable utilisation of shared watercourses. The development of the SADC Hydrological Cycle Observing Systems (SADC-HYCOS) will go far in trying to address this issue. Information-

sharing is central to the co-operation and economic integration envisaged in the SADC Treaty (Ramoeli, 2002:109).

vi) Equitable and reasonable utilisation of shared watercourse systems

Member states undertake to use the resources of shared watercourses in an equitable and reasonable manner. This principle is in line with the principles of international water law such as the Helsinki Rules (1966) (International Law Association, 1966: 240) and the UN Watercourse Convention (1997) (UN, 1997:40). Several aspects must be taken into consideration in order to achieve equity and reasonable sharing. These include the natural physical characteristics of the watercourse; social and economic needs; and potential impacts and effects of the intended use on the watercourse. The principle also promotes the development of guidelines and agreed standards of use. Some of the projects in the SADC Water Sector portfolio – for example, the development of common groundwater minimum standards – already address the development of common minimum standards and guidelines as envisaged in the Protocol (Ramoeli, 2002: 109).

vii) Use of discharge and abstraction permits or licences

This principle confers some responsibility on member states to regulate the use of shared watercourses in order to ensure that adequate protection is given to the resource. This is already practised in most member states, although the level of enforcement differs from one state to the next. The principle supports the 'polluter pays' attitude that is currently gaining ground in the global water sector. Monitoring for compliance and enforcement at national level is very important if there is to be a significant impact at regional level (Ohlsson, 1995:1). In the case of South Africa, the concept of the 'polluter pays' has clearly not worked very well, especially under circumstances where pollution is the by-product of industrial production processes aimed at working in the interest of the national economy.

viii) Obligation to notify about emergency situations, protection against pollution and the use of installations for peaceful purposes

States that are parties to the SADC Protocol have the responsibility to notify potentially affected watercourse states about an emergency that originates in their territory and to take the necessary measures to ameliorate the impact of such an

emergency situation. This principle has been further elaborated and strengthened in the Revised Protocol (Ramoeli, 2002:110).

ix) Institutional framework

The Protocol also proposes an institutional framework necessary for the effective implementation of its various provisions. The following institutions were proposed:

- A monitoring unit as part of the Co-ordination Unit (in the absence of a distinct and dedicated water sector); this unit was intended to be situated in the SADC Environment and Land Management Sector (SADC-ELMS);
- River basin commissions between basin states and in respect of each drainage basin (e.g. the Zambezi River Basin Commission (ZAMCOM); and
- River basin authorities or boards for each drainage basin (Pallet, 1997:11).

2.4.1.1.2 The revised protocol on shared watercourses (2000)

It has already been pointed out that the original Protocol was revised as a result of a number of developments within and outside the SADC. The revised protocol was adopted by SADC in August 2000. It addresses a number of issues, including the following (Stein, 2002:109):

- Definition of terms and concepts (notably the concepts watercourse and basin);
- Alignment with the UN Convention on the Law of the Non-Navigational Uses of Shared Watercourses;
- Provision for environmental protection; and
- A clarification of the role of river basin institutions and their relationship to SADC structures (Stein, 2002: 109).

The process was driven by some critical issues and factors, such as:

- Water shortages and abundance that afflicted the region in the past and are likely to increase in the future (the region is generally arid and experiences extremes of drought and floods; its water is unevenly distributed; and inequalities exist in access to clean water); and

- The threat remains of pollution of shared watercourses and its subsequent impact on the utility of the resource (poor sanitation facilities; unchecked industrial and agricultural activities) (Stein, 2002:117).

There is a need for a regional regulatory framework, which articulates SADC peculiarities and which is sufficiently informed by current international thinking on water resources management and development.

The Revised Protocol includes clearly defined objectives that have taken due cognisance of the provisions of the SADC Treaty, notably to:

- Promote and facilitate the establishment of shared watercourse agreements and institutions for the management of shared watercourses;
- Advance the sustainable, equitable and reasonable utilisation of shared watercourses;
- Promote co-ordinated and integrated environmentally sound development and management of shared watercourses;
- Promote the harmonisation and monitoring of legislation and policies for planning, development, conservation, the protection of shared watercourses and the allocation of their resources; and
- Promote research and technology development, information exchange, capacity building and the application of appropriate technologies in shared watercourses (SADC, 2004).

The Revised Protocol has further enhanced the guiding principles that are included in the original Protocol:

- Equitable and reasonable utilisation;
- No harm to other watercourse states;
- Environmental protection of the watercourse;
- Where harm is nevertheless caused, the duty to eliminate or mitigate and, where appropriate, to discuss compensation;
- No discrimination on the basis of nationality in recognising the rights to claims for harm caused; and
- Exchange of available hydrological, hydro-geological, water quality and meteorological information on shared watercourses (Pallet, 1997:11).

2.4.1.1.3 The Regional Water Strategy

The Regional Water Strategy was developed as the framework for implementation of the Policy and Protocol, indicating actions, responsibilities and timeframes. However, actions towards realisation of the Protocol have been outlined in the Regional Strategic Action Plan on Integrated Water Resources Development and Management (SADC, 2007) which is currently in its second phase, 2005–2010. The RSAP includes seven areas of intervention identified as key issues for the region. These are: legal and regulatory framework; institutional strengthening; linkages with sustainable development policies; data collection, management and dissemination; awareness building, education and training; stakeholder participation; and infrastructure development. There are 31 priority water resource interventions, programmes or projects that were identified as part of the RSAP. One of these is the Regional Groundwater Management Programme (SADC, 1998). Groundwater is viewed as critical to the development of southern Africa. The overall objective of the GMP is to create an enabling environment for the joint management of shared aquifers by putting in place a framework and specific tools to enable effective resource management. To facilitate the Protocol, a river basin approach was adopted by the member states in the planning, development and management of watercourses, particularly if they are shared watercourses. Currently, five River Basin Organisations are in existence. Through these organisations and others like them, it is envisaged to implement the regional water policy effectively thus realising the IWRM of all freshwater resources (Earle, 2005:26).

It is clear from the issues discussed above that hydropolitics plays an important role, particularly in a continental region such as southern Africa where water is seldom available in abundance. Hydropolitics creates the arena where legislation and policies are developed and implemented; it forms a central part of good governance, as discussed earlier in this chapter. In modern political science jargon it is rooted in the hydro-social contract between government and society (Turton & Ohlsson, 1999:2) that will be considered next.

2.4.2 Hydro-social contract

According to Turton & Ohlsson (1999:2) the hydro-social contract is the unwritten contract that exists between the public and the government with regard to water. This contract comes into play when the individual is no longer capable of mobilising sufficient water for his/her own personal survival. This state of affairs functions as the mandate by which the government ultimately assumes this responsibility. The hydro-social contract then becomes the basis for institutional development; it also determines what the public deems to be fair and legitimate practice and to which, in turn, politicians react (Turton & Ohlsson, 1999:2).

Following the fall of apartheid, the Reconstruction and Development Program (RDP) was launched with a view to addressing the inequalities of South Africa's previous dispensation, especially as far as basic human needs were concerned. These included jobs, land, housing, water, electricity, telecommunications, transport, a clean and healthy environment, nutrition, health care and social welfare (South Africa, 1994:4). With regard to water, the RDP stated that millions of South African citizens lacked access to clean drinking water and adequate sanitation (South Africa, 1994:6). It was clear that many people did not have sufficient access to water for their own survival and the government had to step in and put water resource management structures and mechanisms in place to remedy the situation. Furthermore, post-apartheid South Africa is a country characterised by a growing population. Not only there was an increase of 1, 70% from 1990–2006, but this was accompanied by accelerated urbanisation to highly populated areas like Gauteng (UNICEF, 2008). The growing number of people in both urban and rural areas was responsible for a dramatic upward curve in water consumption and this in turn had the effect that natural water allocations to certain areas were surpassed. As a consequence, situations arose where communities experienced conditions of water scarcity (Turton & Ohlsson, 1999:4). When such communities are no longer able to secure their own water supply, a hydro-social contract commences between the community and the state. To adhere to their side of the hydro-social contract, the state typically implements water resource management activities closely aligned with legislation, such as for example, in the case of the National Water Act, 36 of 1998 (National Water Act) and the Water Services Act, 108 of 1997 (Water Services Act).

The conclusion is this: When inhabitants of a country experience water shortages, the government is obliged to take action by virtue of the hydro-social contract. The existing water problem is then moved into the political realm, making it a hydropolitical issue. The hydropolitical issue should then be addressed by means of IWRM interventions.

The following sections will explain IWRM and consider a few international and national trends that have evolved as ways of restricting and managing the consumption of scarce water resources.

2.5 INTEGRATED WATER RESOURCE MANAGEMENT (IWRM)

As mentioned earlier in chapter 1, the concept of IWRM stems from the original theory of Water Demand Management (WDM). Internationally, WDM is regarded as the most efficient way of managing basic water needs. It is a realisation of the maxim 'More for all, instead of much for few'. WDM is a key component of integrated water provision, which in turn is a condition of sustainable development.

According to the DWEA (South Africa, 1991:10), WDM can be defined as the adoption of a strategy (policy) that influences the need and usage of water in order to ensure the sustainability of the resource. Thus, WDM focuses on the manner in which water is used, rather than simply meeting the demand for water. The goals of WDM are economic efficacy; social development; social equity; the conservation of the environment; sustainability of water supply; and political acceptability (Turton, 2002).

IWRM takes this concept even further. It recognises the need for different stakeholder groups to synchronise their efforts in realising the primary ideals of WDM. IWRM is an approach that seeks to reach a viable equilibrium between the need to protect and sustain water resources on the one hand, and the need to develop and use them on the other. It is a developing, interactive process that:

> promotes co-ordinated planning, improvement and management of water, land and related resources in order to maximise the ensuing economic and social welfare in an equitable manner without compromising the sustainability of ecosystems (Uys, 2003:12).

It is also a merger of all sectors using water – all stakeholders, all tiers of government and both formal and informal sectors – to create a viable and sustainable management system (Van Koppen *et al.*, 2007:145).

When all is said and done, what is required is a paradigm shift from the traditional supply-oriented view to that of water conservation and demand management, which is necessary for the sustainability of water resources. It offers a beneficial dispensation for water as a scarce natural resource in the environment, as well as for economic efficacy and social development. The shift towards this integrated approach is a long-term process and requires active effort and commitment from all shareholders and role-players on various levels in the institutional and political arena (Turton, 2002).

The first aspect to consider is the influence of international trends in water policy and demand management.

2.6 INTERNATIONAL TRENDS IN IWRM

The understanding of the complex, interrelated aspects of fresh water has emerged globally only in the last few decades. This awareness has helped generate a number of global summits, agreements and norms that have explored the issue of water and broader environmental processes. Issues that have emerged on the basis of these consultations include the promotion of a greater focus on WDM and conservation within the framework of IWRM, encouraging a shift from the supply-driven approach to meet the demand for water, to the demand management approach and greater efficiency to match available resources. Since the early 1990s, the challenge has been to understand and adopt global benchmarks and then link up agreements, norms, policies and legislation to localised, tangible, feet-on-the-ground actions that have a real impact in the short and the long run (Srinivas, 1990).

2.6.1 United Nations and the Global Water Partnership

In January 1992, at the International Conference on Water and the Environment in Dublin, recognition was given to the importance of managing the world's water resources properly. As many as 500 people, including designated experts from 100

countries and non-governmental organisations, attended this conference. The participants called for a fundamental new approach to the assessment, development and management of resources, which would require political commitment and involvement from all stakeholders involved. Four overarching principles were identified, embracing all the issues involved in managing natural resources. These are:

Principle 1: Fresh water is a finite and vulnerable resource, essential to sustain life, development and the environment.

It is argued that:

> Because water sustains life, effective management of water resources requires a holistic approach, linking social and economic development with protection of natural ecosystems. Effective management links land and water use across the whole of a catchment area or groundwater aquifer (UN, 1992:3).

Principle 2: Water development and management should be based on a participatory approach involving users, planners and policy makers at all levels.

This implies that:

> The participatory approach involves raising awareness of the importance of water among policy makers and the general public. It means that decisions are taken at the lowest appropriate level, with full consultation and involvement of users in the planning and implementation of water projects (UN, 1992:4).

Principle 3: Women play a central part in the provision, management and safeguarding of water.

Quite rightly it is argued:

> This pivotal role of women as providers and users of water and guardians of the living environment has seldom been reflected in institutional arrangements for the development and management of water resources. Acceptance and implementation of this principle requires positive policies to address women's specific needs and to equip and empower women to participate at all levels in water resource programmes, including decision-making and implementation, in ways defined by them (UN, 1992:5).

Principle 4: Water has an economic value in all its competing uses and should be recognised as an economic good.

The material value linked to water implies that:

> Within this principle, it is vital to recognise first the basic right of all human beings to have access to clean water and sanitation at an affordable price. Past failure to recognise the economic value of water has led to wasteful and environmentally damaging uses of the resource. Managing water as an economic good is an important way of achieving efficient and equitable use, and of encouraging conservation and protection of water resources (UN, 1992:5).

As a result of this statement, the United Nations (UN) committed itself through various organisations and strategies to find ways to preserve and manage the global fresh water resource efficiently. At the Earth Summit of the UN in Rio de Janeiro in 1992, representatives of nearly 200 governments from across the globe accepted Agenda 21, which was an action plan and blueprint for sustainable development. The agreement states the following:

> [B]y the year 2000 all states should have national action programmes for water management, based on catchment basins or sub-basins, and efficient water use programmes. These should include integration or water use and other resource planning development and conservation, demand management through pricing, regulation, conservation, reuse and recycling of water (Abrams, 2000).

In September 2000, the UN adopted the Millennium Declaration, in terms of which 191 UN member states pledged to meet global poverty reduction targets, the so-called Millennium Development Goals, by 2015. They committed themselves to halve the proportion of people without sustainable access to safe drinking water. The Millennium Declaration now drives a global freshwater policy, aid and multi-lateral development bank programmes in developing countries worldwide. The agreement acknowledges the need for greater efficiency in the use of water and fair allocation to balance the limited supply with the rising demand, as well as improved sanitation services and good hygiene practices (UN, 2000).

A few years later, on 2 September 2002, the collaboration between the European Union (EU) and the African Union (AU) resulted in the release of the Strategic Partnership on Water Affairs and Sanitation. This plan was announced at the World

Summit for Sustainable Development in Johannesburg, South Africa. Representatives at this summit acknowledged that water resources, high-quality water ecosystems, water supply and sanitation are crucial for the nutrition, security, health and well-being of people and that effective management of water contribute significantly to sustainable development. More importantly, it was emphasised that water policy and water management translates into progress in the three most important pillars of sustainable development, namely social, economic and environmental development (AEU, 2002:2).

In 2006, the UN published its second World Water Development Report. This report assessed progress made by countries since the earlier agreement. The report stated that the world had a great deal of fresh water, but that it was unevenly distributed. Yet, one-fifth of the planet's population was without safe drinking water because of mismanagement, limited resources and environmental changes. Most affected people live in developing countries (previously referred to as Third World countries). At the time the report was compiled, it appeared that these countries would not meet the UN Millennium Development Goal of halving the number of people without safe drinking water by 2015 (UN, 2006:20).

Relevant for this study was the finding in the report that the world would need 55% more food by 2030. This will increase the demand for irrigation, which, according to the UN, already involves 70% of all fresh water consumed by humanity (UN, 2006:23). The irrigation situation in the Lower Orange Water Management Area (LOWMA), discussed in the following chapters, will highlight a perspective of the manifestation of this phenomenon in South Africa in greater detail.

According to the UN report, half of the world's population was destined to live in towns and cities by 2007. By 2030, this should rise to nearly two-thirds, resulting in drastic increases in water demand in urban areas. An estimated two billion of these people will be living in squatter settlements and slums. The urban poor suffer the most from a lack of clean water and sanitation (UN, 2006:22).

In many places worldwide, a colossal 30–40%, or more, of potable water goes unaccounted for because of water leakages in pipes and canals and illegal connections. This study draws attention to a few methods identified by the DWEA to deal with water loss because of leakages and inaccurate readings. Although there

are no accurate figures, estimates suggest that political corruption costs the water sector millions of rands every year and undermines water services, especially to the poor. Recognising the vital part fresh water plays in human security and development, the Johannesburg Plan of Implementation, which was adopted by the UN member states and the World Summit on Sustainable Development in Johannesburg in 2002, called on countries to develop IWRM and water efficiency plans by 2005. But by the designated date a report indicated that only about 12% of countries had done so (UN, 2006:23). Many had begun the process.

From the UN Millennium Goals, the African Water Vision 2025 report was put together and published in 2006. This document emphasises that, although it would appear that Africa has an abundance of water sources (such as lakes, rivers and vast wetlands) this resource is under great threat due to, *inter alia*:

- Inappropriate governance and institutional arrangements in managing national and trans-national basins;
- Depletion of water resources through pollution, environmental degradation and deforestation;
- Failure to invest adequately in resource assessment, protection and development; and
- Unsustainable financing of investment in water supply and sanitation (UN, 2006).

In dealing with these threats, the document highlights the following agreed-upon framework:

- Strengthening governance of water resources;
- Improving water wisdom;
- Meeting urgent water needs; and
- Strengthening the financial base for the desired water future (UN, 2006).

To achieve these goals in managing the water resource and to ensure sustainable development, the following must be adhered to according to the African Water Vision 2025:

- Openness, transparency and accountability in the decision-making process;
- Ability to generate and receive knowledge and information;

- Co-operation and teamwork by all countries in the region to achieve common, mutually beneficial objectives;
- Readiness to take tough decisions on the future direction and course of action consistent with the aspirations in the shared water vision;
- Proper appreciation of 'where we are', 'where we want to be' and 'how to get there'; and
- The adoption of financing and cost-recovery methods that are equitable, and a recognition of the fact that there must be political commitment and grassroots support (UN, 2006).

The next section will clarify South Africa's answer to the above-mentioned criteria and explore the success rate of South African legislation and policies.

2.7 SOUTH AFRICA'S IWRM POLICY

Before 1994, the largest segment of South African society was deprived of basic resources – especially drinking water. The government did not have the political mandate to accept the responsibility to provide access to water to all the residents of the country. After the 1960s the country was divided into separate designated homelands for tribal communities that adopted different development programmes. These were Bophuthatswana, Venda, Transkei and Ciskei. The former Department of Water Affairs (now the DWEA) had no jurisdiction over the use of water in these homelands, nor did these homeland governments have the capability to provide the necessary services. For the most part, therefore, rural communities had to fend for themselves. When South Africa was transformed into a multiracial democracy, the homelands were disbanded and these areas were incorporated into the current nine provinces of the Western Cape, Northern Cape, Eastern Cape, KwZulu-Natal, Free State, North West, Mpumalanga, Gauteng and Limpopo. Because of the backlog in providing access to water, between 12 and 14 million South Africans living in these former homeland areas still did not have access to safe drinking water by the year 2000 (Glazewski, 2000:257).

Since 1994, the DWEA has taken significant steps to address this state of affairs by considering examples in international trends in water policy development. To understand these changes, it should be remembered that all policies are formulated

against the backdrop of the Constitution, which protects the right of access to safe drinking water (South Africa, 1996:34).

There is evidence that the South African government is aware of its constitutional obligation to provide access to water. When the legislative transformation of water laws began, it became clear that the various national policy documents recognised the constitutional permission and the humanitarian imperative to meet the most basic water requirements of the population. However, ongoing inequalities in access to clean water emphasise that the government has failed to achieve a just distribution of water to all South Africa's people. In an attempt to address these issues, legislation that is regarded as modern and comprehensive was subsequently developed (Rose, 2005). In the following section, some of the most important water-related legislation and policies are discussed.

2.7.1 *The National Water Act*, 36 of 1998

The *National Water* Act, 36 of 1998 (National Water Act) underlines the new democratic dispensation and gives effect to the constitutional right of access to water. Section 27 clearly states that each individual has the right of access to sufficient water and food (South Africa, 1998:50). This represents a departure from the traditional context of perceiving water and its uses prior to 1994.

In principle, the National Water Act determines that water is a national resource. It is owned by the inhabitants of South Africa, but the national government acts as the trustee (or custodian) of the resource through the minister of water and environmental affairs. This means that the minister has authority over the country's water resources and is responsible for the public interest. The DWEA thus manages the resources for the benefit of all citizens and future generations. The minister acts through the DWEA, which executes this power. This, in effect, provides the state with control and oversight in the utilisation of all water resources (Glazewski, 2000:250). Therefore, the purpose of the National Water Act is essentially to ensure that the water resources of the country are protected, utilised, developed, conserved, managed and controlled. Thompson (2006:340) cites a few aspects to be taken into account when taking these measures. The following are relevant aspects:

- Meeting the basic human needs of present and future generations;

- Promoting equitable access to water;
- Promoting efficient, sustainable and beneficial use of water in the public interest;
- Facilitating social and economic development;
- Providing for a growing demand for water use;
- Reducing and preventing pollution and degradation of water resources; and
- Meeting international obligations.

By attending to these aspects, implementing the National Water Act should enhance IWRM. For example, this could be done within the framework of catchment management strategies and establishing suitable organisations, such as water user associations.

In accordance with international policy strategies, the National Water Act provides for the establishment of 19 catchment management agencies, each with its own area of jurisdiction. Each agency must compile a management strategy for its area and must perform important functions in terms of the application of the National Water Act (South Africa, 1998:17).

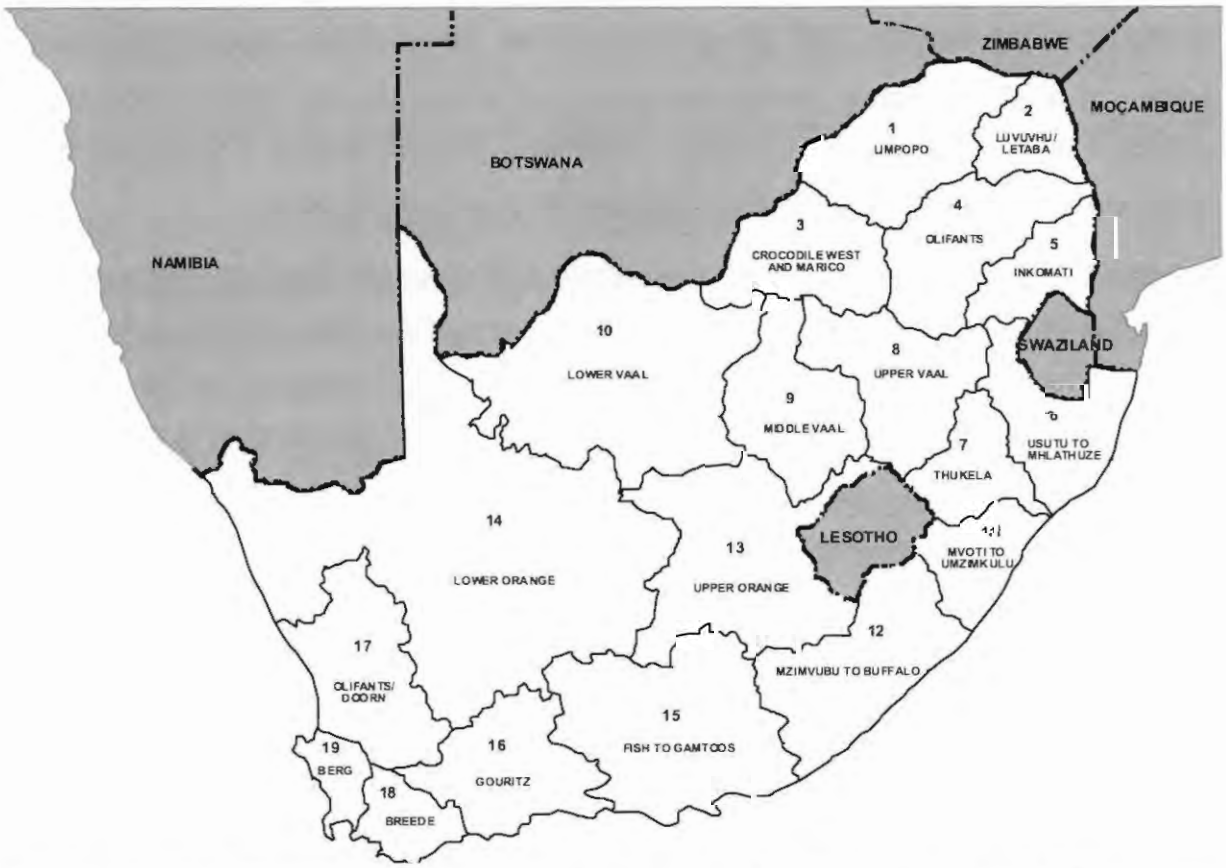


Figure 1: The 19 catchment management areas identified by the DWEA (Source: DWEA)

These agencies must actively encourage community involvement and try to eliminate conflict between stakeholders. The National Water Act provides for the creation of associations by the stakeholders in order to encourage sensible water use. This clause is important because it regulates relations between consumers and agencies with the purpose of effectively regulating and managing water resources (South Africa, 1998:24).

With the implementation of the National Water Act, and specifically with the establishment of the catchment management agencies, local governments (as service delivery institutions) should participate in the activities of catchment management agencies as. However, the agencies are 'employees' of national government and regulated by the DWEA, which is directly accountable to the national government. Thus the challenge is to perform these functions in a manner that does not constitute an unwieldy central bureaucracy, thus disempowering the people at local government level. The idea is that the national government remains in control of water resources, but that stakeholders are involved in the management of the resource through catchment management agencies (South Africa, 1998:23). However, since 2007, the DWEA has been reassessing this situation. Difficulties in the establishment of the catchment management agencies, which will be highlighted in Chapter 4, have given experts at the DWEA reason to believe that it may be sensible to decrease the number of water management areas to make better use of the scarce available human resources to achieve their goals (Kubaie, pers. comm., 2007).

Therefore, IWRM should ideally encourage all stakeholders to decide together, at grassroots level, how much water should be allocated; where this water should be allocated; and how it should be allocated. The National Water Resource Strategy (NWRS) was devised to lay the foundation for sensible development in this direction.

2.7.2 The National Water Resource Strategy

The minister of water and environmental affairs, in conjunction with experts in the field, is responsible for developing the National Water Resource Strategy. This is then binding on all water institutions and water users, and the minister is obliged to update the current strategy at least every five years. The National Water Resource

Strategy provides practical structures to manage water resources and to establish relevant institutions, like catchment management agencies. The first edition, issued in July 2004, outlines the following three basic principles of Water Demand Management (WDM) in South Africa to which these agencies must conform:

- Water institutions should promote WDM among consumers, strive to supply water efficiently and conserve water resources;
- Users should not waste water and should instead use it efficiently; and
- WDM should be an integral part of the planning processes of water resource management (South Africa, 2004:89).

According to the DWEA, the main purpose of the National Water Resource Strategy is to:

- Facilitate the proper management of the nation's water resources;
- Provide a framework for the protection, use, development, conservation, management and control of the water resources of the country as a whole;
- Provide a framework within which water will be managed at a regional or catchment level, in defined water management areas;
- Provide information about all aspects of water resource management; and
- Identify water-related development opportunities and restraints (South Africa, 2004:11).

The National Water Resource Strategy predicts and identifies where water will be accessible for productive livelihoods, as well as the sustainability and support needed to use water efficiently (South Africa, 2004:87). In fulfilling their functions, the agencies have to actively promote community participation. However, such facilitation may well prove difficult, considering the large size of most of the catchment management areas.

As mentioned above, this strategy is currently being revised. Of particular importance in the present planning process is to remove existing tensions between water users on the one hand and the conflicting concerns of financial viability, holistic management of the whole catchment, and the potential for cross-subsidisation, on

the other. The degree to which the agencies will allow for responsive management will depend on the establishment of effective subsidiary measures. Most significantly, the effectiveness of stakeholder involvement will depend on interaction between the agencies and voluntary associations of water users. The National Water Resource Strategy provides for such associations to be formalised as water user associations and catchment management areas.

Existing groups of stakeholders have created forums for water allocation and management in smaller catchments or parts of larger ones. In some instances, these forums hold great promise to lay the foundations for effective stakeholder participation in the new management areas (O'Riordan *et al.*, 2000:3).

The purpose of a catchment management strategy is to:

- Set principles for allocating water to existing and new water users;
- Provide a framework for managing water resources in the water management area; and
- Ensure that water resources in the water management area are protected, used, developed, conserved, managed and controlled (South Africa, 2004:10).

These strategies must clarify the intentions of agencies. What are the water resources in the water management area and how will they be managed? Perceived from the perspective of the National Water Act, the National Water Resource Strategy and ultimately the catchment management strategies, it is clear that global policy trends are incorporated into South African legislation from national to grassroots level. Collective implementation of these legislative strategies must lead to the sustainable development of the water commons.

The *Water Services Act,* 108 of 1997 (Water Services Act) ensures that local authorities know what their powers and functions are.

2.7.3 *The Water Services Act,* 108 of 1997

The *Water Services Act,* 108 of 1997 (Water Services Act) focuses on the responsibilities of municipalities and other water service authorities at grassroots level in providing access to safe drinking water and sanitation. It outlines the duty of water service authorities to ensure the right of access to basic water supply and

sanitation, and provides a rigid framework for establishing water service institutions such as water boards, water service providers and the like. It provides a comprehensive legislative framework for the provision of water and sanitation services to support life and personal hygiene. It also recognises the need to operate in a manner consistent with the broader goals of water resource management. Furthermore it encourages co-operative governance with the emphasis on capacity building at all levels and spells out the role of the DWEA in the event of non-performance by provincial and local government.

Focusing on the responsibility to ensure the right of access to basic water supply, the Water Services Act defines 'basic water supply' as:

> the prescribed minimum standard of water supply services necessary for the reliable supply of a sufficient quantity of water to households, including informal households, to support life and personal hygiene (South Africa, 1997:5).

In terms of this act, the standards for basic water supply are the following:

a) For low-density areas, a minimum quantity of 7 litres (ℓ) of potable water per person, available on a regular daily basis;

b) For high-density areas,

- A minimum quantity of 25ℓ of potable water per person per day;
- Potable water available within a 200-metre walking distance; and
- Water supplied from a source of raw water, which is available 98% of the time, not failing more than one interruption in 50 years with effectiveness of not more than one week interruption in supply per year (Folifac, 2005:13).

The Water Services Act also specifies that the water services authorities have the duty to ensure that all consumers have efficient, affordable and sustainable access to water services. This duty depends on the availability of the resource and on the duty of consumers to pay for this service.

Furthermore, the act lays down requirements for transparency. One example is the stipulation that every water service authority must prepare a report on the implementation of a Water Services Development Plan (WSDP). This blueprint must indicate a timeframe within which the provision of basic water and sanitation may

reasonably be expected. This applies specifically to those who will not receive these services within the following five years. The act also stipulates that if the water services institution is unable to meet the requirements of all its consumers, preference must be given to providing them with basic water supply (Folifac, 2005:5). In general terms it can be said that the Water Services Act sets out the rights and responsibilities of consumers.

According to Earle, Goldin & Kgomotso (2005:11), three common themes can be identified from the principles of the act:

- Equity in compensation for the past differences between communities in access to services. (The social component of water use, where water is an instrument of social development, is emphasised.) This theme is central in this study;
- Sustainability as a concept is introduced. The environmental need for water is recognised; and
- Economic efficiency, cost recovery, payment by users and the involvement of the private sector are included. With this theme, water is seen as an economic commodity to be used efficiently to promote economic development of the country.

These themes relate directly to the requirements for sustainable development that are discussed below. Legislation needs to encompass all three of the requirements to achieve sustainable social, economic and environmental development. Sustainable development is essential to avoid the tragedy of the commons, and legislation provides the necessary restrictions to prevent early depletion of the water commons, while still providing all consumers with basic drinking water. Against this background, the Free Basic Water Strategy was developed.

2.7.4 Free Basic Water Strategy

The requirement for government to provide access to basic drinking water was taken a step further by the development of the Free Basic Water Strategy. Implementation of this policy ensures access to 6Kℓ of free potable water to all households each month. This amounts to 25 litres per person per day (ℓ/p/p/d), which conforms to the standards set by the Water Services Act mentioned above. The amount of 25ℓ/p/p/s of potable water is just above the amount considered by the World Health

Organisation (WHO, 2001). This quantity of free potable water is the same for every household, regardless of wealth or the number of persons residing in the dwelling (South Africa, 2001:15). Municipalities do however have certain options to choose from in implementing the policy.

Three approaches can be followed to provide free basic water:

- A rising block tariff applicable to all residential consumers with the first block set at 6Kℓ per household per month with no set monthly tariff for those who use less;
- Every consumer identified for poverty relief, is given credit on his/her account for the costs that cover 6Kℓ kilolitres of water; and
- Service level targets can be identified. It is then possible to provide water free of charge only through a particular type of service that restricts supply to basic levels. Everyone is offered the basic service level supply, and only those who show that they can afford it, receive higher service levels. Poorer households will evaluate their own targets by upgrading only when they can afford it (South Africa, 2001).

According to Earle *et al.* (2005:3), the three methods of providing free basic water have their limitations. The rising block tariff is the most common method used. This only works effectively, however, when there are enough high-volume users to make cross-subsidisation feasible. This means that there need to be enough consumers who are able to pay for higher volumes of water consumed, to subsidise the free water. In many areas there are not enough high-volume users to facilitate this method properly.

IWRM takes place within the context of the Free Basic Water Strategy by providing society with basic potable water as required by the National Water Act in accordance with international water demand management strategies. The strategy integrates the basic human right to safe drinking water with the appropriate management principles set to conserve the resource.

2.8 SUSTAINABLE DEVELOPMENT

Sustainable development is a concept widely used in government policies and legislation. It lends itself to a variety of definitions and interpretations. According to

Beckenstein *et al.* (1996:7), there are three core objectives of sustainable development. The first is optimising human welfare. This includes income and material consumption, together with education, health, equality of opportunity and human rights. The second objective is that all physical and economic activity should be compatible with the biosphere. This objective focuses on non-renewable resources and underlines that these resources should not be used at a rate exceeding that at which they can be substituted by sustainable renewable resources. Indispensable resources provided by the natural environment should not be depleted. The third objective is the equitable distribution of bio-spherically compatible improvements in human well-being for the present and the future. Here, sustainability implies that development should serve this generation and future generations.

Baker (2006:8) identifies three interdependent requirements to achieve sustainable development, namely social, economic and environmental issues. Figure 2 illustrates this notion.

Figure 2: Sustainable development through the ties between society, economy and the environment (Source: Baker, 2006:12)

For sustainable development to continue, social, economic and environmental development must be pursued simultaneously. If one of these lags behind, the other two will suffer, and sustainable development will no longer be possible. Baker

(2006:10) identifies certain priorities within the confines of the three core objectives. Highlighting the importance of the water commons, these priorities are:

- **Environmental sustainability:** Sustainable development must not endanger the natural systems that support life on earth (WCED, 1987:43). Environmental sustainability is further defined by its proponents as the ability of the environment to continue to function indefinitely and in a proper manner (Cronje & Chenge, 2005).
- **Economic sustainability:** Sustainable development must be based on an economic process with a goal of development prior to the provision of sustainability, but on an integrated basis. The economic aspects of sustainable development require the development of an economic system that facilitates equitable access to resources and opportunities and the fair sharing of finite, ecologically productive space. It must also enable sustainable livelihoods and establish viable businesses and industries based on sound ethical principles (Cronje & Chenge, 2005).
- **Social sustainability:** The moral choice to pursue equity is at the core of the notion of sustainability. This includes equity in legitimacy and institutional decision-making, as well as equity in outcome (Brown & Corbera, 2003:4). In South Africa, poverty is the single greatest burden which is a result of the absence of social equity. This often manifests itself in unemployment. If not addressed, this tendency will continue and poverty margins will keep rising. Rising poverty will put pressure on the health care system which will not be able to continue providing effective free health care if the number of those who cannot pay keeps rising as a result. This is also true for all other sectors of social welfare for which the government is responsible, such as housing and education (UN, 1997).

Sustainable development is ultimately a conceptual and practical approach to tackling poverty, social inequality and environmental degradation. Although it is a relatively new term and concept, it has been recognised worldwide due to development patterns that were focused solely on economic growth and accumulation without considering the impact on natural resources.

Due to the arid circumstances that most water stressed countries face, the use of water resources over many years without proper concern for its sustainability is one of the contributing factors to the current water-related conflicts. The purpose of development is to achieve and enhance the social and economic well-being of communities, both urban and rural, and to meet the basic needs of society. Not only should development concentrate on the material well-being of citizens, it must also ensure individual actualisation and fulfilment and create a just and fair development environment in order to provide equal opportunity for civil society to participate (Cronje & Chenga, 2005).

An important factor in achieving all three objectives to ensure sustainable development is governance, specifically good governance. When discussing sustainable development, the importance of the concept of good governance does not always get the emphasis it should; without it, none of the objectives of sustainable development are possible.

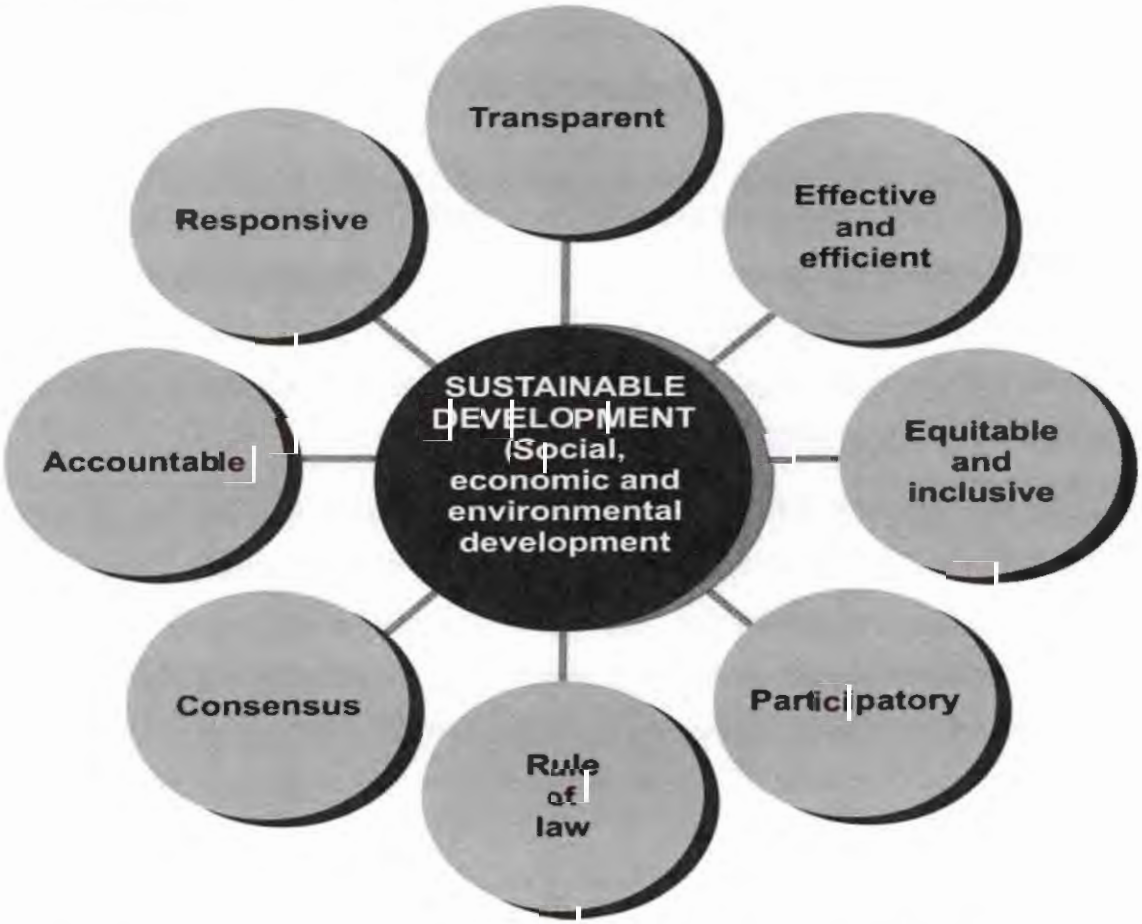


Figure 3: Characteristics of good governance (Source: Baker, 2006:12)

Good governance is difficult to achieve, especially in developing countries in Africa. Still, it should be aspired for, and most urgently where sustainable management of natural resources such as the water commons is concerned.

In 2008 the Mo Ibrahim Foundation released a document called the Index of African Governance. This provides a ranking of sub-Saharan African nations according to tenets of governance quality. This was formulated based on data from 2006 which was the last year in which comprehensive existing data from all sub-Saharan African countries were made available. There are 57 criteria used by the Mo Ibrahim index in assessing each country. The index assesses their progress in five key areas:

- Safety and security;
- Rule of law, transparency and corruption;
- Participation and human rights;
- Sustainable economic development; and
- Human development (Mo Ibrahim Foundation, 2008).

This document was created in recognition of the need for a comprehensive and quantifiable method of measuring governance quality in sub-Saharan Africa, and has been designed to:

- Provide a tool for civil society and citizens to hold governments to account;
- Stimulate debate on governance, in particular by providing information about leadership performance; and
- Provide a diagnostic framework to assess governance in sub-Saharan Africa (Mo Ibrahim Foundation, 2008).

According to Rotberg & Gisselquist (2008), governance is the delivery of political goods to citizens: the better the quality of that delivery and the greater the quantity of the political goods being delivered, the higher the level of governance. The index shows that in South African governance there has been a steady improvement since 2007. The level and quality of governance in South Africa was registered as follows:

Category	2007 score (out of 100)	2008 score (out of 100)	2008 ranking (out of 100)
Safety and security	61.1	61.1	42
Rule of law, transparency and corruption	75.4	78.1	5
Participation and human rights	86.9	86.3	4
Sustainable economic development	62.8	63.5	3
Human development	68.3	68.7	3

Table 3: South African governance ranking according to the Mo Ibrahim Index of African Governance (Source: Mo Ibrahim Foundation, 2009)

According to the Ibrahim index's comprehensive measures of governance performance, South Africa improved in three categories: Rule of law, transparency and corruption; Sustainable economic development; and Human development. In the categories of Safety and security and Participation and human rights, South Africa's score dropped significantly. The most notable improvement was in Rule of law, transparency and corruption, where South Africa's score rose by 2.7 by points. South Africa is currently in fifth place on the index (Mo Ibrahim Foundation, 2008).

When the findings of the Ibrahim Index are considered in the context of the water sector in South Africa, it stands to reason that all five categories of good governance are essential. Water secures safety and security by providing safe drinking water, which is a human right. It also makes sustainable economic development possible with regard to industry and agriculture. The availability of safe drinking water promotes human development and without water governance policies being transparent, corruption in the water sector is imminent. These principles are also integrated; one cannot exist without the other four. Good governance must comply with all five attributes. Failing this, the tragedy of the water commons cannot be avoided. The core idea of the tragedy of the commons is that water as a common commodity will not be available forever if the current consumption is maintained. There must be restriction on the utilisation of the water commons and the only way this can be done is to develop legislation to regulate water use. Typically, governments need to implement these measures. The success of implementation

has a direct influence on achieving sustainable development and depends entirely upon the government's ability to practise good governance.

To illustrate this strategy and understand the practical processes of decision-making, the Lower Orange Water Management Area (LOWMA) will serve as a case study in establishing a catchment management agency. The //Khara-Hais Local Municipality is located within the boundaries of this catchment management area. The concept of hydropolitics becomes more relevant when the policies and legislation, as discussed above, are implemented. The next section reports on accepted policy implementation frameworks used to develop management strategies in public management.

2.9 POLICY IMPLEMENTATION FRAMEWORKS

Policy implementation frameworks in public management are not a novelty. Over the years, a great deal has been written on this topic, to the extent that these over-exposed theories have become dreary and uninteresting. It is, however, dangerous to lose sight of them and the pragmatic value they still have on policy-making strategies. Let us remind ourselves of their relevance.

According to Cloete, public policies are future-orientated and subject to continuous review by legislators (Cloete, 1981:2). Legislators should determine the ideal course of action to solve a particular problem. Public policy-making is the activity preceding the publication of a goal, while a policy statement is the formal articulation or declaration of intent for the goal to be pursued. Public policy has been defined as:

- "... a kind of guide that delimits action" (Hanekom & Thornhill, 1983:41);
- a mechanism employed to realise societal goals an to allocate resources (Starling, 1979:4);
- "... the description and explanation of the causes and consequences of government activity" (Baker *et al.*, 1975:12);
- A comprehensive framework of and for interaction (Dye, 1978:3);
- Purposive goal-orientated behaviour (Dye, 1978:3);
- A desired course of action to achieve particular objects or goals (Dye, 1978:4);
- A declaration and implementation of intent (Anderson *et al.*, 1975:5); and

- The authoritative allocation through the political process, of values to groups or individuals in the society (Friedrich, 1963:69).

It is clear from these definitions that in the past, academics have found it difficult to formulate a comprehensive definition of public policy. Recent publications still use these formulations as a foundation for their personal observations on what constitutes public policy.

It is accepted that public policy-making consists of at least six main groupings of interdependent, mutually inclusive administrative functions. These are: policy-making, organising, financing, staffing, determining work procedures and control (Hanekom 1994:1). An important stipulation made by Hanekom is that there are seven building blocks of successful policy-making. He argues that successful policy-making relies on:

- Participants in public policy-making (policy-making bodies, officials etc.);
- Public participation;
- The process of policy-making itself (theories, models, types and perspectives);
- The implementation of policy;
- Policy analysis (what is policy analysis?);
- Models of policy analysis (types of policy analysis); and
- Policy evaluation (success of policy implementation) (Hanekom, 1994: 1).

If we now consider the good governance principles set out by the Mo Ibrahim Foundation (2008), the interface between good governance principles and public policy are evident.

For less developed or developing countries (former Third World countries), such as South Africa, public policy-making takes on a unique format. Thomas B. Smith identified seven distinctive characteristics of the policy cycle in such countries. The major difference between these characteristics and those of developed countries is that the gap between expectations and fulfilment in less developed countries is usually far greater. Governments in less developed countries have less success in effectively addressing a variety of discrepancies between the demands for change in their political environments and their capabilities to fulfilling those demands (Smith, 1985:130). We now investigate these characteristics, beginning with issue

identification. "Interest groups" in all instances refer to groups, who are affected by government, have the ability to influence government or have the potential to be government.

2.9.1. Issue identification

In less developed countries the process of issue identification is rarely the result of demands and procedures from competing interest groups and political parties. Institutions and organisations of this nature in less developed countries are often very basic, suppressed or non-existent. Under these circumstances, governments tend to respond to demands with shallow populist policies or empty rhetoric (Cloete *et al.* 1991:272).

2.9.2. Policy formulation

Continuous political instability, regime changes and a tendency towards authoritarian rule lead to situations in which the focus tends to be on the survival of the regime rather than the development of the country. In less developed countries, the preference tends to be short-term policies with visible, short-term payoffs even if the longer-term effects may have a negative impact on development. Policy decisions are made and announced without prior consultation with affected interest groups. Planning and planning committees or commissions are popular, but such plans are often vague guidelines for action and are seldom adhered to (Cloete *et al.* 1991:273).

2.9.3. Policy change

Instead of increased policy change (a trademark of industrial democracies), regimes in less developed countries tend to make imposing macro-policy changes every few years. Many of these policies are intricate and require considerable changes in attitude and behaviour. Such policies are often resisted fiercely by interest groups. Consequently, implementation becomes virtually impossible (Smith, 1985: 134).

2.9.4. Policy implementation

Many worthy goals set by less developed country governments have failed because of the inability of such governments to implement their own policies. This state of affairs can be attributed to poor planning, lack of resources, political opposition and a weak or corrupt public sector (Cloete *et al.*, 1991:273).

The above mentioned characteristics are evident in the water-related policies South African government is trying to implement as is illustrated in Chapters 2 and 3 of this study.

2.10 CONCLUSION

Legislation, strategies and water management organisations link to the theory of the tragedy of the commons. A case has been put forward in this chapter that water should be seen as a basic human right. Should we then not be able to use this resource freely without laws and regulation? Hardin (1968:4) states that there could be resistance from people (co-owners of the commons) to restrictions, because they take away certain freedoms. Only through a willingness to include those who do not currently enjoy this basic human right can the problem pertaining to access to basic drinking water be addressed successfully. However, the right to water cannot imply that water and its availability should be unrestricted. This principle is at the core of IWRM. The movement is one of moving away from a supply-orientated approach towards a demand management approach. In South Africa, this relatively new approach to the supply and utilisation of water finds a unique application. South Africa has had significant changes in water policy to address these issues, and *The National Water Act*, 36 of 1998, the National Water Resource Strategy and the *Water Services Act*, 108 of 1997, are prescriptions introduced for the implementation of this transformation in South African water management.

The purpose of legislation implemented in South Africa is to provide at least the basic required water needs to all inhabitants of the country. This needs to happen in a manner that ensures sustainable development and requires practices of good governance. Hydropolitics is the arena in which these practices of good governance are evident since the government has a hydro-social contract with society.

The success of the self-regulating approach outlined in the new water policy implies that all role-players have to be empowered. Empowerment implies capacity building and training. That is why IWRM is a systematic, long-term initiative where role-players, consumers and government must work together to develop a better water-regulating policy. The application of organisational structures like the CMAs and water user associations (WUAs) certainly deal with these matters. Only once firm partnerships of collaboration have been formed, will it be possible to speak of a sound approach to integrated water resource governance.

The ideal is to achieve sustainable development by practising good governance. Although some of the strategies mentioned may restrict free access to water, they make a concerted attempt to provide some access to water for all consumers. At least on paper, it would then seem that the commons are part of the public realm that belongs to all the inhabitants of a country. This form of public ownership turns into a tragedy of the commons in the form of an apparent disregard for valuable natural resources if there is insufficient participation on matters of common interest. In the next chapter, the implementation of catchment management policies, municipal water management and irrigation policies in South Africa is discussed.

CHAPTER THREE

CATCHMENT MANAGEMENT, MUNICIPAL WATER MANAGEMENT AND IRRIGATION IN SOUTH AFRICA

3.1 INTRODUCTION

As outlined in Chapter 2, DWEA divided South Africa into 19 Water Management Areas (WMAs) in line with the *National Water Act,* 36 0f 1998 (National Water Act). The focus of catchment management in South Africa is to ensure that the global policies discussed in Chapter 2 are adhered to. The National Water Act is South Africa's response to an international trend that accentuates the need for a more integrated approach to water management. In terms of the National Water Act, catchment management agencies (CMAs) must be established in each of the 19 areas. According to Malzbender *et al.* (2005:6), the guidelines in the National Water Act for establishing CMAs are vague and leave the process open for interpretation. This issue will become evident later in this chapter. However, public participation in the establishment of CMAs is a clear and important requirement, and proof of this is imperative for the establishment of a CMA. This is also illustrated later in the chapter.

Attention is initially given to an explanation of what a catchment is, and a CMA is defined. A description is then provided of the functions of WUAs and CMAs. Finally, the focus is on how all these issues influence the management of the water commons. Particular attention is also given to irrigation practices in South Africa and how the looming tragedy described in Chapter 2 can be avoided.

3.2 CATCHMENT MANAGEMENT

In seeking to bring coherence and integration to water resources management and at the same time address the issues of equity and sustainability, South Africa has embarked upon a process of decentralisation of both management and regulation. The imperatives for public participation and stakeholder inclusion as required by decentralisation are stipulated in the Constitution and articulated in both the National Water Act and Water Services Act.

South Africa is at a point where, after the complete revision of its water and sanitation policies that accompanied the democratic transformation process, attention has now shifted to implementation. The new policies and their relevant legislative measures are not only about ensuring adequate quality and quantity of water for human need, they are also about protecting the resources available for current and future use so that the national slogan of 'some, for all, forever' can be realised. In a fundamental departure from previous approaches to water resource management, catchments are seen as the units for Integrated Water Resources Management (IWRM) (Pollard & du Toit, 2005:3).

Another key development is the clearly articulated requirement that all local stakeholders should be part of the IWRM framework. In its broadest sense this is to be undertaken by the CMA, tasked with the management of water resources at the level of Water Management Areas. South Africa's 19 water management areas each have a number of sub-catchments. It is incumbent on the CMA to consider the sustainability of both the resource base as well as water delivery mechanisms within these catchments.

Theoretically, the CMAs will be informed by local-level representation through Catchment Forums and WUAs, Water Services Authorities and Water Service Providers. Local governance structures in the form of district and local municipalities are expected to participate in water management and the supply side as Water Service Authorities and Water Service Providers (Warner, 2006:4).

The management of water resources falls within the scope of the National Water Act (1998) and is specific to catchments (natural boundaries) within water management areas. Water services provision, on the other hand, is largely the domain of the

Water Services Act and is mainly grounded in the provision of water services within municipal (administrative) boundaries.

Catchment management can be seen as a way of managing water resources, rivers and the terrestrial activities that affect them. It is an approach underwritten by principles of sustainability planning. Integrated catchment management takes this notion further. The rationale is that the catchment provides a natural framework within which to undertake integrated water resources planning and management. Adopting this orientation means that water cannot, and should not, be viewed or managed simply at the point of extraction or impact, but rather must be seen as a key linkage within a catchment system (Pollard & du Toit, 2005:4).

A **catchment** is a land surface area from which rainfall will drain into the watercourse through surface flow to a customary point. Water from melting snow or rainfall gravitates downhill into a drainage body of water such as a river, dam, lake or wetland (South Africa, 1998:23). The DWEA defines a **catchment management agency (CMA)** as a statutory body. This means that its establishment is approved by means of a formal government notice. It has a governing board appointed by the minister. The minister acts, through the DWEA, to delegate water resource management to the regional and catchment level (South Africa, 2004:89). The main purpose of a CMA is to involve local communities in water resource management. A CMA must ensure that all interested parties, including the previously disadvantaged, are included in decisions regarding management of the water resource. The DWEA has identified a few functions that CMAs must adhere to. For example, they have to:

- Investigate and advise on the protection, use, development, conservation, management and control of the water resource in the WMA;
- Develop a catchment management strategy;
- Co-ordinate activities of water users and water management institutions;
- Promote co-ordination between implementation of catchment management strategies and the implementation of water service development plans by water services authorities (municipalities); and
- Promote community participation in the protection, use, development, conservation, management and control of the water resource in the WMA (South Africa, 2006).

In addition to adhering to these requirements, CMAs are required to ensure consistency when responding to requests for new water licences and informing water users on how the DWEA will manage the water resource within the area of concern (South Africa, 2004).

According to a working paper published by the University of Pretoria in 2004, water entitlements are to be allocated and issued by the CMA every five years, in terms of objectives of social equity, environmental sustainability, and economic efficiency outlined in the National Water Act. Environmental objectives are set out in the stipulations that have a bearing on the preservation of the ecological reserve. After giving first priority to this water destination, the CMA may decide how to allocate the remaining available water among the economic sectors, according to the critical objective of improving the economic efficiency of water use for greater social benefits (Hassan, 2003). The sectors include irrigation boards, smallholders, forestry companies, industries and mines. When licences are issued, individual water users will send an estimate of their own anticipated water demand to the CMA. If the available water, with the exclusion of the ecological reserve, is more than the total requirements of all users, each user will receive an entitlement for the amount of water it has requested (Farolfi, 2004:13).

A water user association (WUA) is a grouping of water users in a demarcated section of a catchment management area, working together towards a common goal. The main functions of the WUAs are to:

- Prevent the misuse of water from the water source and waterworks (for example irrigation canals);
- Protect water sources and waterworks;
- Remove barriers unlawfully placed in the water source or in the waterworks;
- Prevent any unlawful activity that may cause lower quality of the water source or water in the waterworks;
- Act as custodians of the water source and the waterworks;
- Regulate the flow of a watercourse or waterworks by
- cleaning the canal;
- reducing the risk of flood damage;
- Re-route watercourses that naturally change to their original courses;

- Investigate and take note of the amount of water in the water source and waterworks, and the times and places where water is allowed to be used;
- Build or obtain waterworks facilities for the drainage of soil;
- Supply water to land for irrigation and other uses; and
- Act as custodians in regulating the use of water from the water source or waterworks (South Africa, 2002).

A WUA is perhaps the most viable approach for smaller towns, especially in regions where irrigation plays an important role in the local farming sector. The settlement node must typically have rural characteristics, limited local government capacity, and partially developed economic and institutional environments. The WUA is primarily based on local human resource capacity (management oversight is voluntary) carrying low overheads. Although the WUA model has potential, when left in isolation it is likely to fail. It needs support from higher-level organisations which provide guidance, training and access to specialist skills and knowledge. WUAs in small towns have a water board (also called a Board of directors) responsible for management oversight of the WUA. The WUA-Board represents all users, i.e. the relevant local ethnic and social groupings that constitute the user community. WUAs tend to rely on local employees, including an accountant, a clerk and a number of operators/mechanics. A common arrangement in South Africa is that a private or municipal water authority sells bulk water to communities and towns. In the town/community, the water service provider is responsible for distribution, routine operation and maintenance, billing and collection, and also handles communication with consumers. The WUA model is therefore relevant for multi-village schemes, in combination with alternative management options for bulk supply. And bulk supply takes care of many activities that would otherwise require specialist support such as development, expansion and protection of source works, and treatment (Smet, 2003:10).

In a letter to the DWEA in 2008, Mark Dent, one of DWEA's officials, emphasised the problems facing employees of the DWEA, especially in the implementation of catchment management policies. The problem with regard to catchment management, which he highlighted in his letter, is quoted here:

> To date many inside and outside of DWEA have viewed the 19 CMAs as 19 regional offices of DWEA, 10 more than at present. Based on this view they have declared the core institutional arrangements for the 1998 National Water Act unworkable. Caught between a nightmare present and their view of an unworkable future, many despair...

This view sums up the attitude towards the lack of progress made by WMAs to establish CMAs and the decidedly negative influence this has on the functional operations of these agencies. Dent also mentions in his letter that because of the pressures put on personnel in the 19 WMAs, many are leaving for the private sector, putting those who remain under even more strain. The fact that the Lower Orange Water Management Area (LOWMA) has had three directors since 2003 bears testimony to this problem (Kubaie, pers. comm., 2009). On 26 May 2006, during a question-and-answer session in parliament, Ms C.C. September (ANC) put the following question to the minister of water and environmental affairs:

> What progress has been made in the establishment of catchment management agencies around the country and (b) what impact has the shifting of the target date for the establishment of such agencies brought about on transformation in the water sector? (National Assembly Internal Question Paper, 2006)

At the time, four of the 19 identified CMAs had been established. A further two were in the process of being set up. The minister acknowledged that there had been delays, and in an attempt to turn the situation in her favour, stated that the delays contributed to stakeholder empowerment, improved legitimacy and improved organisational stability because more time could be spent on these issues. The minister went on to say that it had been recognised from the outset that the establishment of catchment management agencies would not be a rapid process, which was evident from the fact that the process was taking longer than originally anticipated (National Assembly Internal Question Paper, 2006).

On 22 September 2006, in a question-and-answer session in the National Council of Provinces, Mr N.J. Mack asked the following, more specific question of the minister:

> How has her department monitored the progress of the establishment of catchment management agencies, (b) what were the problems encountered and (c) how will her department address these problems? (National Assembly Internal Question Paper, 2006)

The minister began her answer evasively with a long reference to the stipulations in the National Water Act, pointing out that it allowed for a top-down and bottom-up approach in establishing the CMAs, emphasising stakeholder participation. Because stakeholders did not have the resources to start the process from the bottom up, the DWEA needed to provide support and resources from the top. The minister listed a few challenges facing the DWEA in providing support for establishing CMAs. In essence, her responses are provided below, grouped under appropriate headings. These responses were not quoted verbatim, but were summarised from the National Assembly Internal Question Papers published in the Government Gazette.

3.2.1. Stakeholder involvement

All CMA establishment processes have attempted, in varying degrees, to involve and consult stakeholders in the process of developing their proposals. The success of these processes has been varied due to:

- The challenge and difficulty of involving stakeholders, particularly groups of historically disadvantaged communities;
- The challenge to capacitate stakeholders and to bring them to a point where they are able to discuss matters on a level playing field;
- The potential dominance of organised sectors;
- Limited resources available for the process;
- Confusion about who should be involved, namely individuals or groups;
- Inadequate clarity on what was expected from the process, distinguishing between the needs for consultation and empowerment (capacity building); and
- Limited agreement about approaches to ensure involvement (National Assembly Internal Question Paper, 2006).

The minister also explained that the National Water Act referred to existing and potential water users, provincial and local government and the environmental interests to be considered in the composition of the CMA Governing Board. This implies a focus on groups with a direct interest in using water resources, rather than all inhabitants of a WMA. Although the requirements of attempting to involve all

individuals in a WMA are enormous, one may find disgruntled stakeholders who feel that they have not been consulted. Finding the balance in this is always a challenge (National Assembly Internal Question Paper, 2006).

3.2.2. Resource requirements

The minister admitted that the resources required of the regional offices of the DWEA for the establishment and development of CMAs had been greater than initially estimated. She provided the following reasons, which coincidentally are in line with the concerns outlined by Dent in his letter of 2008, quoted above. These pan out into three distinct patterns:

- Limited capacity in regional offices of the DWEA to facilitate extensive stakeholder participation in the establishment of CMAs. External support (a consultant) was required (at a cost of about R2 million over two years for each CMA), in addition to the active participation of two to five relevant departmental officials;
- Support for a new CMA in terms of establishing a solid corporate governance regime and facilitating the organisational development, required financial and human resources (including skill sets) that regional offices generally did not have; and
- Once established, the CMA desired to develop legitimacy as soon as possible. Therefore, they would have to establish participative structures and processes quickly to foster stakeholder participation in water resource management. As a rule, regional offices were not well-resourced for this, so they would either have to make rapid staff appointments, or bring in external support. Similarly, they wanted to begin operations as soon as possible and this, in turn, required functional and systems capacity.

For effective functioning of CMAs, they needed to be staffed by appropriately skilled managerial and technical people from the water (or allied) sectors and/or be enabled to delegate or contract certain functions to other organisations. Furthermore, integrated water resource management required additional skills to those that historically had been recruited into water resource management. Certainly, accelerated establishment of all 19 CMAs, without providing adequate time to build

the capacity of the entire water sector, may have placed considerable strain on available human resources in South Africa. The parallel need for skills in other water management and service institutions and the potential impact of this on the DWEA's human resources had to be considered (National Assembly Internal Question Paper, 2006).

3.2.3. Restructuring

The minister stated that transformation in the water resource management sector was a priority for her department. This included ensuring demographically representative staffing of CMAs. There were a number of key elements in this process.

Firstly, the DWEA was establishing proto-CMAs (through the cluster restructuring process), largely related to the CMA's initial functions and water use control. The departmental staff involved in this could ultimately be transferred to the CMAs. These transfers needed to be representative, and existing staffing indications needed to be determined from the equity plans of the regional office. Significant vacancies in these structures had to be filled so as to be representative of all sectors of the population and provide training and exposure prior to transfer. In the second place, the DWEA had to involve CMAs to adopt and implement employment equity plans and implement affirmative appointment practices, which they would typically be bound to do as an organ of the state. The minister noted that public entities were as good as, if not better than, government departments, at achieving employment equity. Thirdly, the regional offices (and/or the national head office) of the DWEA had to continue performing the functions that had not yet been delegated to a CMA (or other institution). Therefore, the rate of CMA establishment and evolution would dictate the rate and nature of the transformation of the regional offices of the department. Responsibility and accountability for a function needed to be negotiated once the CMA was in place (National Assembly Internal Question Paper, 2006).

The minister admitted that the pressures on CMA offices highlighted by Mark Dent in his letter of 2008 were justified because the regional offices were not carrying out these functions as they were required to do. And finally, an important function could be delegated to a CMA in one WMA, before an additional CMA was established,

which might complicate the ability of the DWEA to maintain capacity for all WMAs. CMAs that were established initially might have profited disproportionately through transfer or recruitment of departmental staff, leaving CMAs that were established later with a smaller pool of experienced people to draw upon (National Assembly Internal Question Paper, 2006).

The answers provided by the minister suggest that she was aware of the problems and knew what needed to be done, but exactly how this would be done was unclear. Ultimately, the "how" needs to be figured out very soon to make sure that the rate of establishment of CMAs is speeded up. An important issue that needs attention in attempts to expedite this process is the question of human resources. In March 2007, Mr V.C. Gore asked the minister of water affairs and forestry in very explicit fashion:

> [are] there are any vacant positions in ... (a) Limpopo, (b) North West, (c) the Free State, (d) the Western Cape, (e) Gauteng, (f) Mpumalanga, (g) KwaZulu-Natal, (h) the Eastern Cape and (i) the Northern Cape? [I]f so, (i) how many [vacant positions are there] in each province, (ii) what is the level of each vacant position, (iii) how long has each position been vacant, (iv) what measures have been taken to fill each vacancy and (v) when will each vacancy be filled? (National Assembly Internal Question Paper, 2007)

The minister answered the question by providing the following table:

	REGION	**No. of Vacant Funded Posts**
(a)	Limpopo	283
(b)	North West	16
(c)	Free State	70
(d)	Western Cape	87
(e)	Gauteng	95
(f)	Mpumalanga	326
(g)	KwaZulu-Natal	30
(h)	Eastern Cape	703
(i)	Northern Cape	23
		1 633

Table 4: Vacant posts at the DWEA in 2007 (Source: National Assembly Question Paper, 2007)

As Table 2 indicates, the DWEA had 23 vacant posts in the Northern Cape at the time. The minister explained that the vacancy periods varied from two months to two years. She stated that these vacancies would be prioritised according to service delivery requirements and would then be advertised. She acknowledged that constraints in the supply of qualified personnel could have an impact on the rate at which these vacancies would be filled (National Assembly Question Paper: 2007). The answers provided by the minister confirm that the DWEA has a serious problem with human resources. This appears to put constraints on the establishment of CMAs.

The following section reports on irrigation in South Africa and explains how institutional developments influence this sector of water users.

3.3 IRRIGATION

According to Karlberg *et al.* (2007:62), access to safe water in large areas of sub-Saharan Africa is a major challenge in achieving the United Nation's Millennium Development Goals of halving the number of poor and malnourished people by 2015. Three quarters of the world's poor live in rural areas and depend on agriculture to ensure survival. Although water features prominently in international development targets, rural poverty in Africa is not high enough on the agenda (Hope *et al.*, 2006:173). There is a need to confirm that global water policy addresses the realities of rural needs in sub-Saharan Africa because these areas are largely dependent for their subsistence on water to sustain agricultural practices. The amount of water needed to produce crops and keep livestock alive in this region is substantial, but the availability is low.

The efficiency of water use in agriculture, especially in irrigation practices, is generally perceived negatively by stakeholders of other water user groups. Therefore the challenge is to use the available resource as efficiently as possible, especially for to irrigation purposes. Only 45% of water extracted from surface and groundwater sources is believed to find its way to crops. Roughly 35% of the water lost through irrigation systems flows back into the river systems by overland flow and seepage. However, this return flow is usually nutrient-enriched and polluted by pesticides,

herbicides and other pollutants that affect the quality of water and rivers (Stevens, 2006:3).

3.3.1 A brief history of irrigation in South Africa

According to the South African National Committee on Irrigation and Drainage (SANCID, 2008), irrigation development in South Africa can be divided into three broad phases. These overlap in terms of the involvement of private and public organisations which played an active role in the development of irrigation as an industrial pursuit in the country's economy.

3.3.1.1. Phase 1: Individual diversion schemes

In the period until 1875, water resource development for irrigation was primarily a private initiative. Small-scale utilisation was undertaken without government assistance. This first phase of individual weir diversion or pump schemes is characterised by a subsistence economy, limited and distant markets, and little incentive for capital investment. Wherever natural circumstances were favourable, water was abstracted from rivers (SANCID, 2008).

3.3.1.2. Phase 2: Co-operative flood diversion schemes

An active policy with the objective of promoting irrigation began in the former Cape Colony. A two-pronged strategy was introduced, comprising obligatory collaboration between producers and provisions to grant unsubsidised loans for individual or co-operative weir diversion and flood irrigation schemes. This strategy was facilitated by means of legislation promulgated in 1877, which is considered to be the beginning of modern irrigation in South Africa. However, development of co-operative flood schemes was slow. Although measures were applied to make loans more attractive, irrigation development gained momentum only after 1906, following an economic boom brought about by the demand for ostrich feathers as a fashion article. Ostriches are adapted to a dry climate and require permanent pastures such as lucerne under irrigation. However, the considerable expansion of co-operative flood irrigation schemes was of short duration, mainly because of declining markets in this commodity between 1914 and 1916. The slump coincided with a severe drought, and not all the land was cultivated, which culminated in an inability to repay irrigation loans (SANCID, 2008).

3.3.1.3. Phase 3: Public storage schemes

At the beginning of the third phase, it was explicitly recognised that unreliable rainfall and variable river flow necessitated water storage for the regular and consistent irrigation of crops. A range of field, industrial and horticultural crops such as wheat, tobacco, cotton and citrus were produced. The aspiration to store flood water and the expected ability of farmers to finance capital expenditure due to improved markets for staple crops led to a change in policy during 1920. Storage was specifically considered essential for co-operative flood schemes already established, or in the process of full water application. In addition, unused potential could be harnessed through water storage in summer rainfall areas to be used for supplementary irrigation during the critical growth period (SANCID, 2008).

A problem experienced was the low population in relation to the area irrigated. It was realised that irrigation schemes could not succeed without irrigators or people on the land. This led to the strategy of establishing settlers at co-operative schemes and especially impoverished people at government-initiated irrigation settlements. In view of the continued inability of such settlers to repay irrigation loans, the financing strategy was changed to writing-off loans; partial subsidisation of private and co-operative schemes; and total subsidisation of public schemes (SANCID, 2008). The development of storage schemes was backed by the broad objective of utilising water resources for the future agricultural development and prosperity of society.

These phases of irrigation development were linked with some of the significant phases of South Africa's economic development. Private irrigation schemes were dominant during the agricultural phase. Co-operative schemes were implemented during the agricultural/mining phase, and government settlement schemes below public storage dams coincided with the third phase, notable for its simultaneous and integrated agricultural, mining and industrial development.

As anticipated, the emphasis in the water policy gradually shifted away from irrigation towards industrial development. This is illustrated by the replacement of the *Irrigation and Water Conservation Act* no. 8 of 1912 with the *Water Act* no. 54 of 1956 and the change of functions, as well as the name of the Department of Irrigation to the Department of Water Affairs (SANCID, 2008). The table below gives a timeline of the development of irrigation in South Africa.

Year	Total area irrigated (ha)
1910	231 362
1924	318 767
1965	736 932
1996	1 290 132
2000	1 300 000

Table 5: Statistics relating to irrigation (Source: SANCID, 2008)

The following section investigates the current irrigation situation in South Africa.

3.3.2 The current standing of irrigation in South Africa

In the South Africa, equitable water allocation has been an emblematic policy goal driven by the imperative to create a more equitable society. This is influenced by at least two facts. First, the apartheid system of separate development and racial inequality resulted in the exclusion of 14 million black people from the provision of basic water services by 1994. Secondly, average rainfall is low (less than 500mm per year) and is highly variable, often occurring in unpredictable cycles of droughts and floods; this has long been recognised and acted upon through extensive water resource development, leaving few new opportunities for further water storage or cross-boundary transfers. As water resources are almost fully developed, the need for trade-offs and transfers between water use sectors has been debated nationally and has informed new water legislation. Water is defined as "an indivisible national asset" with priority allocations to basic human needs and ecological systems (South Africa, 1998:15). New social and environmental water claims in an economy with high-value industrial water demands, has placed water allocations to agriculture under closer scrutiny. The map below gives an outline of the river basins in South Africa.

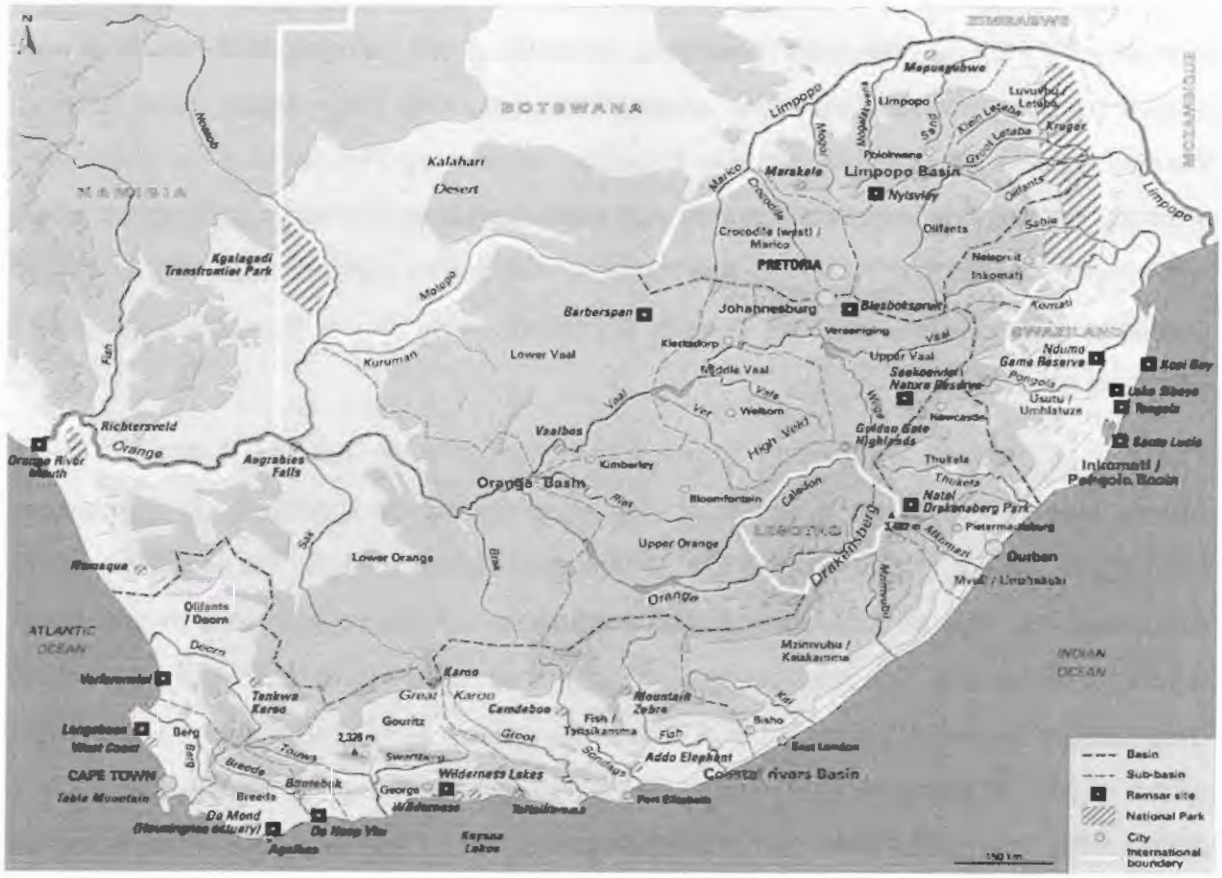


Figure 4: Overview of the River Basins in South Africa (Source: DWEA, 2007)

As in most countries, agriculture takes the largest share of available water resources (over 50%), but a smaller proportion (5%) is contributed to Gross Domestic Product (GDP), as compared to some sub-Saharan African countries, where it is known that as much as 80% of the water supply is used. Of the 16 million hectares of arable land, less than 10% is irrigated. However, this contributes 25% of total output, partly due to over 85% of irrigated land being planted with higher value and higher investment crops such as grapes, citrus or tobacco (Backeberg, 2000:4). Reflecting historical inequalities, the agricultural sector consists of a mainly white commercial sector of large modern farms and a smallholder sector of black emerging or subsistence farmers. The commercial sector comprises some 25 000 farmers who use 95% of the country's irrigation water. The largest area under smallholder irrigation is found in government schemes in the former homelands (or Bantustans) where an estimated 40 000 farmers tend plots of one to two hectares. These farmers largely produce for home consumption. More reasonable access to irrigation by way of legislation offers these farmers the means to contribute to poverty reduction within previously disadvantaged communities. However, this poses a difficult but important

problem. It does not seem to be in the national interest to spend resources on such a tormented sector (smallholder irrigation), because it will increase the use of a very scarce resource for relatively low value production. This issue becomes evident in the perceptions provided by smaller irrigation farmers in Chapter 4. The yields they produce on smaller irrigation land do not seem to be viable when production costs are considered. Is it then still in the national interest to allocate water for irrigation purposes when these farmers do not contribute very much the country's GNP? (Hope *et al.*, 2008:5).

There is a growing interest in improving irrigation water-use efficiency in South Africa. This is mainly as a result of: the phasing out of subsidies on agricultural production inputs; changing policies on the ownership of land; the available water resources; as well as increased public awareness issues related to soil and water ecology. According to Backeberg (2005:1), the total surface and groundwater requirement for irrigation in South Africa is estimated at 12 340 million m^3 per year, which is 56% of annual water requirements. However, this varies from below 40% to above 80% in regions with river catchments sharing the same hydro-meteorological characteristics. Surface water is released primarily from storage dams with a total capacity of 66% of the mean annual run-off, and involves approximately 90% of all available water. Irrigation contributes to between 25% and 30% of commercial agricultural production and makes a contribution of 10% to maize, 30% to wheat and 90% to vegetable, grape, citrus and deciduous fruit production for local and export markets. Irrigated agriculture in South Africa includes a diverse group of subsistence, emerging and commercial farmers, as well as permanent and seasonal labourers, along with their dependent families. Two broad categories of farmers are identified in this diverse group: modern, commercial operations (about 40 000 to 45 000 farmers, of whom the majority are white men); and traditional, subsistence activities (about 200 000 to 250 000 farmers, of whom the majority are black women). Although there are variations in each category with reference to farm size, investment, debt, crop cultivation, production technologies and income from farming, white farmers are on the whole wealthier than black farmers. The table below illustrates the areas, types and methods of irrigation in the different rainfall regions according to the Water Research Commission in South Africa.

Region	Rainfall mm	Total ha	Permanent %	Supple-mentary %	Occasional %	Flood %	Sprink-ler%	Micro%
1	(<126)	19 174	92.5	0	7.5	66.6	8.3	25.2
2	(126-250)	161 197	61.1	0.4	38.5	77.1	16.8	6.1
3	(251-500)	399 278	86.7	7.7	5.7	42.8	43.6	13.6
4	(501-750)	488 543	75.2	20.8	4.0	21.0	65.4	10.8
5	(>750)	221 940	81.5	16.6	1.9	5.3	80.9	13.8
Total		1290232	78.3	13.1	8.6	32.8	54.4	11.8

Table 6: Total areas, types and methods of irrigation in different rainfall regions (Source: WRC, 1996)

Regardless of the differences between these categories, both groups face similar challenges. The first is to improve rural livelihood of farming households in terms of material income and food security. To accomplish this, commercial operations must be sustainable, because they provide job security for farm workers. On the other hand, traditional subsistence farmers must be supported to maintain the activities that ensure their livelihood.

The second challenge is to increase food production for a population of which 48, 5% are living below the poverty line. Until 1999 about 70% (or about 15 million individuals) in this category resided in rural areas (Armitage *et al.*,1999: 301). According to SAPA, this number has increased rapidly ever since. In a newspaper article published in 2008, it was reported that about 5.5 million people moved to urban areas between 1996 and 2001 at a rate of more than one million a year. This suggests that 50% of the population is now urbanised (SAPA, 2008). Of the 50% still living in rural areas, most are poor and unemployed (SAPA, 2008). This means that both commercial and subsistence farmers have to shoulder the responsibility of providing food for a country which must support a large poor community, of whom most are living in rural areas and have limited access to food, water and health services.

This brief discussion of irrigated agriculture seeks to emphasise three realities:

- The biggest share of available water in South Africa is used by commercial agricultural operations for local and export markets;
- A large number of subsistence farmers have legally sanctioned access to a relative small area of land and volume of water; and
- The current distinguishing features of people in commercial and subsistence farming are still largely of a racial and gender nature due to political-ideological (apartheid) and socio-cultural (customs and traditions) perceptions (Backeberg, 2005:3).

According to Mollinga *et al.* (2007:1), the state has always played a leading role in water development. Furthermore, essential natural resources are considered to be public assets, as discussed in Chapter 2. Therefore, these resources must be regulated and managed. In the second half of the twentieth century, the South African government was the driving force behind the significant growth in irrigation development. Although this was an effort to relieve food shortages, critics have begun to question the sustainability of irrigation practices, specifically in relation to the available infrastructure and sound environmental considerations. There has also been a greater demand for water in other sectors. Domestic and industrial consumption has increased considerably and indications are that it will continue to do so in the years to come. This poses a major challenge to the demand by the agricultural sector, at least in the interim, for a greater water allocation. There is considerable pressure on agricultural management in South Africa to give attention to the reallocation of water; even greater pressure is being exerted on institutions that are currently managing the country's water resources. When hydropolitical discussions in this field take place, as a rule accusing fingers are pointed at irrigation farmers for mismanaging their allocated water sources and for having too much water allocated to them in the first place.

An important component of South African agricultural policy is to increase the incomes of the poorest groups in society by creating opportunities for small to medium-size farmers. The national agricultural policy gives particular attention to small-scale agriculture (South Africa, 1998:3). There are three strategic aims, namely to: (a) make the sector more efficient and internationally competitive; (b)

support production and stimulate an increase in the number of new small-scale and medium-scale farmers; and (c) conserve natural agricultural resources.

As mentioned before, water is the most valuable of agricultural inputs. According to the Department of Agriculture, the allocation of water to different categories of farming activities must be efficient and guided by economic considerations (South Africa, 1998:20). In the past, government policies encouraged farmers to invest in capital-intensive infrastructure. This typically included irrigation works. It had the effect of reducing labour demand and producing water-intensive and often inappropriate crops. Circumstantial international evidence suggests that the efficient utilisation of water requires the development of valuations that reflect its probability cost. Low-cost or zero-cost water leads to the production of water-intensive crops that would not be competitive if water were to be valued at its opportunity cost. When the cost of water reflects its opportunity cost, farmers respond by shifting production to more water-efficient activities. Until recently, most established farmers in South Africa obtained water either in terms of allocations from the DWEA, court orders, or 'traditional' access. Under the new water legislation a system of licensing will in time be introduced to regulate the access of all users to water resources. As competing uses for water resources increase, the cost of water to end users, including farmers, will inevitably increase. This means that agriculture must change to more rational, economic and sustainable patterns of crop cultivation and water use (South Africa, 1998:23).

The DWEA has developed a Water Conservation and Water Demand Management (WCDM) strategy for each water use sector, namely agriculture, municipal use, industries, forestry and environment. The National Water Conservation and Demand Strategy is incorporated into the National Water Resources Strategy (NWRS), which is a legal requirement of the *National Water Act,* 36 of 1998. The agricultural WCDM Strategy is to be implemented through the development of water management plans by WUAs and other irrigation water users. These water management plans will be similar to the Water Services Development Plans currently being developed by municipalities. Irrigation water suppliers such as WUAs or former Irrigation Boards are now required in terms of the law to submit water management plans to their catchment management agency (CMA) and/or the DWEA. To enable WUAs to

comply with the legal requirement to submit these plans, the DWEA has consulted with the agricultural sector to develop guidelines for water management plans that would be *practical, fair, effective* and *affordable* (Badenhorst *et al.*, 2002:3). The objective of these plans is to improve agricultural water management by stimulating self-analysis and forward thinking on the part of farmers, their water suppliers, catchment management officials, consultants and advisors. WUAs will develop and implement their plans in a progressive manner. The water management plan may be very superficial to start with and may be lacking in certain data, but it will be improved annually when the WUA reviews its plan. Essentially, the process aims to conserve water, to improve water supply services to irrigation farmers and to enable them to use irrigation water more efficiently. The focus is on WUAs, because they will be at the heart of agriculture's water management relationships and initiatives. Wherever this document speaks of WUAs, it also includes government water schemes. Water has to be conserved at all levels – from the source, right through to the points of use. However, the focus at this early stage of the process is on the activities of WUAs and how these are aimed at:

- Reducing water losses related to the WUA's storage and water distribution systems and management; and
- Enabling farmers to use water more efficiently on-farm (Crosby & Crosby, 1999:5).

The intended outcome of this initiative is to maintain vigorous and sustainable irrigated enterprises that use water more efficiently to improve the health of the environment and assure safe and reliable urban, rural and agricultural water supplies.

Therefore, the irrigation policy will aim to:

- Provide an incentive framework to improve the efficiency of irrigation;
- Develop criteria to be applied in the development of new irrigation capacity which will address the inequalities resulting from past policies and open up irrigation possibilities to new farmers;
- Provide for the self-management of irrigation schemes; and
- Provide for training and extension services to ensure that farmers have the know-how to use water efficiently and access to appropriate irrigation technology (Armitage *et al.*, 1999:303).

Irrigation frequently involves high-cost systems which if not used to their best advantage can result in high levels of indebtedness. It is thus imperative that when new farmers invest in irrigation they do so in schemes that are economically viable. Consistent with the overall agricultural policy principles, there will be a move away from government-owned irrigation schemes to farmer-operated projects, where farmers take responsibility for such investments. As a general rule, such projects will have to be financed from loan capital, and banks will only be willing to finance profitable projects, thus ensuring viability. In respect of farmers coming from a previously disadvantaged background, the role of the government could be to provide guarantees to ensure that small-scale producers with poor access to credit can afford access to irrigation, thus reducing the inequalities currently inherent in irrigation distribution (South Africa, 1998). In future there will consequently be a reduced role for the government, through facilitating rather than controlling the agricultural sector, encouraging the development of the small-farm sector, and also through encouraging a more diverse support system for farmers.

There is little scope for new large-scale irrigation developments in South Africa. The consistent shortage of water has been responsible for the development of projects to maximise the available water. Irrigation abstractions are carefully controlled by means of abstraction licences. In the future, abstractions for irrigation are to be assessed for their impact on the water resources of the respective drainage basins. Charges for irrigation water are to be based upon the availability of water, other economic and environmental demands and water quality issues related to the return of water to surface or groundwater. Charges will have a particular impact on medium to large-scale irrigation schemes (Backeberg, 2000:14).

Most small-scale irrigation schemes abstract very little water, and the majority fall under Schedule 1 use, for which no registration or licence is required. A potential problem for further small-scale and smallholder irrigation is the combination of inadequate water resources and "over-subscription" that makes it difficult or impossible to obtain a water licence. This is certainly the case in the //Khara Hais municipal area with regard to access to water along the Upington canal. Irrigation farmers are made aware of the advantages of belonging to a WUA. Water legislation allows only WUAs to apply for licences to use more water. Failure to become a

member would limit an individual farmer's use of water to that under general authorisation (Schedule 1 use) and prevent him or her from expanding existing operations (Mollinga *et al.*, 2007:3).

Some policy makers see WUAs, together with training and on-farm infrastructural development, as strategies that will lead to better irrigation performance while also reducing government investment as well as operation and maintenance costs. However, later in chapter 4 of this study it is shown that institutions such as WUAs are both complicated to set up and intricate to manage.

As mentioned in Chapter 2, the National Water Act requires a changed approach to agricultural water use. The four principal challenges emanating from the National Water Act are:

- The rehabilitation of existing irrigation schemes, particularly those in the former homelands;
- Determining the development of new irrigation capacity on the additional 200 000 ha;
- The establishment of effective institutional arrangements for implementing policy; and
- Increased efficiency of water use in all sectors (Karlberg *et al.*, 2007:2).

Because agriculture uses approximately 50% of the available water in any one year, the challenge is to encourage the irrigation sub-sector to improve water use efficiency. On the large commercial irrigation farms, water charges will be levied that should encourage the adoption of water-efficient technology. This principle will also apply to irrigated agriculture performed by small-scale commercial farmers, individual (micro) smallholdings and community gardeners. However, there is likely to be some form of transition to assist in paying water charges (Folifac, 2005:10).

Agricultural improvement is seen as essential for economic growth, poverty reduction and food security in Africa, but what is the future role of irrigation? Proponents of irrigation point to the prospect of substantial improvements in agricultural productivity and intensity. They emphasise the contribution of irrigated agriculture to global food production arising from a five-fold increase in irrigated areas in the last century (from 50 to 250 million hectares). This increase contributed to improved yields, prices of

staple foods reaching near historic lows and outputs which have matched the world's average food requirement in the same period (Hope *et al.*, 2008:2).

The following section explains the importance of river basin organisations in the management of the water commons.

3.3.3 River basin organisations

A recent trend has been to promote "river-basin organisations" as a necessary tool for managing competition for water at basin level. There are clear long-term benefits accruing to effective, integrated management of river basins. However, attempts to impose particular models of river basin organisation in developing countries, especially those derived from the experiences of rich countries, are unlikely to succeed in South Africa because objectives and institutional contexts are so different. Indeed, having a formal organisation even in highly developed basins is unnecessary. An attempt to build organisations for managing river basins that represent the interests of thousands of water users, including small farmers, is fraught with difficulties. The idea that a specific organisation is necessary for integrated management of a basin may be based on the false assumption that the physical reality of integrated river basin systems *ipso facto* requires an organisation coinciding with its boundaries (Mollinga *et al.*, 2007:7). The organisation of the LOCMA, for instance, functions within the boundaries of the LOWMA, which were formed along the margins of the lower Orange River basin. However, there are upstream organisations representing certain groups of water users who have an influence on what happens downstream. For these reasons, working and functioning across the borders of WMAs is essential.

Another important aspect in this study is irrigation methods. These are discussed in the next section.

3.3.4 Irrigation methods

Correct irrigation practices can make the difference between optimal water use and crop production on the one hand, and wasting water by over-watering, which will have a negative impact on the quality of crops, on the other. Three irrigation

methods that are being implemented successfully are discussed at some length here.

3.3.4.1. Flood irrigation

Flood irrigation is used by most of the smaller vine farmers in the //Khara Hais municipal area. To these farmers, it seems to be an affordable way to irrigate, because only a few can afford technology for micro-irrigation infrastructure. The way in which flood irrigation is used, is often ineffective and wasteful. However, it can be an effective way to irrigate if a few conditions are adhered to. Rogers (1995:1) claims that proper flood irrigation practices can minimise water application, irrigation costs and chemical leaching, and can result in higher crop yields. Irrigating the entire field as quickly as possible is often the goal of a flood irrigator. Often these farmers are satisfied just to get the water to the end of the furrows, but consideration should be given to how much water is being applied and how it is distributed. The correct amount of water to apply during each irrigation schedule depends on the amount of soil water used by the plants between irrigations; the water-holding capacity of the soil; and the depth of the crop roots. The rate at which water goes into the soil varies from one irrigation schedule to the next and from season to season. One common problem in flood irrigation is that too much water is applied, especially during the first irrigation. When irrigation is required, it becomes important to irrigate the entire field as quickly as possible. Irrigating every other furrow will supply water to one side of each row. The result is applying water to more acres than irrigating every furrow from a given water source in a given time. Irrigating every other furrow is often beneficial on soils with high infiltration rates and low water-holding capacities. Irrigators may encounter higher soil intake rates during the first irrigation. This can result in applying more water during the first irrigation than in subsequent irrigations and requires more hours to irrigate a field from a given water supply (Rogers, 1995:1).

3.3.4.2. Scheduled irrigation

Irrigation scheduling is the process whereby the irrigator decides when to irrigate crops and how much to apply; it is assumed to play an important role in the general improvement of water efficiency on the farm. However, the idea that there is a single key to the adoption of irrigation scheduling on the farm is too simplistic. It implies that

science has all the answers, and "we need just to convince the farmers" (Backeberg, 1996:3).

Only 18% of irrigation farmers in South Africa make use of objective irrigation scheduling methods, while the rest apply subjective scheduling based on intuition, observation, local knowledge and experience. There are different perceptions among farmers as well as between farmers and scientists on the concept of irrigation scheduling; these have contributed to a communication gap between the science and practise of such irrigation, leading ultimately to a low adoption rate (Stevens, 2006:2).

The implementation of irrigation scheduling models is predominantly adviser-driven and not farmer-driven, because farmers perceive them as complex and difficult to implement on the farm. Younger farmers are more willing to use irrigation models because of their higher computer literacy levels and positive attitude towards the use of computers in general. The technology level of a farm, size of farming operation and the value of the crop being produced, determine the selection of irrigation scheduling methods. General problems experienced by some farmers with regard to bulk water delivery, hamper the implementation of more precise irrigation scheduling (Stevens, 2006).

Farmers' awareness, flexibility and willingness to change, innovate and step outside of accustomed ways of implementing irrigation are strongly influenced by their social, economic, cultural and institutional settings, and not merely by irrigation-scheduling technology. Perceived indicators of efficient use of irrigation on the farm include increased production levels; lower electricity costs; improvement of crop quality; and efficiency of fertiliser use. Farmers identify accuracy, reliability, ease of implementation and affordability as important technological characteristics of scheduling methods and devices (Federer & Umlali, 1993:217).

In case studies conducted by Stevens (2006), small-scale irrigation farming revealed that weak institutional arrangements and handling of farmers' affairs on the level of several small-scale irrigation schemes hampered sustainable agricultural development. Small-scale irrigators have also reported that the lack of competent extension support prevented them from implementing irrigation scheduling. The scientific framework used by scientists and advisors to convey information to

irrigators also often follows the linear transfer of technology approach instead of following the 'learning-based approach'.

3.3.4.3. Micro irrigation

The term 'micro-irrigation' describes a family of irrigation systems that apply water through small devices. These devices deliver water onto the soil surface very near the plant or below the soil surface directly into the plant root zone. Growers, producers and landscapers have adapted micro-irrigation systems to suit their needs for precision water application. These systems are immensely popular, not only in arid regions and urban settings, but also in sub-humid and humid zones where water supplies are limited or water is expensive. In irrigated agriculture, micro-irrigation is used extensively for row crops, mulched crops, orchards, gardens, greenhouses and nurseries. In urban landscapes, micro-irrigation is widely used with ornamental plantings. These methods are characterised by the localised application of irrigation water by means of low-flow and high-frequency applications, either on the surface of the ground or underground (Aung & Scherer, 2003).

The importance of micro-irrigation systems came to the fore when the debate on the efficient use of water for irrigation was given prominence on the agendas of water management institutions. According to Stern (1979:12), conventional irrigation systems such as channel irrigation and indiscriminate flooding tend to waste water, because large quantities are supplied to the field in one go, most of which just flows over the crop and runs away without being absorbed by the plants. Micro-irrigation is an approach to irrigation that keeps the water demand to a minimum. The drip irrigation system, for example, works in such a way that water is applied directly to the root system. Typically, these commercial irrigation systems, which may be permanent or portable, comprise a surface or buried pipe distribution network using emitters which supply water to the soil at regular intervals (Stern, 1979:23).

3.4 MUNICIPAL WATER MANAGEMENT

A municipality is that level of government that operates at grassroots level; it exists as a legal entity as well as being a key part of a set of governmental relationships and organisational systems. A municipality is required to give effect to the provisions

of the Constitution and to prioritise the basic needs of the local community which it serves. It is expected to promote the development of the specific community and ensure that all members have access to at least the minimum level of basic municipal services (Craythorne, 2006:51).

The nature and extent of local government in South Africa has been undergoing continuous change since 1996. Reddy (1999:10) defines municipalities as:

> ... local democratic units within the democratic system which are subordinate members of the government vested with prescribed, controlled governmental powers and sources of income to render specific local services and to control and regulate the geographic, social and economic development of defined local areas (Reddy, 1990:10).

In the apartheid era there were more than 800 racially segregated local governmental institutions consisting of *inter alia* municipalities, town councils and village management boards. These were scattered countrywide, with some rural areas located at great distances away from existing infrastructure and with no basic public service provision. This negative state of affairs arose because the previous government did not take responsibility for servicing the entire population; it selected specific racial groups in certain geographical areas and prioritised their interests.

The local government elections held on 5 December 2000 ushered in a new system of local governance in South Africa. The newly structured and empowered local government sector has been granted some degree of autonomy and has expanded responsibilities (a shift to developmental local government) (Fast & Engelbrecht, 1999:2). Prior to this date, municipalities were characterised by racial segregation, unequal allocation of resources and unequal delivery of basic public services. The legal and administrative structures inherited by the current government did not serve the broader population. Public participation – now a constitutional requirement – was nonexistent (Motshekga, 2008:1).

Under the new dispensation, all decision-making related to public service delivery is taken on behalf of the majority. In order to ensure that integrated economic development and improved basic public services are delivered effectively and efficiently to the previously under-serviced communities, the municipal boundaries have been re-demarcated, newly merged municipalities with new organisational

structures and policies have been set up. Organisational arrangements have been transformed and they now incorporate more accessible and transparent citizen participation (Craythorne, 2006:54).

In the developing South African context the following categories of municipalities are identified:

- Category A: Metropolitan municipalities (e.g. City of Tshwane Metropolitan Municipality);
- Category B: Local municipalities (e.g. Thlokwe Local Municipality); and
- Category C: District municipalities (e.g. Sedibeng District Municipality, of which the Emfuleni Local Municipality forms a part) (Nealer & Raga, 2008:163).

It is thus evident that the functions a municipality is expected to fulfil are diverse and complex. The concept diversity encompasses various forms of heterogeneity which the public sector institution must attempt to accommodate in the different services it has to deliver and the subsequent workforce it has to organise and manage (Nel *et al.*, 2001:395). Complexity, on the other hand, is indicative of the degree of sophistication and specialisation entailed in the execution of a specific activity. It is partly a function of societal heterogeneity, confronting managers with a public that have varying resources, needs and expectations; and partly one of structural diversity within and among more or less autonomous organisations whose activities must be co-ordinated in many instances through service networks (Fox & Meyer, 1995:24).

One of the most crucial functions of every municipality in South Africa is the sustainable delivery of potable water services to all its customers within its area of jurisdiction. In a national sample survey in South Africa undertaken by the Human Sciences Research Council (HSRC) in 1998, 41% of the respondents placed crime prevention at the top of their needs agenda to improve the quality of life for all. The creation of jobs was listed as a second need and the provision of improved services was identified as the third most important priority. Of these public services the respondents identified the provision of running water (27%) as the most crucial basic need; then came affordable housing (20%); while the provision of electricity and health care both came in at 16% (Khosa, 2000: 248–249). It is thus evident that water supply and sanitation service delivery is a high priority to South Africans in all

walks of life. Municipalities evidently have an important role to play in improving the quality of life.

In a large municipality, the department responsible for water and scientific services usually has to attend to the provision of a constant supply of safe potable water and related water supply services to all the water users and consumers in the designated municipal area. Specific functions of such an organisational unit might include the management and control of potable water; wastewater operations and services; the governance of water regulations; planning; tariff setting; and the construction of minor water related municipal works (Nealer & Raga, 2008:163).

3.5 CONCLUSION

Catchment management as required by the *National Water Act,* 36 of 1998 and outlined in the National Water Resource Strategy, is the most important institutional development process dealing with water management processes in South Africa.

South Africa is at a point where, after the complete revision of its water and sanitation policies that accompanied the democratic transformation process, attention has now shifted to implementation. The new policies and the relevant legislation are not only concerned with ensuring an adequate quality and quantity of water for human needs, they are also about protecting the resources available for current and future use so that the national slogan of 'some, for all, forever' can be realised. In a fundamental departure from previous approaches to water resource management, catchments are seen as the units for IWRM. The main purpose of a CMA is to involve local communities in water resource management. A CMA must ensure that all interested parties, including the previously disadvantaged, are consulted on decisions about the management of the water resource.

As far as irrigation in South Africa is concerned, equitable water allocation has been an emblematic policy goal, driven by the imperative to create a fairer society. There is a growing interest in improving the efficiency of irrigation water. Both commercial and subsistence farmers have to take responsibility to provide food for a country which must support a large poor community, many of whom live in the rural areas. There is pressure on agricultural management in South Africa to give attention to the reallocation of water and there is even greater pressure to reform institutions in charge of managing the country's water resources.

The third water management sector discussed in this chapter is municipal management; this plays an integral role in water management in South Africa. One of the most crucial functions of every municipality is the sustainable delivery of potable water services to all its customers within its specific area of jurisdiction.

In Chapter 4, the empirical evidence on water management policies is investigated by providing perceptions from DWAE officials, irrigation farmers and public officials of the //Khara Hais Local Municipality.

CHAPTER FOUR

EMPIRICAL RESEARCH FINDINGS

4.1 INTRODUCTION

In Chapter 3, IWRM was divided into three main categories of investigation: catchment management, which deals with water management on a national and regional level; municipal management, which takes water management to a more local level; and irrigation, which is an example of special interest groups managing the water commons. In this chapter the empirical research findings of an investigation into aspects of integrated water resource management are discussed, specifically those in the Lower Orange Water Management Area (LOWMA). The development of relevant institutions has been a crucial determinant of successful IWRM strategies in the LOWMA. Therefore, for the purposes of this study, local developments were studied over the period 2004–2009.

In continuation of the research outline provided in Chapter 1, in the discussion to follow more light is shed on the qualitative methodology used in this study. Firstly, the progress of the establishment of the Lower Orange Catchment Management Agency (LOCMA) is outlined. Secondly, the establishment of the Upington Islands Water User Association (UIWUA) is sketched. Thirdly, the //Khara Hais local authority's management of the water commons was investigated and findings are presented in an effort to provide some clarity on the complex process of developing a local integrated water resource management strategy. Lastly, a section follows which gives a qualitative exposition of the perceptions of local irrigation farmers on the water management institutions and how these developments affect them.

4.2 QUALITATIVE RESEARCH APPROACH

Qualitative interviews were conducted with officials and stakeholders in the relevant institutions responsible for managing and consuming the local water supplies. This research method was then used in conjunction with data found in official documentation. The manner in which interviews were conducted was determined by the type of respondent (e.g. an official, active irrigation stakeholder, or an informed local resident) with an understanding of the prevalent situation. A list of questions was compiled well in advance and this was used as a basic guideline in the first fieldwork session in September 2004. The questions were marginally refined in order to create a sense of contextual relevance and coherence. Typical questions asked, were:

- What, according to you, is Integrated Water Demand Management?
- Do you personally use any way to save water?
- Do you have access to water near your home/business?
- Do you have access to water in your home/business?
- Do you experience any problems with the provision of water?
- Are you aware of the price of water?
- Do you think that one should pay for water?
- Do have any knowledge of the National Water Act?
- Do you have any problems with the policies in this act?
- Do you have any problem with the quality of water?
- Do you know who your local water service provider is?
- Are you satisfied with the service being delivered by the service provider?
- Do you know in which of the CMAs this area is situated?
- Are you affiliated to a water provision association?
- What is your opinion about the 6Kℓ free basic water allocated to all households?
- What is water mainly used for in your household/irrigation?
- Do you know what water scarcity is?
- There are theories that within the next 20 years, a real water scarcity will manifest itself in southern Africa. What is your reaction to this?
- Do you have any suggestions towards saving water?
- Are you aware of water pollution?

- What are your suggestions on how to deal with water pollution?
- Do you think that your local authority is keeping high standards in the delivery of water services in this municipality?
- Which policies towards implementing water are being implemented at the moment?
- What are the problems you encountered in implementing water-related policies?
- What, in your view, are the reasons for these problems and what do you think the solutions may be?
- Are there any water restrictions active at the moment?

In some interviews the questions were asked in a systematic manner. In others, selected questions were asked. If and when the need arose there were additional questions. These had their origins in the information provided by respondents.

A total of 24 interviews were conducted. Of these, 16 were with irrigation farmers, three with officials of the Upington Islands Water Users Association (UIWUA) and three with officials of DWEA's LOWMA office. Only one respondent, an official of LOWMA in Upington, was a female. The absence of more females in the water management sector may be ascribed to a) a local shortage of skilled human resources (Kubaie, pers. comm., 2007); and b) an apparent disinterest to participate as stakeholders in water management issues (Chamberlain, pers. comm., 2007), as will become evident from the discussion below.

When irrigation farmers were interviewed as representatives of active irrigation stakeholders, attempts were made to find respondents from previously disadvantaged communities. These attempts failed. Although black people are supposed to be represented in the UIWUA as emerging farmers, it proved impossible to find any farmers that were representative.[1] Organised irrigation farming is still dominated by white males in the LOWMA. Attempts made by several government departments to include black emerging farmers have apparently failed. An area of about 4 000ha of potential irrigation land was set aside for people from

[1] The term black is used here (as is the widely accepted academic and colloquial practice) to include Africans, coloured people and people of Indian descent, all of whom were disadvantaged under the pre-1994 apartheid government.

previously disadvantaged communities but a number of institutional problems then arose. Up to the present there has been an ongoing interdepartmental dispute between the department of agriculture and the DWEA about which government department should take responsibility for this development project (Kubaie, pers. comm., 2005). At the time of writing (November 2009), the 4 000ha was still not in use. This accounts for the absence of interviews with representatives from this section of the community. Black people were furthermore not classified as typical commercial irrigation stakeholders with a vested interest in the IWRM process of the LOWMA, despite the fact that policy guidelines require their participation. It seems therefore that the empowerment of previously disadvantaged people through membership of the //Khara Hais Local Municipality in the Upington Islands Water Users Association, has been used to make the water management institutions more representative. This line of approach has been responsible for a number of impractical arrangements, as will become evident in the discussion to follow.

Respondents were interviewed at different points in time. This made it possible to form an impression of developments taking place over time. It also enabled the researcher to determine if issues, outlined as problems, had changed significantly.

In the first interviews with officials and farmers the basic questions, listed above, were systematically worked through. It soon became apparent that some farmers had more thoughts they wanted to share with the researcher and gave opinions and viewpoints beyond the ambit of the listed questions. In subsequent interviews these were further explored. The smaller-scale farmers, in particular, were keen to use the opportunity to explain the nature of the problems they were experiencing. Those who chose to participate as respondents clearly wanted to voice their opinions on the importance of water in their lives. They also needed to tell someone their experiences as commercial farmers in South Africa. These interviews then shed light on a variety of perceptions, such as how they: viewed the government's water policies; managed irrigation water; used domestic water; and felt about their socio-economic position as irrigation farmers.

In the series of interviews with officials it was possible for the researcher to form an impression of the challenges they faced in the process of establishing an IWRM. Despite some persistent problems, such as those experienced with integrating the

//Khara Hais Local Municipality (Chamberlain, pers. comm., 2007), the UIWUA seems to be a success story. The establishment of the Lower Orange Catchment Agency, on the other hand, has been a less successful project. Whilst the interviews were important to inform the researcher of developments taking place, they were clearly of value to the officials. The opportunity to talk about developments, offered officials the opportunity to be reflective on what had been achieved over a period of five years.

The major advantage of conducting qualitative interviews in this research project was that it allowed respondents to talk more freely about their perceptions of water management policies. This led the researcher to the realisation that these policies per se were not the problem; objections were raised about the way in which they were implemented. The purpose of these interviews was to integrate the information and articulate their views. In most published works on the implementation of public policy, the emphasis appears to fall on the policies themselves and the success stories of their implementation. The personal perceptions of officials; the day-to-day difficulties they encounter in implementing policies; and the perceptions of those who are affected by these policies, seems to fall through the cracks. This study focuses on gleaning these perceptions from a representative spectrum of stakeholders.

Before dealing with the empirical research synthesis it is necessary for the reader to form an impression of the LOWMA and how the water commons is managed in this region.

4.3 THE LOWER ORANGE WATER MANAGEMENT AREA: MANAGING THE COMMONS

The borders of the Lower Orange Water Management Area (LOWMA) more or less coincide with those of the northern frontier of the Northern Cape Province of South Africa. The LOWMA is a section of the comprehensive Vaal and Orange River systems. It is a semi-arid region with low rainfall and an almost desert-like climate. Water is used primarily for domestic purposes, non-agricultural industrial activities and, to a considerable extent, for irrigation farming. The main source of water for this WMA is a section of the mighty Orange River that flows through the Northern Cape.

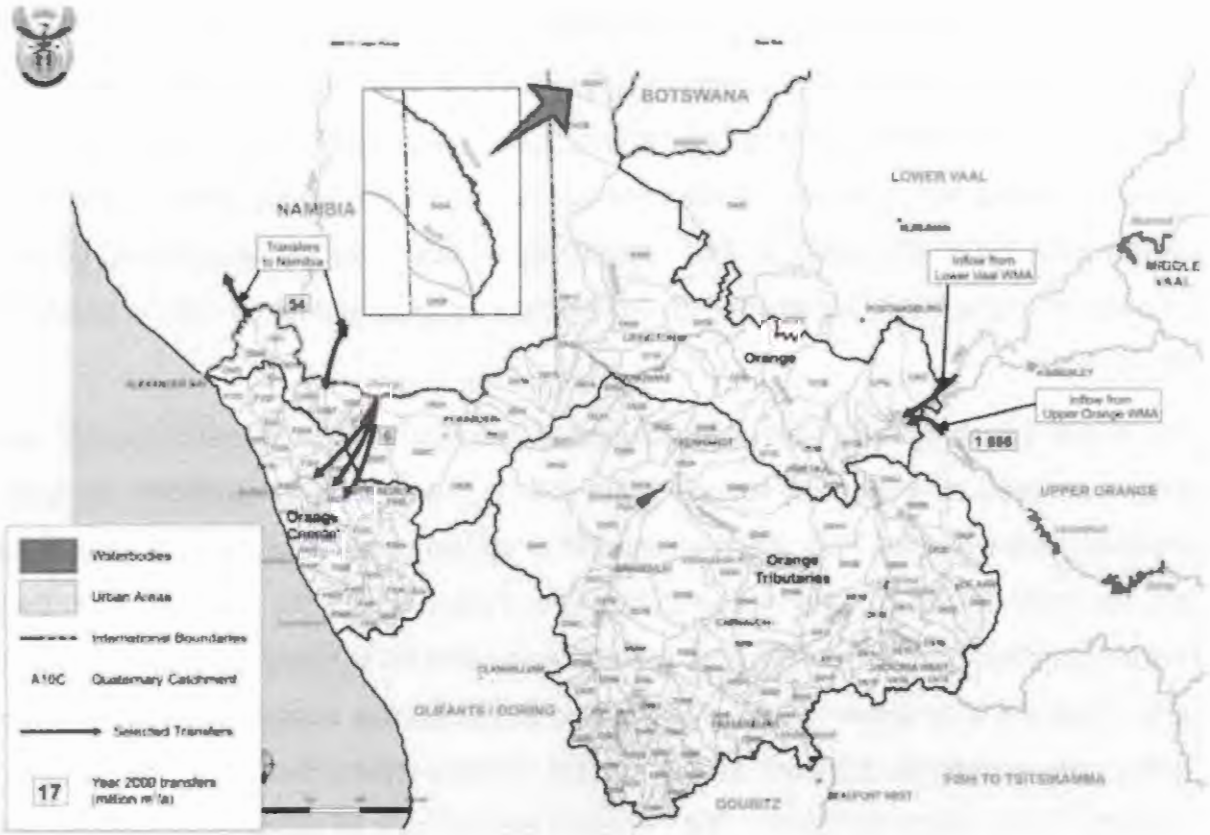


Figure 5: The Lower Orange Water Management Area (Source: DWEA, South Africa, 2004)

The Orange also forms the border between South Africa and Namibia. With an average annual run-off of 11 5000 million m³, the Orange River is the largest river in South Africa. It rises in the Drakensberg range in Lesotho and flows over a distance of 2 200km westward through some of the most arid parts of South Africa into the Atlantic Ocean (South Africa, 2004).

According to the DWEA, the available surface water in the LOWMA is barely enough to support existing development. An estimated 93% of all water in the Orange River is generated above the Vaal/Orange convergence. This means that the manner in which the water source is managed upstream in other WMAs has a direct influence on what ends up in the Orange River. In many places the river supports large-scale irrigation, especially in areas with suitable alluvial soils (South Africa, 2004).

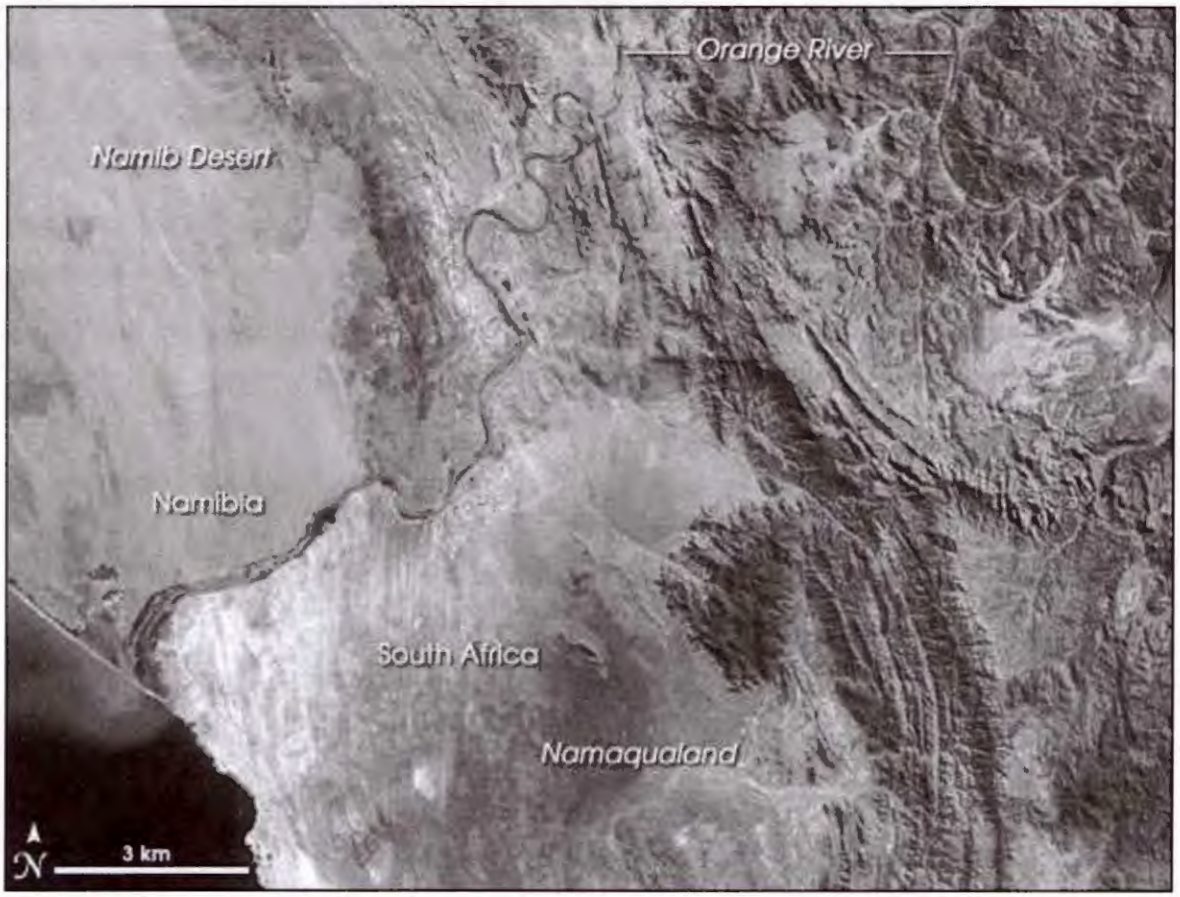


Figure 6: A satellite image of the Lower Orange River (Source: Earthobservatory, NASA)

The total available water component in the LOWMA is 1 122 million m^3/a as indicated in South Africa's National Water Resource Strategy. This includes local groundwater supplies. In most cases, groundwater is the only available water source in the LOWMA. It is used mainly for domestic purposes and livestock watering in areas away from the riverfront. It is insufficient to support any large-scale irrigation. The further development of groundwater supplies close to towns is impossible. Potential groundwater supplies outside the urban areas seem to be the only viable option (DWEA, 2004). It is thus clear that the water resources (the commons) require sound management strategies in the LOWMA to ensure that all inhabitants get what can be considered to be their 'fair share' of this water commons. As explained in Chapter 2, the water commons is being depleted. Free access to the commons is no longer possible and restrictions in the form of legislation and efficient integrated resource management strategies are essential. Legislation, in turn, leads to management strategies. In the case of the LOWMA an Internal Strategic Perspective (ISP) was therefore developed for the purposes of managing the water commons.

There is an overarching ISP for the Orange and Vaal River system. This was used to inform the ISP developed for the LOWMA. These documents represent the DWEA's views on how IWRM should be introduced and put into effect locally. Of great importance is the fact that the ISP explains how the LOCMA is to be established and what its functions should typically be. In the early phases of development an ISP provides the basic framework for the DWEA's management of a WMA until it is possible to hand the institution over to a legal local management that will function as a gazetted CMA. The DWEA has identified a few functions that CMAs must adhere to. For example, they have to:

- Investigate and advise on the protection, use, development, conservation, management and control of the water resources in the WMA;
- Develop a catchment management strategy;
- Co-ordinate activities of water users and water management institutions;
- Promote co-ordination between implementation of catchment management strategy and the implementation of water service development plans by water services authorities (municipalities); and
- Promote community participation in the protection, use, development, conservation, management and control of the water resources in the WMA (South Africa, 2006).

It was emphasised in the case of the Lower Orange River's ISP how important it was to create an awareness of the processes. In short, the public had to be informed on developments. Public participation, it was decided, would be invaluable in the establishment of the LOCMA. Stakeholders had to be identified and their needs recognised so that capacity-building and empowerment of stakeholder groups could take place. The issue of empowerment implied that knowledge had to be transferred from the DWEA to the leaders of different stakeholder groups. They had to become 'water literate' (pers. comm., Conradie, 2004; Kubaie, 2007).

Subsequently, a timeline was proposed at a planning session held in 2002 for the establishment of the LOCMA. An awareness campaign would be introduced in 2003 to make every relevant party aware of water demand management issues in the WMA. At the planning session it was recognised that sub-catchment forums (institutions dedicated to nurturing and cultivating public participation) should be

created in the Orange tributaries catchment, the Orange coastal catchment and the Orange catchment. Once this was achieved, consultation processes to include all stakeholders had to be adopted. In 2004, the institutions created in 2003 were due to be formalised and provision would be made for a steering committee. In 2005, the proposal would be initiated to establish the CMA. In 2006, this proposal had to be sent to the minister of the former Department of Water Affairs and Forestry (since 2009 the Department of Water and Environmental Affairs [DWEA]). Once the proposal was accepted and the appointment of the governing board had taken place, the establishment of the LOCMA would be formally complete (Conradie, pers. comm., 2004).

4.4 ESTABLISHING THE LOCMA

From 2004 onwards, a number of interviews were conducted with the serving DWEA directors of the Lower Orange Catchment Management Area (LOCMA). Their responses are divided under two main headings: 1) the institutional development process and 2) perceptions about the way forward.

4.4.1 Institutional development

Initially a timeline was set up for the establishment of the LOCMA (see above). Planning for this process began in September 2002 and the decision was made that this medium-term process had to be complete by 2007. However, in 2007 the LOCMA was nowhere near being established (pers. comm., Conradie, 2004; Kubaie, 2007). Reasons provided for this state of affairs were primarily that the incumbent of the directorship of LOCMA had changed no fewer than four times since 2003. In 2003 Mr Stanley Chamberlain was the director. He retired and Ms Bettie Conradie was appointed in 2004. Conradie resigned in January of 2006 and her replacement, Mr Ernest Kubaie, only took over in January 2007. In effect, not much progress was made in the period from 2004 to 2007. Conradie's resignation in 2006 disrupted the process. She was an integral part of the planning, especially with regard to securing public participation. Kubaie was still learning what procedures to follow at the time of our interview in 2007. He resigned in 2008 and then returned in to the post in 2009.

All this led to a situation of discontinuity; processes begun by one director were prone to stand still or be changed when a new director was appointed (Kubaie, pers. comm., 2007, 2009).

4.4.1.1 Public participation

One of the processes severely affected by the situation described above was that of getting an active, broad spectrum of public representatives to participate in the development of the LOCMA. Conradie, adhering to the stipulated requirements of public participation, founded the Lower Orange Mediation Forum (LOMF) to consult with stakeholders. The last meeting of this forum was held in August 2006, shortly before she resigned, and the forum has not met again since. It appears that it was too focused on technical issues such as water quality – the prevalent problem being algae in the river's water. There was insufficient focus on ordinary water consumers and their everyday concerns. This caused what Kubaie refers to as 'organisational fatigue'. Forum members started withdrawing and the process lost momentum (Kubaie, pers. comm., 2007).

This deterioration of public support has become a crucial issue because the successful establishment of a CMA has to be grounded on extensive public participation; this is the justification of its existence (pers. comm., Chamberlain, 2003; Conradie, 2004; Kubaie, 2007). Kubaie claims that he had to begin this process all over again in 2007. But in 2009, at the time of the second interview with Kubaie, the LOMF had not yet held any further meetings. Most of his time had been taken up attending to daily operations (Kubaie, pers. comm., 2009). In addition, water consumers living further away from the Orange River seemed to be disinterested. They were under the impression that all matters pertaining to water only related to the stakeholders living in the vicinity of the river. This problem was also encountered by the UIWUA, with participation only coming from irrigation farmers and the representatives of urban communities such as the //Khara Hais Local Municipality (Chamberlain, pers. comm., 2007, 2009). Rural communities showed little interest in becoming involved. This lapse in active participation on the part of many stakeholders proved to be problematic because as Kubaie pointed out,

participation in institutional matters involving water is relative to what the access to water and its effective use mean to local residents (Kubaie, pers. comm., 2007).

An important partner in the process of establishing the LOCMA and implementing effective IWRM strategies in the LOWMA is the //Khara Hais Local Municipality. The municipality buys water in bulk from the DWEA via the LOWMA once established. Currently, this is where the relationship ends. The municipality is supposed to play an active role in the management of the LOWMA and the subsequent establishment of the LOCMA. Several management and human resource problems are hampering this participation (pers. comm., Kubaie, 2009; Auret, 2009). These are outlined in the section dealing with the water management of the //Khara Hais Local Municipality.

4.4.1.2 Reprioritisation of the DWEA's plans for CMAs

A major setback occurred when the DWEA shifted the deadline for establishing the CMA from 2007 to 2011. The DWEA has in effect reprioritised the process of establishing CMAs across the country, and the LOCMA is scheduled as the last to be established. It seems that the department is now moving towards establishing only one CMA for each river system. This means, for example, that the Orange River will only have one governing body instead of three separate bodies serving the Upper, Middle and Lower Orange. The same goes for the Vaal River system that feeds into the Orange. Currently there are three WMAs in the Orange River system. A decision needs to be taken on where the control centre of the WMA will be and which regional office (such as for example, the DWEA office in Kimberley in the Northern Cape) should drive this undertaking. And what responsibilities will be given to an area office such as Upington? (Kubaie, pers. comm., 2009)

Until such decisions are made by the departmental head office, everything hangs in limbo. It is of course also understandable that the DWEA would place the establishment of the LOCMA last on the list because local progress since 2003 has been minimal. It is clear that this water management area needs time to get its affairs in order, to start again with proper stakeholder consultation and try to retain qualified personnel to continue the process.

4.4.1.3 Financial support

Another major issue in the establishment of the LOCMA is the question of financial support from the DWEA head office. Financial and working support from the DWEA is directly related to where the specific CMA is on the department's list of development priorities. Mr Kubaie claims that his section does not have sufficient funds to perform core functions. The main source of funding comes from the National Treasury, in other words, taxpayers. These funds are used for daily operational costs and salaries. This means that functions of the WMA and operational expenditure has to be funded from this single source. Budgeting is extremely difficult and priorities have to be planned very carefully (Kubaie, pers. comm., 2007, 2009). In essence, until the DWEA takes a final decision about reducing the number of CMAs and decides where on that list the Orange River catchment will be in terms of establishing a CMA, the funding required for these processes is simply unavailable.

4.4.1.4 Human resources

In terms of human resources issues, there is a distinct shortage of expertise. The LOWMA is not popular among young, educated or experienced engineers (Kubaie, pers. comm., 2007). Individuals with professional qualifications, such as an engineering degree, seem to find the private sector more attractive. Business pays more than a government department. The //Khara Hais Local Municipality has experienced similar problems (Auret, pers. comm., 2009). Furthermore, the LOWMA is situated in a remote area in South Africa – at least 800 km away from the larger metropolitan centres of Johannesburg and Cape Town. Young, qualified individuals far prefer working in more populated areas. The outcome of all this is that qualified engineers or consulting engineering companies have to be contracted at exorbitant cost to do the necessary work (pers. comm., Conradie, 2004; Kubaie, 2007).

An exception to the rule is the recent appointment of a young official, Ms Mashudu Randwedzi. She graduated with a BSc in Environmental Sciences at the University of the North, in the Limpopo Province, where she majored in Ecology and Resource Management. She attended a DWEA leadership programme and accepted an appointment at a water purification plant – an experience she enjoyed. She then moved to Rustenburg in the North West Province, where she worked in

environmental and water monitoring for pollution. The challenges facing the country's water resources attracted her to stay in the employment of DWEA (Randwedzi, pers. comm., 2009).

At the time of the interview she had only been in her post in Upington for three months. She had been working diligently at becoming acquainted with the area and the activities of the office. She plans to focus mainly on community involvement and communication with water stakeholders in the area. This undertaking is advantageous for the Upington office because of the existing public participation problems. Randwedzi realises that the office is facing great challenges, as highlighted by Kubaie, but she claims to be ready to take up the challenge. She also says that she is committed to remaining at the Upington office of DWEA for at least five years and that she plans to train the next person to fill the position if she were to accept another post. She is committed to preventing a situation similar to that which she found herself in when she arrived. At the time of the interview she expressed the opinion that it would take at least six months for a new appointee to become familiar with the nature of the work and the area (Randwedzi, pers. comm., 2009).

This indicates that there are indeed some young qualified individuals out there who are not only passionate about water-related issues but are willing to work in this remote area for a period of time and are prepared to leave trained officials behind when they decide to leave. However, it is also important to bear in mind that certain categories of skilled officials, such as qualified engineers, would be considerably harder to find.

4.4.1.5 Linguistic communication barriers

Considerable problems have been experienced in the creation of a functional communication platform between the DEA officials responsible for the LOWMA and their stakeholders. Afrikaans is spoken by most residents of the //Khara Hais municipal area, and when new staff is recruited this factor is often ignored. Language was not a problem for Conradie and Chamberlain, but Kubaie encountered many instances where fractured communication proved to be an obstacle. He has begun to teach himself to speak in Afrikaans (Kubaie, pers. comm., 2007). Randwedzi (pers. comm., 2009) encounters the same challenges with the language barrier.

4.4.2 Perceptions of the way forward

As highlighted above the obstacles to making management breakthroughs in the establishment of the LOCMA appear to be in:

- Human resources (where there is a shortage of suitable officials, a lack of sufficient skills and frequent changes in management);
- Farmers' support (where there is a distrust of the DWEA and its inability to communicate policy and management strategies properly in Afrikaans);
- A lack of willingness on the part of the DWEA to provide the necessary support; and
- Policy misunderstandings.

Collectively these problems pose a number of challenges that have the potential to leave the proposed institutional development hamstrung. That is, of course, if no creative solutions are found.

4.4.2.1 Securing income

One way of solving some of these problems is for the LOWMA staff to pursue active strategies aimed at securing an income. A direct potential source is to manage the water users' licence system properly. Kubaie (pers. comm., 2009) was asked whether there was progress towards implementing departmental licensing policies for irrigation water users. Furthermore, was water theft a problem? He replied that unlawful water use was possible, but was difficult to detect because at the time of the interview there was a surplus supply of water in the system. If there was a water shortage, unlawful extraction would have been easier to pick up. He pointed out that the plan was to continue with the existing water scheduling system. Licensing individual irrigation operations in the area was not financially viable. If LOWMA were to issue water licences, they would have to install water meters for which there was not enough money. Moreover, they would have to pay for the labour to maintain and regularly read meters (Kubaie, pers. comm., 2009).

Another issue is new water applications, which would then be subject to water licensing. A big drawback for this potential source of income is that each application has to be accompanied by a Black Economic Empowerment (BEE) plan. However,

administrative and management systems to support the implementation of the BEE policies are not available. For example, the LOWMA office in Upington currently (2009) has a backlog of 70 water licensing applications and 60 applications for water rights transfers (Kubaie, pers. comm., 2009). To process these applications requires the services of an experienced and skilled group of assessors. Several senior officials in the local water sector have experienced similar problems over the years (pers. comm., Chamberlain, 2005; Louw, 2004; Van Rensburg, 2005). As far as emerging black farmers are concerned, very few deals are coming through the system. A major obstacle is that white farmers do not appear to want black partners. At the same time, certain applications by white farmers who do indeed work in cooperation with black farming partners, have not all been verified. The bottom line is that there is a critical shortage of officials to do the necessary verification and assessment. For this reason, it is difficult to identify those beneficiaries of the BEE policies who have the necessary skills and interests (Kubaie, pers. comm., 2009). It seems that these licensing and metering problems are the key to the sound financial management of the LOWMA. When farmers begin to pay for all the water they use, there will be enough money to employ the necessary qualified personnel and exercise the control needed to manage the water commons in the LOWMA. However, this arrangement is subject to thorough and efficient communication and the introduction of effective strategies of public participation in the integrated water resource management process.

In short, as far as establishing the LOCMA is concerned, it is a matter of going back to the drawing board. The process has to begin with public consultation and better financial management, with the support of the DWEA. With these processes and difficulties in mind, it is now necessary to consider the issue of establishing water user associations (WUAs) to function in catchment management areas. Let us consider the Upington Islands WUA as an example.

4.5 THE UPINGTON ISLANDS WATER USER ASSOCIATION: MANAGING THE COMMONS

In 2005, interviews were held with the chief executive officer of the Upington Islands Water User Association (UIWUA). He is Mr Stanley Chamberlain, a former director of

the Lower Orange catchment management, who was appointed as the official responsible for the WUA. The DWEA's decision to appoint Chamberlain as CEO of the UIWUA proved to be sound. It is evident that this local but important institution has been a rare success story as far as institutional development in this water management area is concerned – despite the fact that the process took longer than Mr Chamberlain anticipated.

In the discussion to follow, attention will be given to what has been done thus far to establish an effective WUA. The assessment is divided into four broad categories, namely 1) institutional development; 2) DWEA support; 3) standard operations; and 4) the way forward. It becomes evident how the UIWUA manages the commons to ensure that all stakeholders are included and that everybody receives reasonable and equitable access to the commons. The main purpose of the UIWUA is clearly to determine what the water commons should be used for and to ensure that stakeholders get the allocations needed for their specific purposes, whilst protecting the commons by preventing wastage, pollution and mismanagement.

4.5.1 Institutional development

According to Chamberlain, the establishment of a WUA required particular information in the compilation of a proposal for submission to the DWEA. The proposal had to include the name of the proposed association and its area of jurisdiction. This could only be one area divided into sub-districts. The following diagram outlines the sub-districts identified within the Upington Islands WUA (Chamberlain, pers. comm., 2005).

A potential problem identified early in the development process was that these areas were all named as sub-districts. In the process, for example, domestic water consumers, beginner farmers and comprehensive irrigation projects were all grouped together in "sub-districts". Administratively it was a prudent move for these sectors to be identified and demarcated, but most were surely, in some way or another, part and parcel of every other sub-district indicated in Figure 9. Louisvale, for instance, has domestic consumers, beginner farmers (a special type of consumer) and established commercial irrigation operators (Chamberlain, pers. comm., 2005). Therefore there was a clear overlap of interests in many of the sub-districts.

Figure 7: Outline of the Upington Island WUA sub-districts and main water users (Chamberlain, pers. comm., 2005)

A constitution for the proposed WUA had to be formulated according to guidelines outlined in the National Water Act. An important issue was that there had to be proof of consultation and the inclusion of all interest groups. The following diagram illustrates the proposed management of the Upington Islands WUA, with all its stakeholders. The main categories are gender, race and disability (Chamberlain, pers. comm., 2005).

Interest Group A	Male		Female		Disabled	Total
	Black	White	Black	White		
1. Industries				1		1
2. Local authorities:						
//Khara Hais			2			2
Kai Gariep			1			1
3. Community institutions			1			1
4. Emerging farmers	1					1
5. Potable and household water users			1			1
6. Recreational water users			1			1
	1		6	1		8

Table 7: Proposed outline of the management of Interest Group A of the Upington Islands Water User Association

Interest Group B	Male		Female		Disabled	Total
Irrigation sub-regions	Black	White	Black	White		
1. Straussburg		1				1
2. Olyvenhoutsdrift South		1				1
3. Louisvale		1				1
4. Blaausekop		1				1
5. Swartkop		1				1
6. Steynsvoor		1				1
7. Kanoneiland		1				1
8. Upington		1				1
9. Blocuso			1			1
10. River users (irrigation)				1		1
		8	1	1		10

Table 8: Proposed outline of the management of Interest Group B of the Upington Islands Water User Association

As illustrated by the two tables above, at the time of its formation, the Upington Islands WUA proposed that two main groups be represented. Interest group A comprises the main groups of water users in this region namely: industry; local authorities; community institutions; emerging farmers; domestic water users; and recreational water users. The proposal was to include one black male emerging

farmer, six black females and one white female on this board. As is evident in group A, no disabled representatives were targeted. Chamberlain also stated that they were under pressure to have at least one representative for emerging farmers, but that they were unable to find a suitable person in the region (Chamberlain, pers. comm., 2005).

Interest group B comprises eight irrigation boards in the region, as well as irrigators who use water from the Orange River but are not affiliated to any irrigation boards. Interestingly, the representation on interest group B seems to consist mainly of white males. One black female and one white female were proposed for this group. Chamberlain once again indicated that it was difficult to identify females in this region to be representatives of interest group B. The reasons for this state of affairs were that there were few, if any, female irrigation farmers in the region. As a rule females did not show any interest in becoming representatives of a specific grouping in the Upington Islands WUA (Chamberlain, pers. comm., 2005).

This UIWUA proposal was then presented to the district office of the DWEA, where a committee decided whether all requirements for a proposal had been met. The district manager of the DWEA then made a recommendation and the proposal was sent to the DWEA head office in Pretoria (Chamberlain, pers. comm., 2005). As becomes evident in Chamberlain's account of the way forward (provided later in this section), the DWEA is currently scrutinising all proposals for the establishment of WUAs in South Africa. This has had the effect of delaying the comprehensive implementation of an integrated water resource management programme for the UIWUA.

4.5.2 DWEA support

Various directorates are currently evaluating the proposal submitted to establish the UIWUA and a recommendation will be made to the minister. Official notice will be given in the *Government Gazette* of the proposed WUA. Comments on the proposal can be submitted within 60 days after the publication of the notice. If there are no comments and all requirements have been met, the minister will approve the WUA. The original proposal will then be accepted as the UIWUA's constitution. When this process is complete, a management committee must be elected from the ranks of

water users. Then follows the framing of a business plan in which dedicated attention has to be given to financial management. In a later interview Chamberlain (pers. comm., 2006), explained that it was apparent (and confirmed by the DWEA) that the National Water Act regulated the activities of the WUAs. A WUA may only exercise its functions and powers if it has been delegated by the CMA and the minister. The establishment of WUAs is designed to make the functions of the minister and CMAs easier; they will then deal with organised groupings rather than individual water users (Chamberlain, pers. comm., 2005).

Developments in the establishment of the Upington Islands WUA were outlined during a follow-up interview in November 2007 with Chamberlain and two directors of sub-districts. Chamberlain said that the Upington Islands WUA was at a stage where minor changes to its constitution had been made and submitted for the attention of the minister. The proposed constitution could not be copied for public dissemination until it was approved by the minister and published in the *Government Gazette*. The changes that had been made included a plan to conform to the requirement that 50% of board members had to be women and that the WUA needed to put together a schedule that stated how it would accomplish this. Finding women to serve on the board, according to Chamberlain, proved difficult, but the minister suggested that management consider title deeds of properties and approach women who were married in terms of formal marriage contracts. This implies that a woman may represent the same property as her husband. However, she had to be accorded independent voting rights on the board. It seems that this arrangement would be a 'waste of time'. Circumstantial evidence suggests that women would almost inevitably cast the same votes as their spouses (Chamberlain, pers. comm., 2007).

Farmers are acutely aware of delays in the establishment of WUAs. According to Mr C. Erasmus of the Boegoeberg sub-district, the major problem is to obtain feedback from the minister. In an interview in 2007 he claimed that he knew of WUAs that had been waiting for as long as two years for an official response to the constitution they had submitted. However, this did not mean that the DWEA did not provide support in the interim (Erasmus, pers. comm., 2007). In discussions with officials there were also clear indications of frustration with delays in the establishment of WUAs.

4.5.3 Standard operations of the UIWUA

During one of the interviews conducted with Chamberlain in 2009, he shed some light on the procedures for the allocation of irrigation schedules. As Kubaie (pers. comm., 2009) also pointed out, farmers did not have water meters on their properties to measure the exact amount of water they consumed. Instead, water usage was measured according to the amount of time the sluice on a particular farmer's section of the canal was left open. Kubaie indicated that in the case of the LOWMA, meters would prove too expensive. The same was true of the UIWUA. Not only could they ill afford these meters but they did not have the funding for the maintenance that would inevitably be required in terms of human resources.

Farmers have a standard water allocation of 15 000 m³/ha/a. They are required to submit an application which indicates the days and the times they want to irrigate their lands. These forms must then be handed in at a central point on a Thursday before 16:00. An employee of the UIWUA collects the forms, after which the irrigation period is scheduled against the farmer's name for the following week. An example of the relevant form is included below. Unfortunately, some of these forms are only available in Afrikaans (Chamberlain, pers. comm., 2009).

OLYVENHOUTSDRIFT SUID BESPROEIINGSRAAD

AANSOEK OM WATER • APPLICATION FOR WATER

Voerkanaal/Feeder canal ..... Periode/Period .....

Sluis No. / Sluice No.	Vloeitempo / Rate of flow	Ure / Hours	Son / Sun		Maan / Mon		Dins / Tues		Woens / Wed		Don / Thurs		Vry / Fri		Sat / Sat		Son / Sun		Handtekening / Signature
			D	N	D	N	D	N	D	N	D	N	D	N	D	N	D	N	

Figure 8: Water application form: Example from the Olyvenhoutsdrift irrigation board

Should the farmer decide to irrigate at another time, or to not irrigate at all during the week in question, he must fill in a cancellation form as illustrated in the figure below:

OLYVENHOUTSDRIFT SUID
BESPROEIINGSRAAD

KANSELLASIE VAN WATER · CANCELLATION OF WATER

Alle aansoeke om water te kanselleer moet by die Wykswaterbestuurbeampte gedoen word.
Hierdie vorm moet volledig ingevul en onderteken word voordat die kansellasie plaasvind.
HIERDIE VORM SAL NIE AANVAAR WORD AS DIT NIE VOLLEDIG INGEVUL EN ONDERTEKEN IS NIE.

All applications for the cancellation of water must be made to the Section Water Control Officer.
This form must be fully completed and signed before cancellation is effected.
THIS FORM WILL NOT BE ACCEPTED UNLESS COMPLETED PROPERLY.

Voerkanaal / Feeder canal ..... Pancode No. / Period No. .....

Sluis No. / Sluice No.	Vloeibedrag / Rate of flow	Ure / Hours	So. Su. D	So. Su. N	Ma. Mo. D	Ma. Mo. N	Di. Tu. D	Di. Tu. N	Wo. We. D	Wo. We. N	Do. Th. D	Do. Th. N	Vr. Fr. D	Vr. Fr. N	Sa. Sa. D	Sa. Sa. N	So. So. D	So. So. N	Handtekening · Signature Besproeier · Irrigator

Bogenoemde aansoek is op ..... ontvang en kan soos aangedui toegestaan word.

The above-mentioned application was received on ..... and may be granted as shown.

Handtekening / Signature ..... Rang / Rank ..... Datum / Date .....

Ek/Ons bevestig en aanvaar hiermee die bovermelde aansoek om kansellasie van besproeiingswater.

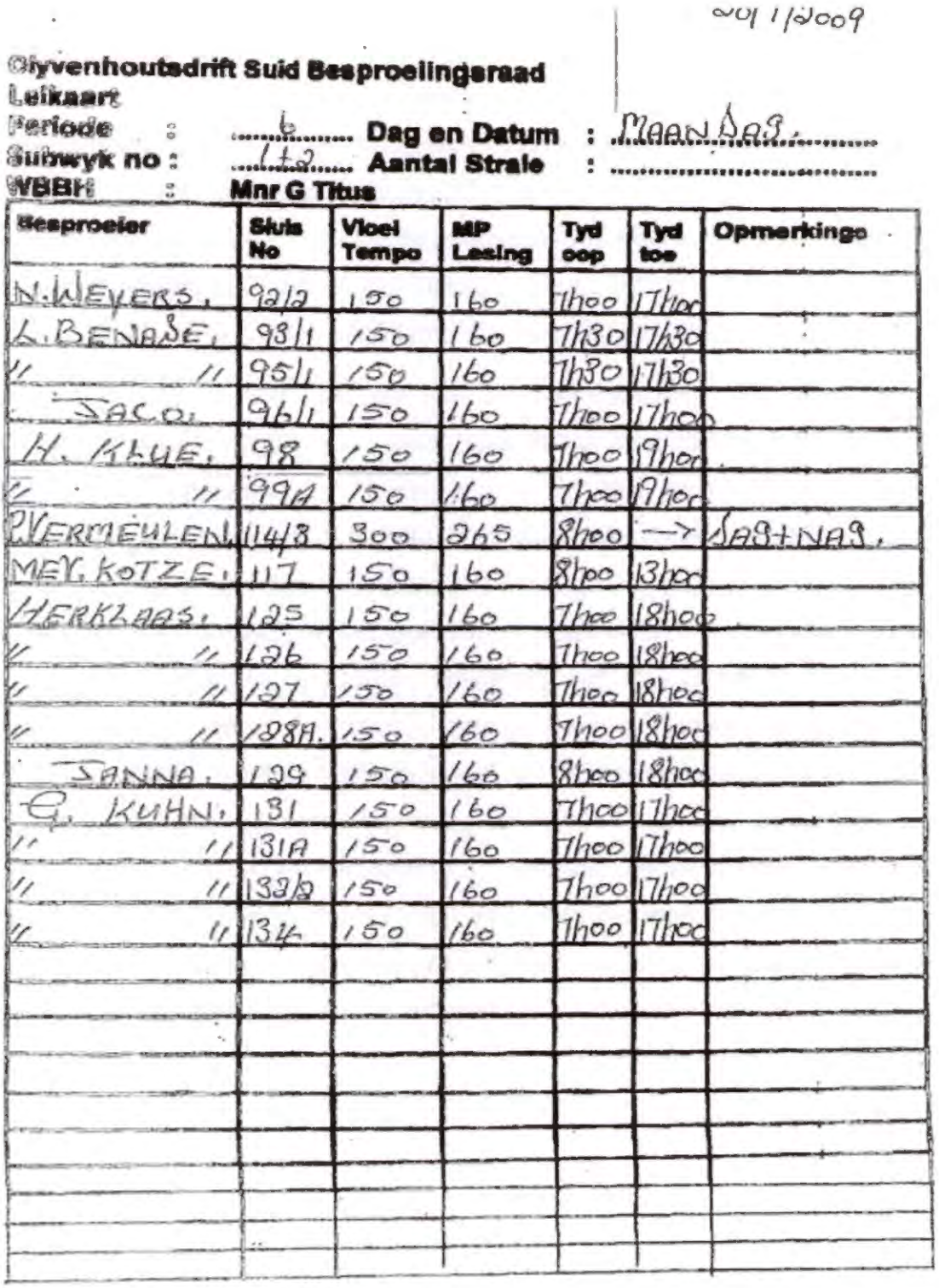
I/We hereby confirm and accept the above-mentioned application for the cancellation of irrigation water.

Besproeier · Segsman ..... Datum · Date .....

Trans Oranje (054) 24624

Figure 9: Water irrigation cancellation form: Example from the Olyvenhoutsdrift irrigation board

The form below is an example of a weekly timetable. It identifies the farmer; how much water he has requested; and on which days. It also indicates when the particular sluice was opened and when it was closed.



Olyvenhoutsdrift Suid Besproeiingsraad
Leikaart
Periode : ..... Dag en Datum : MAANDAG.....
Subwyk no : ...12..... Aantal Strale : .....
WBBR : Mnr G Titus

Besproeier	Sluis No	Vloei Tempo	MP Lesing	Tyd oop	Tyd toe	Opmerkings
N. WEYERS.	92/2	150	160	7h00	17h00	
L. BENADE.	93/1	150	160	7h30	17h30	
" "	95/1	150	160	7h30	17h30	
JACO.	96/1	150	160	7h00	17h00	
H. KLUE.	98	150	160	7h00	19h00	
" "	99A	150	160	7h00	19h00	
P. VERMEULEN.	114/3	300	265	8h00	→	SAS+NAS.
MEY. KOTZE.	117	150	160	8h00	13h00	
HERKLAAS.	125	150	160	7h00	18h00	
" "	126	150	160	7h00	18h00	
" "	127	150	160	7h00	18h00	
" "	128A.	150	160	7h00	18h00	
JANNA.	129	150	160	8h00	18h00	
G. KUHN.	131	150	160	7h00	17h00	
" "	131A	150	160	7h00	17h00	
" "	133/2	150	160	7h00	17h00	
" "	134	150	160	7h00	17h00	

Figure 10: Example of a weekly irrigation timetable: Olyvenhoutsdrift irrigation board

According to Chamberlain, the months November and December, as well as staggered intervals up to April are peak irrigation periods for the UIWUA. The irrigation timetable has to be planned carefully to ensure that all farmers have their fair share. The current irrigation timetable makes provision for 120 irrigation hours, from 05:00–23:00, six days a week. The problem with this arrangement is that all farmers preferred to irrigate during normal office hours, to avoid paying their workers overtime as required by the country's labour legislation. This clearly places the water resource under substantial pressure (Chamberlain, pers. comm., 2009).

Chamberlain also indicated how he and his staff had to change the irrigation timetable to make provision for climate change. Every year during the "off-season", the canal is closed for a period of four weeks for maintenance. The off-season is usually during the winter months (May to July) when temperatures are low and there is less need for constant irrigation. Farmers complained that a period of four weeks without irrigation, even in off-season, was just too long for soil to be without water. It was then decided to split this four-week period into two irrigation periods of two weeks each (Chamberlain, pers. comm., 2009). The closing time has since been changed back to a whole month for the period 2004 to 2010. This is illustrated in the two timetables below. The scheduled times coincide with seasonal changes. Chamberlain attributes this strategy to management interventions aimed at mitigating anticipated climate change trends (See Van Niekerk, *et al.,* 2009). Once again these tables are written in Afrikaans. Note the two periods during the beginning of October in 2003/4 and November of the timetable for 2010. These periods are labelled "DROOG" (which means 'dry').

UPINGTON EILANDE HOOFBESPROEIINGSRAAD
AMPTELIKE TYDTAFEL - JULIE 2003 TOT JUNIE 2004

Periode	Van	Tot	Ure	Periode	Van	Tot	Ure
2	30/06/03	05/07/03	Droog	29	05/01/04	10/01/04	120
3	07/07/03	12/07/03	120	30	12/01/04	17/01/04	120
4	14/07/03	19/07/03	120	31	19/01/04	24/01/04	120
5	21/07/03	26/07/03	120	32	26/01/04	31/01/04	120
6	28/07/03	02/08/03	120	33	02/02/04	07/02/04	120
7	04/08/03	09/08/03	120	34	09/02/04	14/02/04	120
8	11/08/03	16/08/03	120	35	16/02/04	21/02/04	120
9	18/08/03	23/08/03	120	36	23/02/04	28/02/04	120
10	25/08/03	30/08/03	120	37	01/03/04	06/03/04	120
11	01/09/03	06/09/03	120	38	08/03/04	13/03/04	120
12	08/09/03	13/09/03	120	39	15/03/04	20/03/04	120
13	15/09/03	20/09/03	120	40	22/03/04	27/03/04	120
14	22/09/03	27/09/03	120	41	29/03/04	03/04/04	120
15	29/09/03	04/10/03	120	42	05/04/04	10/04/04	120
16	06/10/03	11/10/03	120	43(6h00)	10/04/04	17/04/04	DROOG
17	13/10/03	18/10/03	120	44	19/04/04	24/04/04	DROOG
18	20/10/03	25/10/03	120	45	26/04/04	01/05/04	120
19	27/10/03	01/11/03	120	46	03/05/04	08/05/04	120
20	03/11/03	08/11/03	120	47(6h00)	08/05/04	15/05/04	DROOG
21	10/11/03	15/11/03	120	48	17/05/04	22/05/04	DROOG
22	17/11/03	22/11/03	120	49	24/05/04	29/05/04	120
23	24/11/03	29/11/03	120	50	31/05/04	05/06/04	120
24	01/12/03	06/12/03	120	51	07/06/04	12/06/04	120
25	08/12/03	13/12/03	120	52	14/06/04	19/06/04	120
26	15/12/03	20/12/03	120	1	21/06/04	26/06/04	120
27	22/12/03	27/12/03	120	2	28/06/04	03/07/04	120
28	29/12/03	03/01/04	120	3	05/07/04	10/07/04	120

Figure 11: Annual irrigation timetable for 2003/4: Example from the Upington Islands Water User Association

UPINGTON EILANDE HOOFBESPROEIINGSRAAD
AMPTELIKE TYDTAFEL - AUGUSTUS 2009 TOT JULIE 2010

Periode	Van	Tot	Ure	Periode	Van	Tot	Ure
8	03/08/09	08/08/09	120	35	08/02/10	13/02/10	120
9	10/08/09	15/08/09	120	36	15/02/10	20/02/10	120
10	17/08/09	22/08/09	120	37	22/02/10	27/02/10	120
11	24/08/09	29/08/09	120	38	01/03/10	06/03/10	120
12	31/08/09	05/09/09	120	39	08/03/10	13/03/10	120
13	07/09/09	12/09/09	120	40	15/03/10	20/03/10	120
14	14/09/09	19/09/09	120	41	22/03/10	27/03/10	120
15	21/09/09	26/09/09	120	42	29/03/10	03/04/10	120
16	28/09/09	03/10/09	120	43	05/04/10	10/04/10	120
17	05/10/09	10/10/09	120	44	12/04/10	17/04/10	120
18	12/10/09	17/10/09	120	45	19/04/10	23/04/10	120
19	19/10/09	24/10/09	120	46	24/04/10 (06:00)	01/05/10	DROOG
20	26/10/09	31/10/09	120	47	02/05/10	08/05/10	DROOG
21	02/11/09	07/11/09	120	48	10/05/10	15/05/10	120
22	09/11/09	14/11/09	120	49	17/05/10	21/05/10	120
23	16/11/09	21/11/09	120	50	22/05/10 (06:00)	29/05/10	DROOG
24	23/11/09	28/11/09	120	51	30/05/10	05/06/10	DROOG
25	30/11/09	05/12/09	120	52	07/06/10	12/06/10	120
26	07/12/09	12/12/09	120	1	14/06/10	19/06/10	120
27	14/12/09	19/12/09	120	2	21/06/10	26/06/10	120
28	21/12/09	26/12/09	120	3	28/06/10	03/07/10	120
29	28/12/09	02/01/10	120	4	05/07/10	10/07/10	120
30	04/01/10	09/01/10	120	5	12/07/10	17/07/10	120
31	11/01/10	16/01/10	120	6	19/07/10	24/07/10	120
32	18/01/10	23/01/10	120	7	26/07/10	31/07/10	120
33	25/01/10	30/01/10	120				
34	01/02/10	06/02/10	120				

Figure 12: Annual irrigation timetable for 2010: Example from the Upington Islands Water User Association

As far as irrigation goes, the UIWUA is playing an important role and is essentially going about its normal business, constitution or not. Chamberlain foresees that the WUA will go from strength to strength and that any challenges that may arise once all the other stakeholders are included, will be dealt with accordingly (Chamberlain, pers. comm., 2009).

The next section provides insight on how officials of the UIWUA see they way forward in their operations.

4.5.4 Perceptions about the way forward

Problems identified with the operations of the UIWUA are:

- Stakeholder involvement from (mostly white) irrigation farmers;
- The negative perceptions about the involvement of the //Khara Hais Local Municipality;
- Unclear billing processes; and
- Human resources problems (such as personnel transfers and labour unions).

In an interview in 2007, Chamberlain highlighted a few issues that he believed would create problems in the future.

4.5.4.1 Stakeholder participation

The first was that the chairpersons of former irrigation boards, scheduled to become part of the UIWUA, were white irrigation farmers. This situation was bound to change, and would have certain implications. He went on to say that the UIWUA's priority is to improve the irrigation operations of the water canal in Upington, but that some members of the management felt that their good intentions might be jeopardised by the //Khara Hais officials. One example was the plan by the management of the WUA to set aside R1 million to put up a fence around the canal for safety reasons; fatalities had been recorded of people and animals drowning in the canal. Some of the stakeholders represented on the WUA expressed their reservations. It was feared that as a result of the seniority of the //Khara Hais Local Municipality as a stakeholder in the WUA, the chances were fairly good that funds

earmarked for fencing would be reallocated somewhere else by municipal officials (Chamberlain, pers. comm., 2007). Water management officials at the time were of the opinion that circumstances of this nature could potentially create conflict between stakeholders and undermine confidence in a system of collaborative and integrated water resource management that has taken so long to put in place.

4.5.4.2 Stakeholder cynicism

Despite success with the UIWUA there are still some stakeholders who are not overly excited about the new water management institutions. For example, Mr C. Williams of the Steynsvoor sub-district was of the opinion that stakeholders were uncertain about the expected outcomes (Williams, pers. comm., 2007). The elaborate scheme of things in many respects detracted from the real purpose of what had to be managed, i.e. irrigation activities on the banks of the Orange River in the areas under the jurisdiction of the relevant user associations. Chamberlain also highlighted a sense of uncertainty among stakeholders about the delays in the establishment of the CMA, which, as mentioned above, had been postponed to 2011. They argued that by that time the WUAs would be established and functioning and their processes and procedures would be in place. Because the WUAs will be supervised by the CMA, it indeed might happen in 2011 that the CMA would insist on changes within the WUAs. This could possibly destabilise their operations (Chamberlain, pers. comm., 2007).

4.5.4.3 Billing issues

Billing was a concern. One official, Mr Chris Erasmus of the Boegoeberg sub-district, said that in former times, irrigation boards managed accounts very well. The DWEA had billed consumers, who paid their accounts to the finance section of the local irrigation board. The board then transferred the funds to the DWEA. In the new dispensation the WUA had to distribute the accounts, but could not collect the money because the WUA's tax number did not appear on the accounts. This caused irritating delays in the collection of outstanding accounts and there was confusion about which institution had to collect the money. Then the WUA sent newsletters to consumers asking them not to pay outstanding accounts to the WUA's

administration, but directly to the DWEA. At the time the officials took in a wait-and-see attitude to find out if the process would become more streamlined (Erasmus, pers. comm., 2007). In a follow-up interview with Chamberlain, two years later, it was confirmed that the situation had still not been resolved (Chamberlain, pers. comm., 2009).

4.5.4.4 Redeployed officials

At the time of an interview in 2007, another official, Williams, of the Steynsvoor sub-district, argued that the biggest challenge his irrigation board faced was the situation that prevailed after DWEA employees had been redeployed – first to his irrigation board and ultimately to the UIWUA. The transfer of these employees had not yet been finalised. In effect they were working for the UIWUA, which was supposed to be part of a private sector operation. However, they were still employed by the DWEA. These employees were disgruntled about the process and took liberties by avoiding their responsibilities because they knew the management of the particular irrigation board did not have the authority to discipline them. To all intents and purposes they were still employed by the DWEA and taking orders from anyone else seemed to be a problem. Erasmus confirmed this and said that it seemed as if these employees had given the DWEA head office the impression that the UIWUA was not an effective organisation and would not cut the mustard with the work that needed to be done. Getting feedback from DWEA on the matter was difficult, according to Chamberlain (pers. comm., 2007). It seemed as if there was no one in charge of completing the process of transferring personnel and no one wanted to take responsibility for this (Williams, pers. comm., 2007).

The most recent new challenge in 2009 was dealing with labour unions, specifically the National Education Health and Allied Workers Union (NEHAWU). As mentioned in the 2007 interview, Chamberlain and his board faced the problem of redeployment of former DWEA employees to the UIWUA. A similar management operation had been conducted successfully in 1993 in the Upington Irrigation Board, which was subsequently incorporated into the UIWUA. With the rest of the irrigation boards this action had not been formalised. Consequently NEHAWU made demands, obstructing the redeployment of personnel. It seemed that the union did not want the

privatisation of water institutions in the first place. However, the DWEA decided to go ahead with the implementation of the stipulated policies regardless of the union's objections and this aggravated the union leaders and their members. What they failed to understand, according to Chamberlain, was that the "privatisation" of the WUA was not really privatisation, but rather a form of restructuring. DWEA was, in terms of the National Water Act, still the custodian of all water management institutions (Chamberlain, pers. comm., 2009).

4.5.4.5 Formal approval of the WUA

During the last follow-up interview with Chamberlain in 2009, the progress on the status of the UIWUA was discussed. Chamberlain said that the constitution of the UIWUA had still not been approved by the minister of the DWEA. In requests for feedback from DWEA, the department replied that they did not want to do anything about these matters before the approaching 2009 general elections (April 2009). The undertaking was to send feedback on the draft constitution before November 2009. At the time of writing (November 2009) the matter had not yet been resolved. In a telephone conversation with Chamberlain he explained that a national moratorium had been placed on the establishment of all WUAs in the country by the new DWEA. They were scrutinising the profile of representation of all WUA managements. Representation on the board of such WUAs had to reflect South Africa's employment equity policies. To that end, black emerging farmers and women (preferably black women) were essential. As such, the UIWUA does not expect feedback about their draft constitution before the 2010 (Chamberlain, pers. comm., 2009).

4.5.4.6 //Khara Hais Local Municipality

The next important point on the agenda was the issue of negotiations with the //Khara Hais Local Municipality. Since the general elections in 2009, a new speaker for the council of the local authority has been elected. He had to nominate two members of the council to represent the //Khara Hais on the UIWUA. The previous speaker of the //Khara Hais council had made matters difficult for the UIWUA by demanding that eight of the 16 members of the board of the UIWUA had to be members of the council of the //Khara Hais Local Municipality, who, incidentally,

were all ANC councillors. This was not possible, according to Chamberlain, because the 16 board members had to be representative of all water user sectors as illustrated in Table 6. At the time of the interview, Chamberlain said that he did not foresee this problem with the new speaker who he had personally come to know as a reasonable man (Chamberlain, pers. comm., 2009).

4.6 THE //KHARA HAIS LOCAL MUNICIPALITY

In order to form an impression of the complex hydropolitical factors that influence the development of an integrated water resource management plan in the LOWMA, attention needs to be given to the manner in which the //Khara Hais Local Municipality manages the water commons. As will be outlined below the historical development of local irrigation activities up to the present assert a powerful influence on the manner in which some stakeholders appropriate for themselves the right as beneficiaries of the local water commons.

4.6.1 Background

The history of the //Khara-Hais Local Municipality coincides with that of the town of Upington, which forms the greater part of the administrative area of its jurisdiction. The town, which originally went by the name of Olijvenhoutsdrift, was established on the banks of the Orange River in the 1870s, when Reverend Christiaan Schröder of the Missionary Society of the Dutch Reformed Church arrived at the request of the Khoisan (Hottentot) chieftain, Klaas Lucas. Reverend Schröder and his people at the mission station were supposed to act as a buffer between the Koranna people and local white farmers who were at odds over possession of land at the time. The Khoisan leader also realised that it was important for his people to be able to read and write. The mission provided this service (Vuvuzela, 2007:3).

In 1882, according to Legassick (1996:396), a farm was given to Abraham 'Holbors' September who was said to be the first person to lead water from the Orange River for irrigation purposes. After the construction of the canal had been completed under the supervision of Schröder, September and his family were systematically pushed off their land on the grounds of demarcated group areas legislation passed by the

legislative assembly of the former Union of South Africa (1910–1961). Thus the September family ended up in a township outside Upington. Today the descendants of September are claiming back land which is now part of the municipal commons of //Khara Hais Local Municipality (Legassick, 1996:374). The white residents in the area are of the opinion that Reverend Schröder and a land surveyor, Mr Japie Lutz, realised the irrigation potential of the area and initiated the plans to lead water from the Orange River.

Over the years the local urban population increased substantially. Following a personal visit in 1879, the name Olyvenhoutsdrift meanwhile was changed to Upington after Sir Thomas Upington, the attorney-general of the Cape at the time, visited the town. Then, in 1889, a town council was established and the town attained municipal status (Legassick, 1996:373). Since then, Upington has been growing rapidly, establishing itself as a bustling regional centre of trade and industry. The irrigation farming sector is influential in the local economy.

4.6.2 //Khara Hais' management of the water commons

In 1994, South Africa held its first multiracial democratic elections, and new demarcations were introduced. District municipalities were established and the Siyanda District Municipality, which largely resembles the borders of the Northern Cape Province in South Africa, was demarcated in this area in 2000.

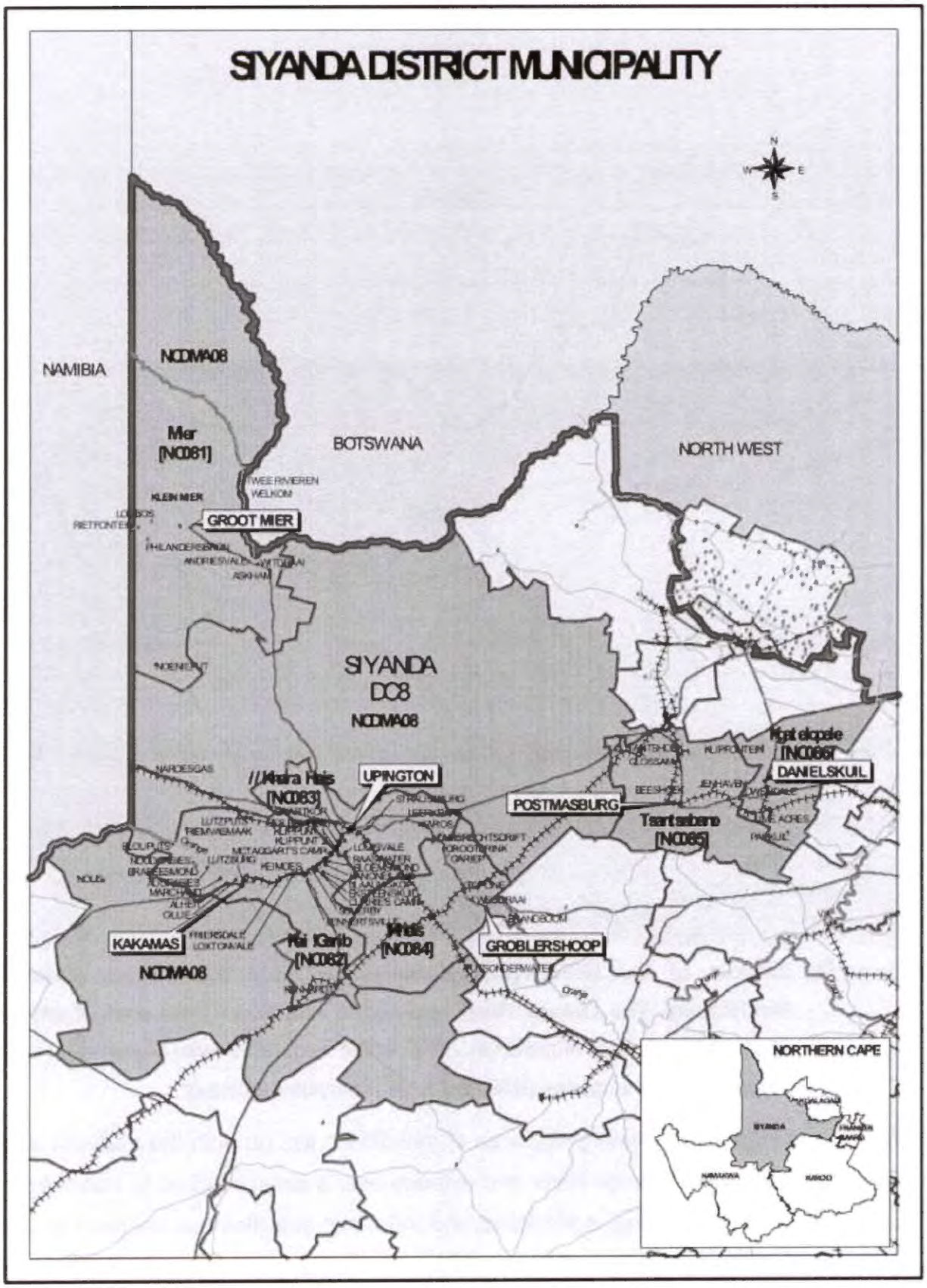


Figure 13: Borders of the Siyanda District Municipality (Municipal Demarcation Board, 2001)

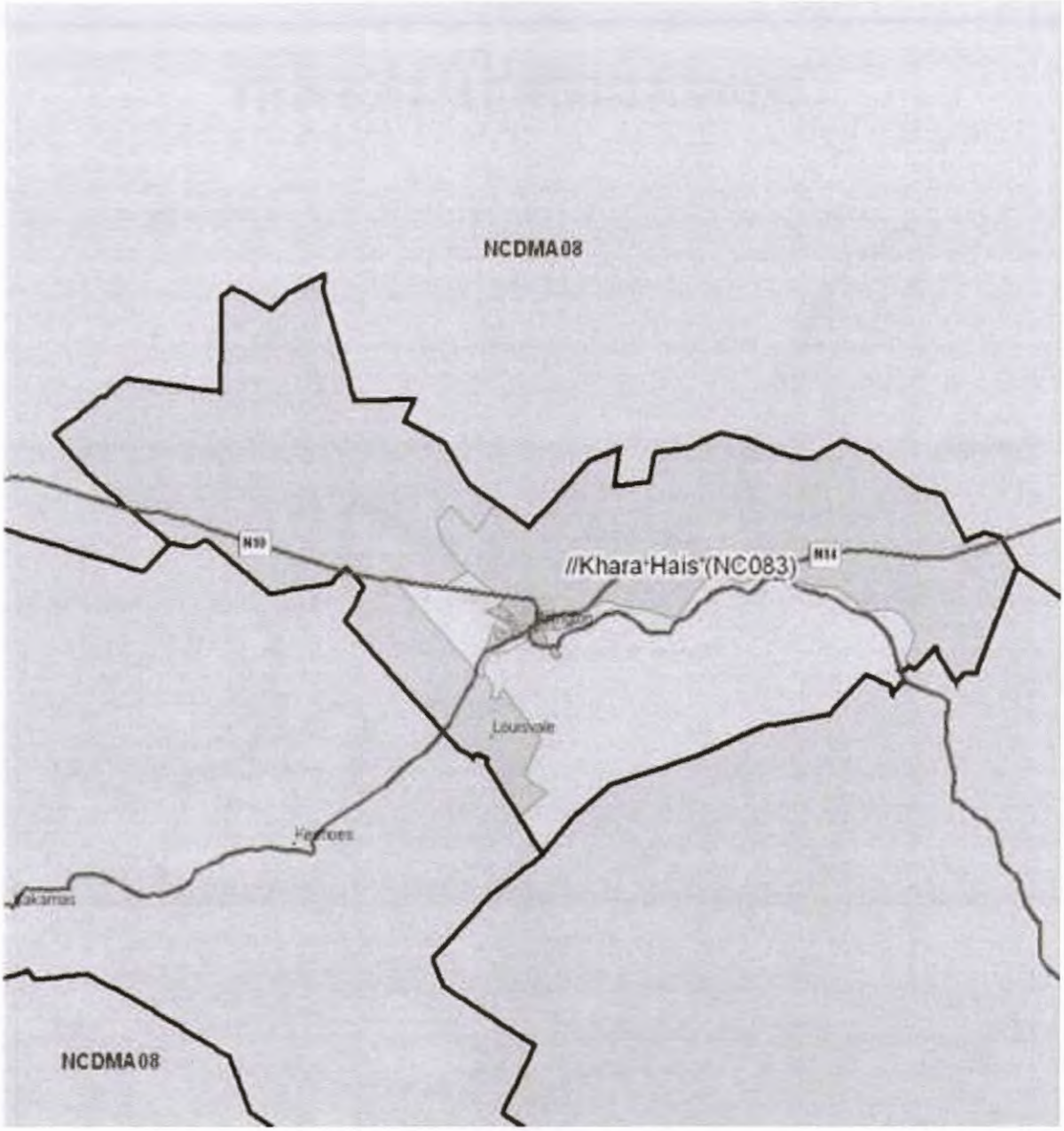


Figure 14: Borders of the //Khara-Hais Municipality within the Siyanda District Municipality. The Orange River, marked in red, flows from east (right) to west (left), in the illustration. The other red lines are important local communications routes (N50 and N14) (kharahais.gov.za)

The //Khara Hais Local Municipality area of jurisdiction lies on both the northern and southern banks of the Orange River and extends over a distance of up to 70 km from the banks of the river. Most agricultural and industrial activities are confined to the banks of the Orange River (//Khara Hais, 2009). As part of the transition, in September 2001 the Upington Municipality was renamed the //Khara-Hais Local Municipality. The name means 'big tree' and refers to the tree under which Chief

Lucas had his kraal. The slogan of the municipality is: 'The People Govern' (kharahais.gov.za, 2008).

//Khara-Hais is classified as a category C local municipality, meaning that it is a municipality functioning under the jurisdiction of a district municipality, in this case, Siyanda. Upington is the largest town in the Northern Cape (apart from Kimberley which was founded in 1871). The residential areas of Upington are divided into three sections. The former black township, Paballelo, was incorporated into the town in 1994. In the course of 1995 the area known as Louisvale Road (consisting primarily of peri-urban irrigation farming properties) was also incorporated. The area of jurisdiction of the municipality increased to almost 16 times its original size after the municipal elections in 2000 (kharahais.gov.za, 2008). According to the socio-economic survey of the Department of Local and Provincial Government (DPLG) in December 2002, there were 72 4676 inhabitants in //Khara Hais. The table below gives the demographic structure of the local population.

AGE	NUMBER OF PERSONS			%
	MALE	FEMALE	TOTAL	
0-5	4409	4387	8796	12,14
6-10	4279	4047	8326	11,49
11-15	3760	3982	7742	10,68
16-20	3776	3857	7633	10,53
21-25	2781	3197	5978	8,25
26-30	2570	3035	5605	7,73
31-35	2391	2921	5312	7,33
36-40	2315	2651	4966	6,85
41-45	1720	2337	4057	5,60
46-50	1412	1742	3154	4,35
51-55	1212	1488	2700	3,73
56-60	844	1380	2224	3,07
61-65	930	1282	2212	3,05
66-70	757	822	1579	2,18
71 •*•	855	1336	2191	3J)2
TOTAL	34011	38464	72475	100
%				

Table 9: The demographic structure of the local population of //Khara Hais (Source: DPLG, Socio-Economic survey for //Khara Hais, December 2002)

About 44, 84% of the inhabitants are under the age of 21 years, while 8, 24% of the inhabitants are over the age of 60 years. Only 25, 22% of the inhabitants are economically active.

//Khara Hais is situated in a semi-arid area. The average summer temperatures fluctuate between 18–36°C, with extreme temperatures going up as high as 43°C. The region has an average annual rainfall of 184mm. The following illustrations outline the temperatures coinciding with the rainfall patterns (South Africa, 2000).

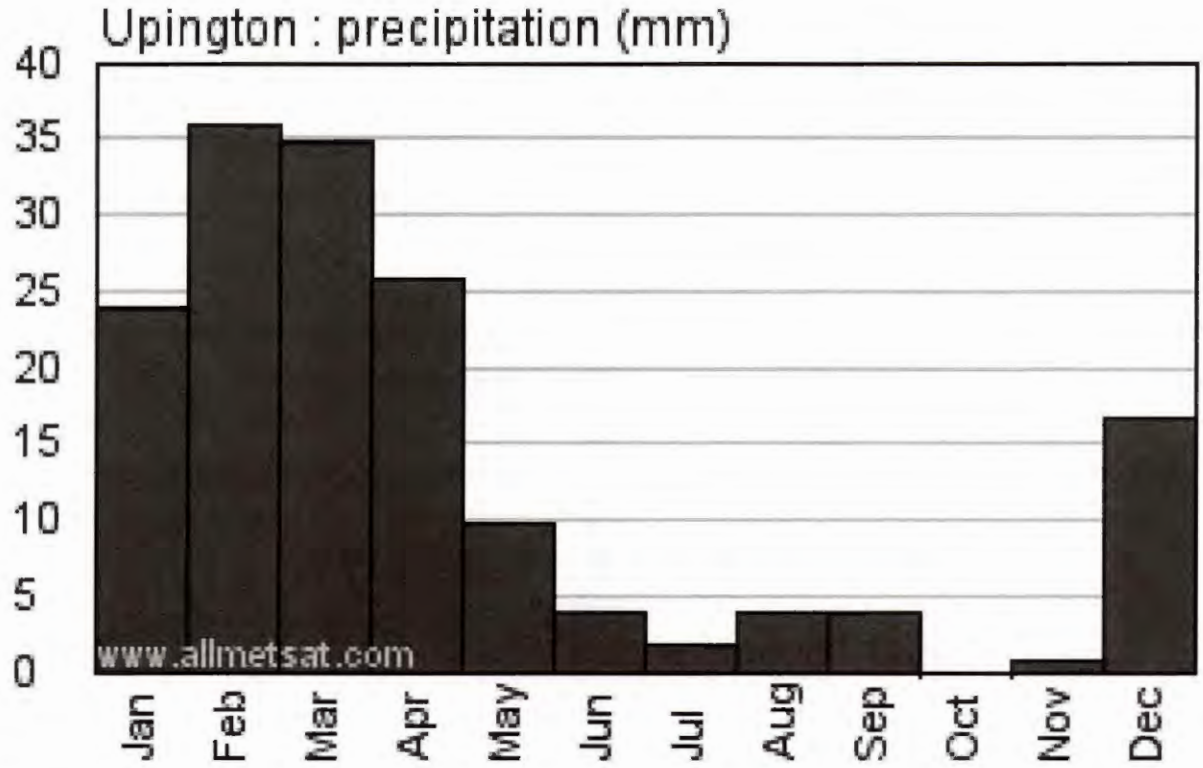


Figure 15: Average monthly rainfall, //Khara Hais (Source: Eldoradocountryweather. Com)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Highest recorded temperature (°C)	42	42	41	38	34	29	29	33	39	40	41	43	43
Average daily maximum temperature (°C)	36	34	32	28	24	21	21	23	27	30	33	35	29
Average daily minimum temperature (°C)	20	20	18	13	8	5	4	6	9	13	16	19	13
Lowest recorded temperature (°C)	10	9	5	2	-2	-5	-6	-7	-2	2	5	6	-7
Average monthly precipitation (mm)	24	35	37	26	10	4	2	4	4	9	17	17	189
Average number of rain days (>= 1 mm)	4	6	6	5	2	2	1	1	2	3	3	4	37

Table 10:Temperatures and rainfall patterns of //Khara Hais (Source: The South African Weather Service, September 2007)

According to //Khara Hais' Integrated Development Plan (IDP) for 2007–2012, the average water usage is about 32 982 m³ per day. As illustrated in the table above, precipitation is hardly enough to provide the groundwater needed for the town's water consumption. Upington also has no significant groundwater supply. The town, as is the case with neighbouring settlements, relies almost entirely on the Orange River for its water – either by direct withdrawal or from the irrigation canal. Water is pumped from the inlet of the river to the water purification works. The waterworks produce 64Mℓ of potable water per day. Smaller villages have smaller independent treatment plants that produce about 6–9Mℓ per day. Still using the data derived from the 2001 national census, the Department of Provincial and Local Government (DPLG) claims that 98% of households in //Khara Hais have access to water less than 200m from the dwellings. This meets the accepted reconstruction and development programme (RDP) requirement. This means that 1 815 of the total of 17 257 households do not have the legally stipulated access to water within 200m (South Africa, 2000).

As with all municipalities in South Africa, //Khara Hais is required to have an IDP in accordance with the *Municipal Systems Act,* 32 of 2000. This is once again a legislative strategy required to prevent free and uncontrolled access which may lead to the depletion of the commons. An IDP is a medium-term plan consisting of actions that need to be taken to ensure development in all departments of local government in order to ensure sustainable development. The purpose of this IDP for //Khara Hais is outlined in the background section of the document and reads as follows:

- To create a framework within which the local community and other role-players identify their own development needs and plan how these will be brought to effect;
- To establish a balanced framework for local economic growth and address local development needs;
- To create space for exchanging information between the community and the local, provincial and national authorities and development strategies;
- To develop a planning system that will promote community involvement and encourage participation and partnership between the Government and the community through the implementation of land development objectives;
- To develop a planning system that links public expenses to sustainable development strategies. Attainable aims and priorities will be established by the //Khara Hais Municipality and the local community;
- To create a planning system that links spatial and developmental planning;
- To create a system framework through which the //Khara Hais Municipality can be held responsible for progress in terms of aims and objectives;
- To start a practical process of integrated development planning;
- To promote co-operation and co-ordination between //Khara Hais and Government departments on provincial and national levels;
- To ensure the speedy execution of programmes and projects that are related to the Reconstruction and Development Project; and
- To establish co-operation and co-ordination with neighbouring municipalities and the district municipality (//Khara Hais IDP, 2007:5).

What do these goals mean for integrated water resource management by the local municipality? The issue of water is central to achieving most of these objectives,

especially where local social and economic development needs and service delivery are concerned. To address the issue of water management, //Khara Hais has developed a separate Water Services Development Plan (WSDP), which was published in 2006. This plan sets out the strategies the local authority plans to implement in adherence to the IDP as far as water services are concerned. The following diagram outlines the framework for the development of this plan.

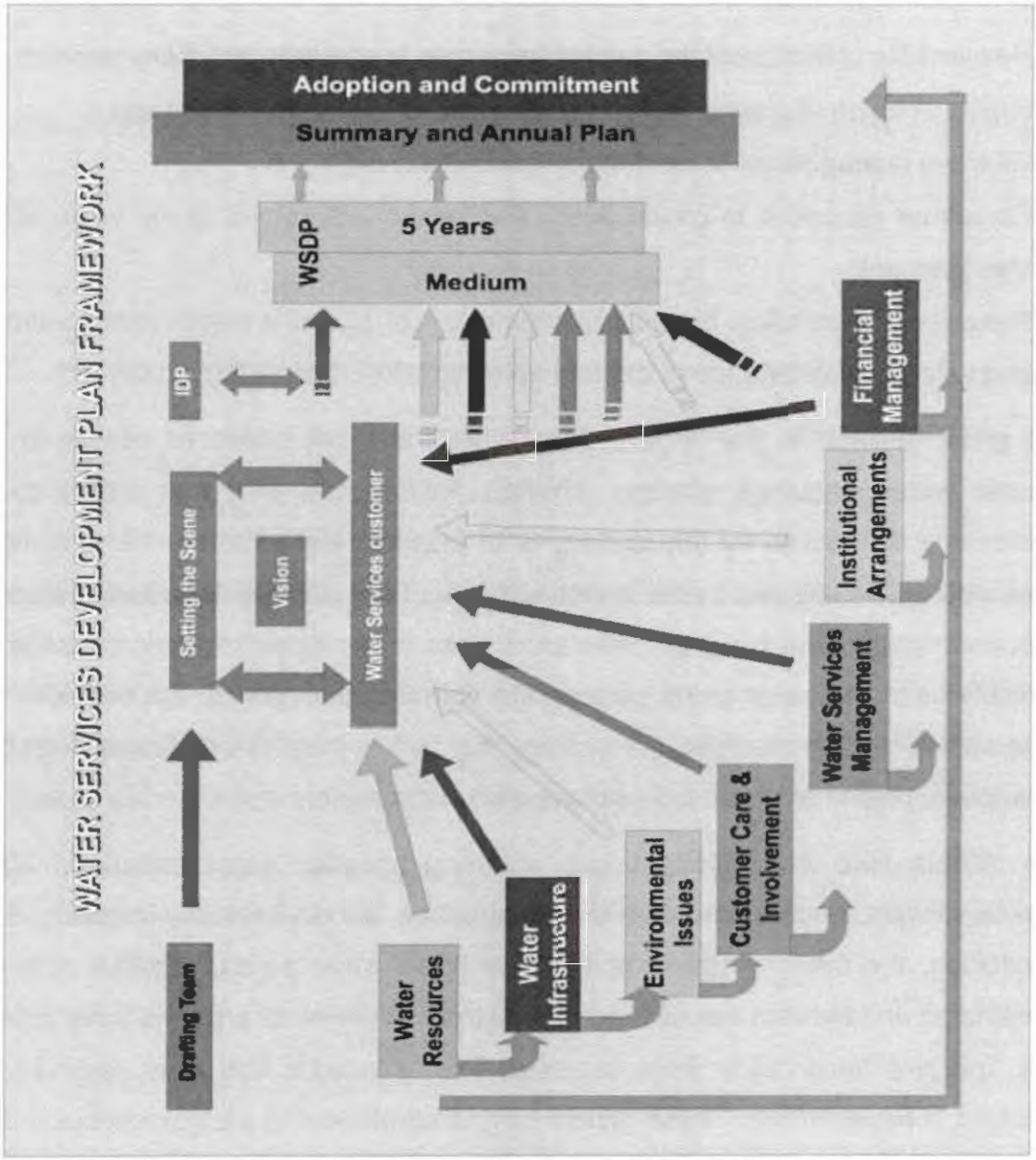


Figure 16: Road map of planning framework (Source: //Khara Hais Water Services Development Plan, 2007)

This road map indicates the route that was followed until the adoption and commitment to the WSDP. A drafting team was assembled in the municipality, and a

representative of the DWEA was co-opted for technical inputs. This team then set the scene and created a vision that accommodated consumers' needs. The vision is based on relevant aspects pertaining to the local water resource; water infrastructure; environmental issues; customer care and involvement; water services management; institutional arrangements; and financial management. With all these themes adopted, the WSDP was assembled and incorporated into the IDP. The //Khara Hais WSDP (2006: 27) outlines a few IWRM goals:

- Responsible utilisation of the current resources in a legally compliant manner;
- Implementation of a water conservation/demand management strategy;
- Effective management of networks to minimise losses;
- Consumer education to create public awareness with regard to the value of the resource; and
- Prevention of pollution by the implementation of effective wastewater treatment and suitable maintenance of existing systems (//Khara Hais IDP, 2007: 27).

The goals outlined in the //Khara Hais WSDP are well suited to adhere to the national water resources strategy (NWRS). However, a goal that seems to be consistently overlooked by the strategy is to secure insight into the perceptions of those who will be affected by the implementation of the strategy. Wherever customer care, participation and creating public awareness is mentioned, there is no evidence available on individual or group perceptions. Current strategies do not deal with this issue sufficiently. An example of a strategy that suffers from this particular neglect is the implementation of a plan to install pre-paid water meters in the municipal area.

The //Khara Hais Municipality began installing pre-paid water meters in 2002. Several villages, incorporated after the demarcation, did not have any metering at all. In addition, the implementation of the free basic water policy, together with the unrestricted and unbilled use of water, made the installation of pre-paid water meters vital. Indigent households were targeted first to ensure that they received an allocated 10Kℓ per month. These meters were programmed to allow households 333ℓ per household per day. According to Mr J. Isaacs, the //Khara Hais portfolio councillor for water, this resulted in substantial savings on the bulk supply of infrastructure, which was unable to maintain sufficient supply at all times. In his interview Isaacs expressed the firm belief that supplying poor families with free basic

water in the specified manner was the best way to control consumption (Isaacs, pers. comm., 2005).

Since 2004 several attempts were made to discuss water management issues with the relevant public officials at the //Khara Hais Local Municipality. These proved unsuccessful until 2009. Reasons for this state of affairs are discussed in the following sections.

4.6.2.1 Human resource issues at //Khara Hais

Providing the water services set out in the //Khara Hais WSDP, requires particular expertise and ability. In public management, several management functions are constantly applied, such as the control function, financial management function, etc. People carry out a combination of these functions, making human resources a vital component of operations in the public sector. Human resources problems are hampering the delivery of water services in this local municipality. In February 2006, SABC news reported that Ms Priscilla Allie, an Independent Democrat (ID) councillor, alleged that jobs in the Upington region were reserved for those with ANC membership cards. Ms Allie claimed that even with her business degree she had failed to secure a job in several departments at //Khara Hais Local Municipality because she was not an ANC member. At the time Mr Eric Ngxanga, ANC secretary for the Siyanda region, said that the allegations were malicious and that there were no corruption charges against any public officials in the district (Anon, 2006). However, in an interview with a local government official early October 2008, some worrisome issues emerged. The official asked to remain anonymous for fear of losing her job, which indicates a stressful working environment and distrust between those officials who should be focusing on delivery of essential water services. In the course of collecting data for this study, it was a constant struggle to secure interviews with local government officials. Officials referred questions to each other and no-one seemed inclined to take the responsibility to respond. The anonymous official indicated a possible reason for the difficulties experienced in getting a response from water services officials at this particular municipality.

4.6.2.2 Irregularities

It appears that there may have been many irregularities at the //Khara Hais Local Municipality. According to the anonymous respondent, the technical manager for water and sanitation indicated that there were certain discrepancies which emerged at the beginning of February 2008 resulting in the suspension of four officials. The Waste Water superintendent, who also served on the directorate of //Khara Hais, was among those suspended. According to the source, the auditing firm KPMG carried out a highly confidential investigation into the affairs of the municipality. Everyone was uncertain about the future and rumours were rife that more officials would be suspended. The situation became so stressful that the director of technical services gave notice at the beginning of June 2008. He was apparently well-respected by his peers. Since then his position has remained vacant. At the time this research was conducted there were indications that the position would not be filled until the investigation by KPMG was completed. One reason for this was the fact that the then chief civil engineer, Mr J. Modisaotsile, applied for the position but allegations of discrepancies against him were also being investigated (Anon., pers. comm., 2008). Modisaotsile agreed to a telephonic interview in 2008. The purpose of this interview was to provide insight into the issues and problems the municipality had encountered in delivering water-related services and to compare the responses of water consumers with those of a public official responsible for providing the resource.

4.6.2.3 Lack of knowledge

From the response and attitude of Modisaotsile it became evident that there was a lack of knowledge of the existing legislation and policies on water service delivery and management (Modisaotsile, pers. comm., 2008). He did not know the proper titles of the relevant legislation and the policies he had presumably worked with every day. His perceptions about the way irrigation farmers used the water allocated to them was also insightful. He accepted that these farmers used water optimally simply because they had micro-irrigation systems. As is evident later in this study, not all irrigation farmers use micro-irrigation systems. Many of them still use flood irrigation methods, which are wasteful when not practised properly. Modisaotsile also failed to recognise that irrigation farmers clearly used more water than any other

consumer group. He assumed that inhabitants of //Khara Hais did not need to have access to water for any other purpose than domestic consumption, since they did not own farms. Furthermore, he acknowledged that the //Khara Hais Local Municipality did not have sufficient capacity to implement policies and that there was not enough training for public officials who were responsible for implementing these policies (Modisaotsile, pers. comm., 2008).

Modisaotsile admitted that the vacant positions and the general management problems experienced in the //Khara Hais Local Municipality were of critical importance for the provision of water services. Because these positions were vacant, the onus was on the Water Works supervisor to perform some of the functions to provide basic water services that inhabitants of this area required daily (Modisaotsile, pers. comm., 2008). The supervisor was not prepared to be interviewed.

Modisaotsile acknowledged that human resources problems could indeed be the reason for the mistrust of inhabitants of //Khara Hais against some of the policies the municipality tried to implement. If more consultation had taken place with residents about the pre-paid water meters, many water-related problems might be resolved. Water usage would be measured more accurately and the municipality could be relieved of a significant burden with regard to billing. For the necessary consultation to succeed, suitably qualified and honourable personnel were needed. Modisaotsile indicated that if this was not done, the //Khara Hais WSDP would not be implemented effectively (Modisaotsile, pers. comm., 2008).

Subsequent to the interview, Modisaotsile was released from his position. Mr Hennie Auret was appointed as acting head of technical services. In the next section, an interview with Mr Auret sheds some light on the reasons for these actions and his perceptions about the way forward.

4.6.3 Perceptions about the way forward

The main human resource problems identified with the previous discussion are:

- Corruption;
- Lack of qualified officials, forcing the municipal management to appoint an electrical engineer as head of technical services; and

- Little to no involvement with the establishment of the LOCMA and the operations of the UIWUA as a result of the above-mentioned problems.

Hennie Auret is presently the acting head of technical services at the //Khara Hais Local Municipality. He is an electrical engineer and worked as an electrical engineer at Spoornet where he oversaw the Sishen-Saldanha railway. He then accepted a position as head of electrical services at the //Khara Hais Local Municipality (then the Upington Municipality) a post he held for 18½ years (Auret, pers. comm., 2009).

At the end of 2008 his professional life changed dramatically. He was appointed as acting head of technical services at the //Khara Hais Local Municipality. He suddenly had to take the lead in two very big departments of which he had no experience. In addition, two major management positions in the department of Technical Services, Civil Engineering Water Services and the Head of Water Purification, were also vacant. He effectively did the work of two people over and above his own responsibilities. In addition Auret mentioned that in the entire municipality, eight of the 16 top management positions were vacant. Many advertisements had been placed to fill the positions, especially those for civil engineers. It seemed that qualified people were simply not available. The remoteness of the municipality also had a negative impact on the type of applications received (Auret, pers. comm., 2009).

Auret was asked to shed some light on how this parlous situation developed. He explained that the previous head of the technical department had basically fled after embezzling a large amount of money from the coffers of the municipality. It had been discovered that a certain sum of money (he did not want to disclose the amount) was allocated for water meters to be installed in new housing developments. At about 2 500 residential stands the water was connected but no water meters installed. Since taking over, Auret had assumed responsibility for connecting water on about 1 100 stands without installing water meters, because the previous head had not budgeted for additional funds for meters. This meant that all these inhabitants used water at will without paying for it, which cost the municipality an exorbitant amount of money. An emergency budget meeting had to be held to solve the problem (Auret, pers. comm., 2009).

Since his predecessor's departure, those who had remained loyal to him had also vacated their posts, which left Auret with a staffing predicament. He said that his lack of experience in water management placed a great deal of pressure on his shoulders. This was in addition to his position as head of electrical engineering. He said that he was obliged to rely heavily on the operational workers at the water purification plant and the wastewater treatment works. These individuals were experienced in their jobs and Auret trusted them, as he put it, to "keep water in the pipes and sewage out of the drinking water". He said that this department also employed first-class plumbers, fitters and electricians, who made his job much easier (Auret, pers. comm., 2009).

Auret complained that he was receiving water-related reports and documents to read on a daily basis, but did not have the time to read half of them; sometimes he simply did not understand what these reports meant. For the first time he had to familiarise himself with policy documents such as the Water Services Development Plan. He was unaware that //Khara Hais was supposed to be involved in a WUA and only focused on sending the DWEA regular reports they required on water quality and bulk usage. He was emphatic that there was simply no time for any further responsibilities and that he was not interested (for the present at least) to be involved in these institutions (Auret, pers. comm., 2009).

It is clear that this considerable human resources problem in the //Khara Hais Local Municipality will inevitably have negative effects for the water commons. Auret is clearly doing his best under trying circumstances, but if the situation is not dealt with urgently, the wheels would come off the wagon. It can safely be assumed that one person will not be able to cope with the workload for an extended period of time.

The next section investigates irrigation in the jurisdiction of the //Khara Hais Local Municipality and conveys the perceptions of irrigation farmers with regard to water use and water allocation.

4.7 FARMING IN THE LOWER ORANGE WATER MANAGEMENT AREA

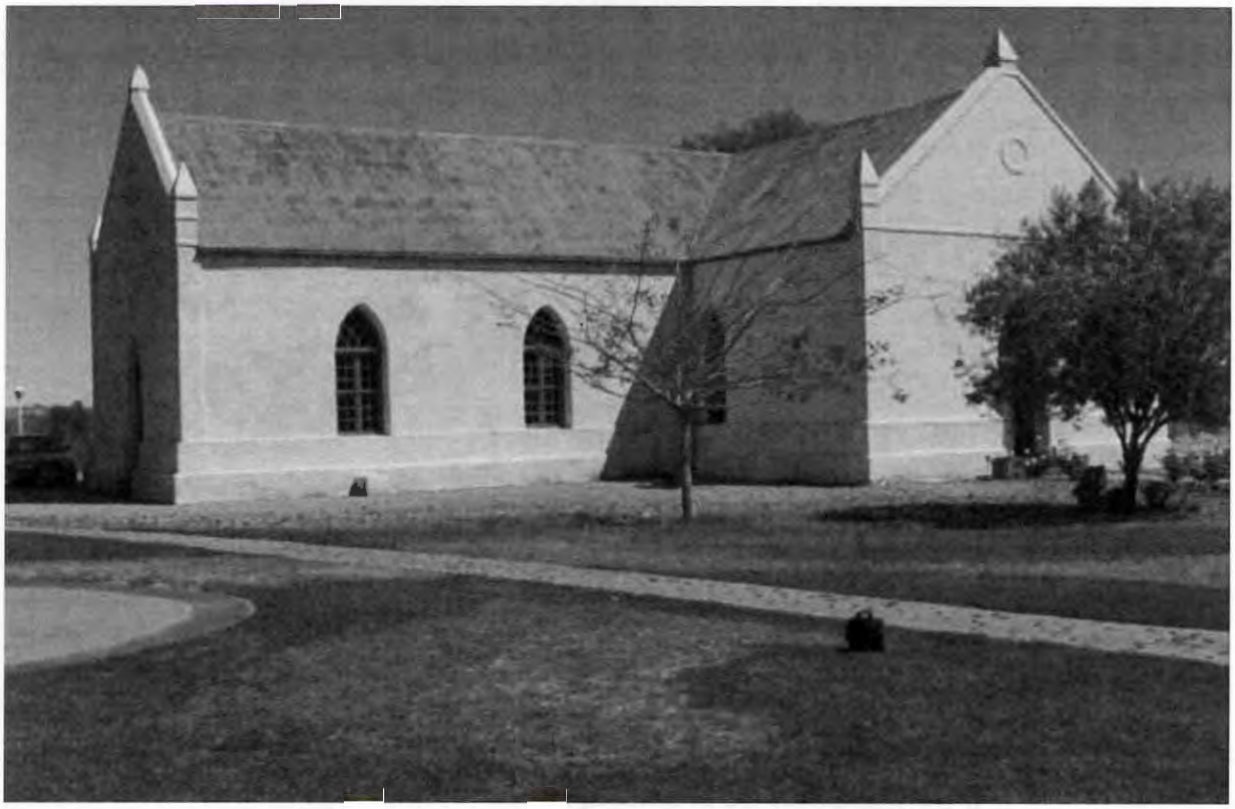
The history of irrigation and the Upington canal is fraught with disputes and uncertainties. There are two main opinions on who first began to lead water from the Orange River for the purposes of irrigation. The one is that Abraham September started the Upington canal. Others claim that Rev. Schröder, with the help of Japie

Lutz, took the initiative. The debate is also addressed in an interesting article by Martin Legassick in the *Journal of African History*, "The Will of Abraham and Elizabeth September: The Struggle for Land in Gordonia, 1898–1995". The article focuses on how Abraham September and his family lost their land and also deals with September's contribution to the building of the Upington water canal (Legassick, 1996:375).

4.7.1 Abraham September versus Reverend Schröder

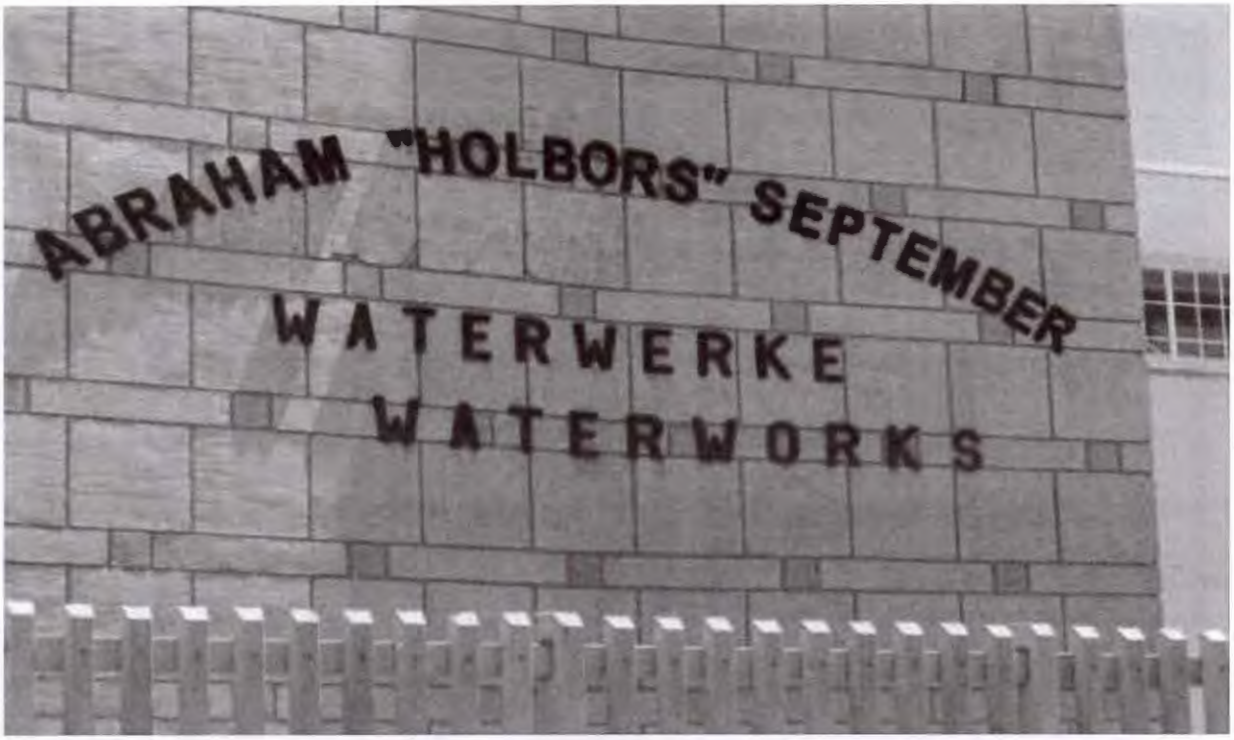
According to Legassick, "white historical mythology" has distorted the contribution of Abraham September in the creation of the Upington canal. This historical myth asserts that it was Rev. Schröder who identified the potential of using water from the Orange River for irrigation purposes, but disregards the fact that he only became aware of this after witnessing Abraham September leading water from the Orange River. Legassick (1996:371) says that the white settlers' drive and innovation may have led the way to modernisation and development, but that the coloured community assisted with labour and that Abraham September must be credited with showing the initial inventiveness in using the Orange River for irrigation. Both these men are important in the history of Upington, and monuments representing their contributions feature prominently in the town (Legassick, 1996:372).

When visiting Upington it is evident that this debate has elicited emotional reactions from different sections of the community. For the white irrigation farmers, the legacy of Reverend Schröder as the "father" of Upington and the innovator of the canal is clearly important. It is a legacy they wish to cherish in perpetuity. More than once, when respondents were interviewed and asked for comments on the matter, their reactions had a racist undertone. One of the farmers said bluntly that Abraham September's legacy is nothing more than digging a little furrow to direct sewage away from his house to the river. For obvious reasons, this farmer preferred to remain anonymous (Anon., pers. comm., 2005).



Photograph 1: The Schröder Museum in Upington (Photographer: Mr M.F. (Tienie) van der Walt)

The coloured community, on the other hand, believe that Abraham September was the first person to channel water from the Orange River for irrigation and that his contribution gave birth to the canal. Abraham September's legacy is acknowledged by the erection of a memorial needle in front of the municipal offices and by naming the water works building in his honour. According to the //Khara Hais IDP, plans are in place to declare Abraham September's house a national preservation site (//Khara Hais IDP, 2007:23).



Photograph 2: The waterworks in Upington dedicated to Abraham September (Photographer: Ms I. Gouws)

The purpose of this study is not to take sides or prove one or the other of these views correct. Instead, the aim is to highlight the fact that this community is divided over its irrigation heritage. This division is along racial lines and is deep-seated, which complicates the implementation of water-related policies. It forms part of the hydropolitical complexity of introducing an effective integrated water resource management programme in the area under the jurisdiction of the local municipality.

4.7.2 The Upington canal

The Upington irrigation canal forms part of the larger Orange River irrigation scheme. This canal has been providing access to water from the Orange River since its construction in 1882. The canal is 43 km long and begins at Uap, a small settlement outside Upington. It then flows through the town and past Keimoes, a town further on towards Augrabies. Some of the walls of the canal still consist of soil. In some cases, especially in the residential areas of Upington, the walls have been re-cast in cement (//khara hais.co.za, 2005).

Photograph 3: Canal with soil walls (Photographer: Mr M.F. (Tienie) van der Walt)

In and around Upington, people have built their lives around this canal for irrigation purposes apart from the municipal water that is available to them. Residents in the town use water from the canal to irrigate their gardens.

Photograph 4: Residence beside the canal, using water for garden irrigation (Photographer: Mr M.F. (Tienie) van der Walt)

On the outskirts of the town, farmers use the canal to irrigate their crops – vineyards, cotton and wheat. Some of these irrigation farmers were interviewed because as a group they use the largest quantity of water in the region. According to the IDP of //Khara Hais for the period 2007–2012, irrigation farmers use up to 75% of the available surface water (//Khara Hais IDP, 2007:45).

At the time of writing in November 2009, 21 farms use the canal for irrigation purposes in the //Khara Hais Local Municipal area (//Khara Hais IDP, 2007:33). Crops being irrigated include vineyards (export-quality table grapes and wine grapes) and fruit for the purposes of drying and export. As discussed in Chapter 3, the lower Orange River area is situated in a semi-arid, summer rainfall region with temperatures frequently going up as high as 40°C, so crops are dependent on irrigation quotas of 15 000 m^3 or more p/ha/p/a in the Upington area (Myburgh, 2007).

When visiting irrigation farms in the //Khara Hais region, it becomes evident that these farms fall into two broad groups. The first type is the large commercial farms that irrigate up to 1000 ha of land. Then there are small farms of no more than 30ha along the Upington canal. The managers of large farming operations have different perceptions of water issues compared to the owners of small farming operations. Some of these opinions and perceptions will be discussed below.

First, it is necessary to give an impression of the two categories of farms and the farmers who manage them. Their respective responses are discussed under the rubrics of domestic water; irrigation practices; perceptions of legislation; and views on the institutional development for water management.

The discussion thus far in this chapter has focused on the views of the public officials who manage the commons. We now turn to explore the perceptions of a group of water users who are on the 'receiving end' of water management – those who had to experience the implementation of a policy which changed their access to the water commons. Emphasis is placed on irrigation farmers' perceptions of the water commons, their access to it and the restrictions placed on this access by legislation.

4.7.3 Larger irrigation farming operations

The first of the larger irrigation farms investigated is Karsten Farms.

4.7.3.1 Karsten Farms

Karsten Farms have been in operation in an area called Roepersfontein near Upington since 1980, when Mr Piet Karsten first began farming grapes. The farms have since expanded into a company exporting most of its produce through packing houses in Port Elizabeth and the United Kingdom (Du Plessis, pers. comm., 2004). Mr Piet du Plessis is a manager on the Karsten Farms Estate and according to him 866ha are under irrigation and the average amount of water used is about 10 000 mm p/h/p/d. Micro-irrigation systems are largely used, but about 60ha are still under flood irrigation. According to Du Plessis it is not financially viable to install micro-irrigation systems in these areas. He provided an estimate of the average amount of water used for irrigation per annum, which is illustrated in the table below (Du Plessis, pers. comm., 2004).

	Spring	Summer	Autumn	Winter
Jan		10mm		
Feb		8mm		
March			8mm	
April			6mm	
May				4mm
Jun/Jul				1mm
Aug				4mm
Sept	6mm			
Oct	8mm			
Nov/Dec		10mm		

Table 11: Average amount of water used by Karsten Farms for irrigation per hectare per annum (Source: Mr Piet du Plessis, pers. comm., 2004)

Photograph 5: Vast hectares of vineyards under irrigation on Karsten Farms, Roepersfontein, Upington (Photographer: Mr M.F. (Tienie) van der Walt)

Photograph 6: Vineyards under irrigation on Karsten Farms, Roepersfontein, Upington (Photographer: Mr M.F. (Tienie) van der Walt)

Photograph 7: Micro-irrigation system installed on Karsten Farms, Roepersfontein, Upington (Photographer: Mr M.F. (Tienie) van der Walt)

It is clear from these images and the table that an enormous amount of water is used daily to irrigate crops. According to Du Plessis there was a great deal of pressure on farms such as these to ensure sustainable production by using less water without jeopardising the quality of the grapes they produced. This was why it had been prudent to invest in micro-irrigation systems and do away with the traditional flood irrigation (Du Plessis, pers. comm., 2004). Large corporations like Karsten Farms could afford to do this, but smaller farmers (as became evident in the interviews) found it difficult to provide the capital needed to make the switch.

In the following section, perceptions about another larger irrigation farmer are outlined. This farmer was more cooperative and gave some very useful insight into the operation of larger-scale corporate irrigation practices.

4.7.3.2 Blouputs

The interview with Mr Alwyn Dippenaar was particularly productive as far as wider usage and perceptions about water issues are concerned. The information gleaned

is divided under the headings: 1) domestic water use; 2) irrigation practices; and 3) perceptions on the way forward.

Mr Alwyn Dippenaar is a farmer in the Blouputs region. He was well aware of the concept of water demand management and its importance. He irrigates more than 600ha of crops including vineyards, wheat and maize. When asked how the allocations of water for irrigation purposes worked, he was clear that water allocated by the relevant irrigation board (now part of the Upington Islands WAU) belonged to him because of his existing water rights. He claimed, however, that he had made every effort to do more with his water allocation than just mere irrigation (Dippenaar, pers. comm., 2005).

4.7.3.3 Domestic water use

As far as water use for domestic purposes is concerned, Dippenaar highlighted the extraordinary steps he takes to provide potable water for his own household and that of his employees. He employs 700 permanent workers comprising 150 families who reside on his farm. If he calculates these numbers, plus their dependants, and adds the seasonal workers, he employs and provides housing for almost 1 200 workers per annum. Surplus irrigation water is used to provide water for this staff and their households. He has built his own water purification plant on the farm to make the water potable. He thus believes that he not only uses the water effectively, but saves water and additional electricity costs to boot. Dippenaar firmly believes that by implementing these methods, he is "doing his share" to save water (Dippenaar, pers. comm., 2005).

4.7.3.4 Irrigation practices

According to Dippenaar, the formula in use to decide the water allocations per farm is to calculate the average evaporating numbers and multiply that by the numbers provided by crop factors such as growth rate. However, the crop factors used were those for "annuals" which include crops such as maize and wheat which must be replanted after harvesting. He feels that the allocations for "perennials" should have been used instead for this calculation. Perennials are crops like vines and feed,

which provide continuous harvest with the same plants. Annuals require more water than perennials. With this in mind, Dippenaar is of the opinion that too much water is allocated to farmers like him who mostly irrigate vineyards. He has made his own calculations and found that he only used 65% of the water allocated to him for irrigation; this surplus has meant that he has been able to plant more vineyards. He admits that he has possibly also saved on his water use because he has invested in micro-irrigation methods (Dippenaar, pers. comm., 2005).

Photograph 8: Blouputs (Photographer: Ms Ina Gouws)

In addition, he has also built a weather station on his farm and irrigation is applied strictly according to the data received, which provides rainfall and ambient evaporation figures among other information. He combines all this with data on the growing stages of the different grape cultivars in his vineyards. This means that irrigation schedules are constantly adjusted to suit specific requirements (Dippenaar, pers. comm., 2005).

When asked whether one should pay for water, Dippenaar expressed the following views: ultimately water forms part of his production costs; water was relatively cheap in relation to other production costs such as fertilisers; the cost of electricity to pump the water from the river to his irrigation dams and from there to the irrigation

systems, is a more serious concern as far as he is concerned (Dippenaar, pers. comm., 2005). This view was shared by smaller irrigation farmers (pers. comm., Badenhorst, 2009; Bergh, 2009).

4.7.3.5 Perceptions about the way forward

Dippenaar identified the following issues regarding his water allocation:

- Capital is needed for investment in micro-irrigation systems;
- Too much water is allocated for irrigation and the water is not used optimally; and
- Farmers must irrigate crops which can yield harvests more than once a year which they can export for a profit instead of irrigating crops such as maize which is being imported by the government, thus lowering the harvest prices.

He is emphatic that small irrigators will not survive in the long run. They do not have the capital to invest in micro-irrigation systems, which means they are unable to plant more crops to irrigate with the water saved by using more sophisticated irrigation methods. Smaller irrigation farmers agreed with this opinion (pers. comm., Badenhorst, 2005, 2009; Bergh, 2005, 2009; Louw, 2004; Visser, 2005). According to Dippenaar this implies that smaller farmers will be unable to yield more crops to obtain a larger profit in order to balance ever-increasing production costs. He believes that less water should be allocated to farms where water is not used to capacity. He also said it was evident that the government was moving towards importing more and more grains, such as maize and wheat. To that end, farmers should stop irrigating these annual crops and shift towards crops that they can export themselves. He considers this more lucrative for both the farmer and the government. More water would also be saved, since maize and wheat crops use more than double the amount required for perennial crops. It also means that there would be more job security for more individuals. He believes that water allocations should reflect the contribution made by the farmer to the economy and in the provision of jobs (Dippenaar, pers. comm., 2005).

Dippenaar went on to say that if he had any say in the matter he would urge the DWEA to provide interest-free loans for working farms so that farmers could invest in micro-irrigation equipment. This would save a great deal of water, which formed part

of the DWEA's IWRM focus (Dippenaar, pers. comm., 2005). Mr Dippenaar's view on this matter is similar to that of smaller farm owners.

4.7.4 Smaller irrigation farm owners

Over a period of four years, a number of smaller irrigation farm owners were interviewed. Three of them, Messrs Badenhorst, Snyman and Bergh, were interviewed (for either a second or third time) in 2009, shortly before the submission of this study, to ascertain whether any significant changes had been made as far as their irrigation practices were concerned since the previous interviews. Their responses are divided into five main categories, namely 1) historical information; 2) domestic water; 3) irrigation practices; 4) institutional development; and 5) additional concerns voiced by farmers.

4.7.4.1 Historical information

Most small irrigation farmers are second or third generation farmers on the land. They seem to have a vested interest and strong emotional attachment to the land. Some of them also provided their take on the historical development of irrigation in this region. This section provides a short description of the history of some of these farmers. There are many similarities in the discourses.

Willie Snyman is a third-generation farmer in the Upington region. His father started farming locally in 1919 on a number of adjoining properties he had bought on the banks of the Orange River. During the Great Depression of 1930–33 the family sold some properties and after the Second World War (1939–1945), his father gradually began to buy these back. Snyman continued to do so, and at the time of the first interview only four more properties had to be acquired before the original farm was intact (Snyman, pers. comm., 2004).

Mr Barend Louw is a third-generation farmer in the area. He previously worked as a policeman and was a prominent rugby player for the Griquas provincial rugby team. He irrigates wine grapes (Louw, pers. comm., 2004). In the first interview Louw said that his grandfather had bought the farm from coloured people who had been resident in the area for many years. He mentioned that on the farm there was a

bridge that had been built over the canal in 1885. He then volunteered to give his version of the history of the 43km-long canal. He said that the construction of the canal started in 1883 on the initiative of Reverend Schröder, who established a mission station in Upington (Louw, pers. comm., 2004). The Upington irrigation board was established soon afterwards and as far as he knew it was still managing the canal. Louw did not accept the notion that the canal was the initiative of Abraham September and rejected out of hand the recognition September had received for his role.

Swartkop Farm, a 40ha property on the outskirts of Upington, belongs to Mr Johan Badenhorst and his father, Jonna Badenhorst. Only vineyards are under irrigation on this small farm and Badenhorst's father has been farming on this land since 1990. Johan joined the operation in 1999. He irrigates a total of 40ha of land that comprises 20ha of vineyards and 20ha under maize, wheat and cotton. Crops are rotated annually (Badenhorst, pers. comm., 2005).

Mr Frans Bergh has been farming since 2000. His grandfather bought the farm in 1930. His father joined his grandfather on the farm in 1998. Berg is therefore a third-generation farmer and only came to the farm when his father indicated that he needed help to run the operation more effectively. Prior to this, Bergh worked in Gauteng in the casino industry. His grandfather had initially only grown cotton, fodder and maize in rotation, but began irrigating vineyards to produce raisins in 1970. At the time of the interview Bergh had 35ha under irrigation (Bergh, pers. comm., 2005).

From these accounts, it is clear that these particular farmers irrigate much smaller pieces of land than for example Karsten Farms and Alwyn Dippenaar. This does not however diminish their vested interest in their farms and farming activities. The farms provide livelihoods not just for themselves, but for farm workers in the region as well.

4.7.4.2 Domestic water use

Farmers were prepared to share their perceptions about domestic water use and the following issues were emphasised:

- Awareness of the concept of IWDM;

- Perceptions about government policies such as the Free Basic Water Policy;
- Perceptions about payment for water from boreholes, which is still free; and
- Quality of municipal water.

In this section the views of farmers on domestic water use and the importance of saving water is discussed. Since the LOWMA is semi-arid and local rainfall is less than in most other parts of the country, farmers are generally aware that water is scarce and should be consumed sparingly. Farmers were asked whether they used any specific methods for saving water and if they were aware of the concept of WDM.

Farmers indicated that they are well aware of the concept of WDM. This is a testament to the success of the UIWUA to incorporate irrigation boards and the awareness they have created among farmers about new water management policies. These farmers are generally very aware of the importance of water and the need for saving this potentially scarce resource. Most of them grew up in households where they had to use water sparingly (pers. comm., Snyman, 2004; Louw, 2004; Badenhorst, 2005; Bergh, 2005; Visser, 2005; Van Rensburg, 2005; Terblanche, 2005).

Some of the farmers felt that the government's free water policy of 6Kℓ free water per household per month was too much. For them the policy was not in line with sensible water demand management practices and they suspect that they in the end they foot the bill for this free water anyway (pers. comm., Snyman, 2004; Van Rensburg, 2005; Visser, 2005).

Most farmers use water from boreholes for domestic purposes. All smallholdings (these farms are actually in this category) have to pay rates and taxes at about 5% of the value of the property, even if they do not use municipal water. This was not too steep at the time, but nevertheless this was still an amount that none of the farmers had really budgeted for. They felt that the government might soon insist on payments for water from their boreholes and predicted that if this were done the farmers would be outraged and would almost certainly offer resistance. They pointed out that they had paid a substantial amount of money to sink boreholes and put up pumps with the entire related infrastructure. For the government to come and tell them that this was no longer 'their' water and they now had to pay for it, was totally unacceptable. They

wondered whether the government was going to do the maintenance on the pump and borehole and whether farmers were going to be reimburse for the money they spent on their boreholes. The notion was unacceptable. They emphasised that if the government formulated policies such as this it would certainly discourage farmers from continuing with their activities; farmers would be disheartened to the extent that they might give up farming and sell their farms – this would be the easiest way for the government to secure water and land for black people (pers. comm., Snyman, 2004; Visser, 2005; Terblanche, 2005; Louw, 2004; Van Rensburg, 2005). However, as indicated in the discussions with Kubaie in 2009, the registration process of boreholes and irrigation water is so far behind that it seems that farmers do not have to worry about this for the foreseeable future. Added to this, the installation of water meters and the human resources necessary to administer the process will entail expenditure that the department simply cannot afford (Kubaie, pers. comm., 2009).

One farmer did admit that since the water from their boreholes was free, they used it too liberally. As water consumers they could make an effort to save water from the borehole (Bergh, pers. comm., 2005). Borehole water was clearly an important source of domestic water supply for the farmers. While some did have the choice to make use of municipal water, only a few were connected to municipal mains. This also confirms the perception of most farmers about water from boreholes: they choose not make use of municipal water, even if they have access to it, because their borehole water is free of charge Those who are connected to municipal water systems were not at all satisfied with the quality of municipal water.

Felix Visser is one of a few irrigation farmers whose small holding is connected to the municipal water system. His main concern is the poor quality of municipal water. He believes that the water supply is not clean. At the time of the interview in 2005, he was the chairperson of the local Farmers' Association and he summoned an official from the //Khara Hais Local Municipality to test the municipal water in the river on his property. He then asked neighbours to bring borehole water which they had purified themselves so that he could compare the water quality. Visser claimed that the water from boreholes was much cleaner than municipal water. He complained that his workers regularly suffer from diarrhoea and he believes that this is because of the unsafe municipal water. He has invested in a water purifier for his household

(Visser, pers. comm., 2005). Farmers believe that municipal officials are incapable of providing the inhabitants of the region with clean water and expressed their disdain for affirmative action policies which lead to the firing of experienced officials who know how to provide clean municipal water (pers. comm., Visser, 2005; Bergh, 2005; Van Rensburg, 2005).

In an interview conducted with Hennie Auret (pers. comm., 2009) discussed earlier in this chapter, it is evident that the municipality disagrees with Visser. According to Auret the municipal water conforms in every way with specifications required by the DWEA. He insists that any claims that the water is making people ill, are unfounded (Auret, pers. comm., 2009).

4.7.4.3 Irrigation practices

Perceptions about irrigation practices highlighted the following issues:

- Methods;
- Capital investment and micro-irrigation systems;
- Payment for irrigation water;
- Quality of irrigation water;
- Institutional development issues;
- Black Economic Empowerment (BEE); and
- Labour concerns.

Most small farmers still use flood irrigation methods. This is in strong contrast with the larger irrigation farming operations discussed above. Farmers indicate that they use flood irrigation because it is still the cheapest way to irrigate. They do not have the capital to invest in micro-irrigation systems. Badenhorst (pers. comm., 2005) for instance, said that he could not afford to install a micro-irrigation system, which could cost as much as R18 000 per hectare. This did not even include the cost of building a pump station with an expensive pump. Furthermore, a pump station has to be close to the canal but away from the flood line of the river to avoid potential flood damage. But equally, farmers are aware that using flood irrigation is a problem because it is difficult to irrigate evenly with this system. Sometimes only a portion of land needs irrigation but the entire area is watered. This was not good for the soil or

the crop and it was wasteful of water (pers. comm., Badenhorst, 2005; Louw, 2005; Snyman, 2005; Van Rensburg, 2005).

Farmers do try to avoid wasting water as far as possible by lasering the land. To laser a piece of land means to construct the incline so water flows freely over the soil by gravity flow to filter into the soil (Badenhorst, pers. comm., 2005).

Photograph 9: Flood irrigation system on Swartkop Farm, Louisvale, Upington (Photographer: Ms I. Gouws)

As the photograph above illustrates, flood irrigation is not very effective. Water often accumulates in a corner of a field. Over-irrigation occurs and there is not enough control over the quantity of water that flows across the land. This illustrates the point the farmers made above. They also try to irrigate during cooler times of the day and in the evenings to prevent undue evaporation. Farmers say that irrigating grapes is a finely tuned process. Too much water may cause the grapes to burst open. Table grapes become less sweet and a surplus of water can cause vines to contract rotting diseases (pers. comm., Badenhorst, 2005; Visser, 2005; Bergh, 2005; Terblanche, 2005).

As far as WDM for agriculture goes, farmers believe that new policies mean that available water sources are now managed on a much larger scale. Critical deficit management is paramount in this endeavour and this has to translate to irrigation practices. Farmers believe that there are two main facets to these government initiatives. They are the water scheduling aspect (which requires engineering expertise); and the crop cultivar aspect (where an agronomic expert would typically inform the farmer how much water was necessary to grow a specific crop). As discussed earlier, most of these smaller farms in the Orange River irrigation system still use flood irrigation, a low-cost form of irrigation for which very little infrastructure is needed. The farmer merely opens the sluice in the canal and the water flows over the land, watering the crops. Farmers believe that if they grew grapes for the purpose of wine making, it was possible to get away with flood irrigation but table grapes require closer attention as far as water is concerned and micro-irrigation systems are essential (pers. comm., Terblanche, 2005; Badenhorst, 2005; Visser, 2005).

However, there are farmers who believe that some of their fellow farmers resort to micro-irrigation methods without keeping certain key aspects in mind. In the case of micro-irrigation systems, a larger surface is watered at any given time. This method is thus better suited to larger vineyard acreage although the evaporation rate is higher than that of drip irrigation. Drip irrigation, on the other hand, is a better choice for smaller farms, since the soil is watered at a very specific spot where it is needed most. Evaporation rates tend to be reduced significantly with this particular method, which is a viable WDM strategy (pers. comm., Van Rensburg, 2005; Terblanche, 2005).

One farmer shared his thoughts on another method farmers can use to be as sparing of water as possible. He says that he makes sure the soil is properly watered by regularly going over the soil with a ripper. This is a machine used to make very deep furrows. It literally breaks the ground as deep as it will allow without breaking the machine. Water is then flooded into the soil. Under normal circumstances it would for instance take the farmer one day to irrigate a piece of land. With these deep furrows, it was possible to irrigate for two to three days at a time because the water flows far deeper into the soil. The effect is that when the soil has been watered as deeply as

this, it remains moist far longer and irrigation intervals can be further apart (Visser, pers. comm., 2005).

4.7.4.3.1 Payment for irrigation water

As far as water for irrigation goes, in recent interviews farmers indicated that the price of water has remained the same since 2005 and they currently still enjoy good service from the irrigation board and the UIWUA. They still pay R425 p/ha/p/a for water which came to an average of about R18 000 per year per farming unit. They did however say that it was difficult to ascertain exactly how much water was used for irrigation and that this drawback affects the efficiency of crop management. The harvest they produce is delivered to the local co-operative and the price they receive is determined by local markets, because grapes grown by smaller irrigation farmers are not destined for the export market. The farms provide these farmers with a middle-income lifestyle and they would prefer water prices to remain more or less stable so that their lifestyle does not have to change (pers. comm., Badenhorst, 2005, 2009; Bergh, 2005, 2009).

As far as the rates go farmers are inclined to emphasise two different perceptions, as illustrated by the comments made by Mr Frans Bergh and Mr Felix Visser, Bergh was asked whether he was satisfied with the rate he had to pay for the water allocation for irrigation and whether he found it acceptable to have to pay for water at all. He replied that the rates for irrigation water were fair, but being a typical farmer, he would certainly not have minded paying less. He also said he accepted that one must pay for water because of the infrastructure that had to be maintained (Bergh, pers. comm., 2005). Visser, on the other hand, was of the opinion that water was expensive. For the 36ha he irrigated, he paid almost R30 000 p/a although his land had been lasered to promote more effective water use. When asked whether he believed one should pay for water, he replied that he paid R800 p/ha/p/a for his water allocation and that R200 of that was paid directly to the government. He believed that the government should not receive that R200, because in his opinion they did not use the money to improve the water service (Visser, pers. comm., 2005). Officials at the LOWMA and the UIWUA would do well to bear these differing perceptions in mind when implementing water management policies.

4.7.4.3.2 Quality of irrigation water

This section reports on farmer's views about the quality of the water they have to use for irrigation. Views were generally rather negative. They feel that with all the activities going on in the Orange River, including too much irrigation and the dams in the river, it does not flood as regularly as it should, which means that it does not get the chance to clean itself. 'Someone' had to do something about the polluted water flowing into the Orange River from the Vaal River. However, none of those interviewed indicated that they were willing to take this responsibility upon themselves. They believe that legislation preventing industries from polluting rivers has to be more stringent and punishment for non-compliance more severe (pers. comm., Snyman 2004; Visser, 2005).

Farmers feel that the bad quality of the water in the river was the reason for the meagre yield in 2005. They said that they experienced "stop growth" during that season, which meant that the vines did not produce grapes. Bergh (pers. comm., 2005) admitted that his vines were 25 years old and that farmers had had to start thinking about replacing them, but even 25-year old vines could still produce a substantial yield (Bergh had more to say about replacing vines and this discussion is provided below). According to Bergh, even the younger vines did not produce as much as they usually did. He was of the opinion that the decline of the water quality of the Orange River contributed to this. The vines could not be supported without the necessary nutrients, and these were absent in the water. According to him the farmers had approached the DWEA's Bettie Conradie in 2005 to provide them with a report on the quality of the water in the river and she had duly sent them a document of 15 pages in English (Bergh is Afrikaans-speaking) which included a report on water quality tests in the river. He said that one had to be really interested in the findings to wade through the entire document and to find the answers the farmers needed (Bergh, pers. comm., 2005). During a follow up interview conducted with Bergh in 2009, he said that the quality of the water was still declining although he feels that the administration on issues pertaining to the canal is now much better. The canal has been cleaned and maintenance appears to be effective. He ascribed this state of affairs to the functioning of the UIWUA (Bergh, pers. comm., 2009).

Another problem with the quality of the water from the Orange River is a 'green deposit' on the surface of the water. When this water is used for irrigation, it tends to insulate the ground surface and prevent oxygen from reaching deeper layers of soil. This causes the root systems of plants to rot. The algae in the water are a concern and there was talk of a red deposit on the surface of the soil after irrigating, which was worrying farmers. Visser (pers. comm., 2005) also mentioned that when the level of the water in the Orange River was low, the algae grew more rapidly. When less water was released at the Van der Kloof Dam (situated in the eastern parts of the Free State Province, and the second largest water storage facility in South Africa after the Gariep Dam), the quality in the Orange River deteriorated as a result of the polluted water flowing into the Orange River from the Vaal River system (pers. comm., Terblanche, 2005; Visser, 2005; Berg, 2009).

4.7.4.4 Institutional development

This section provides evidence on farmers' perceptions of the development and establishment of water management institutions. Questions asked of respondents focused on their views about the management of the water source and their perceptions about the Upington canal and how it is managed. This reflects to a large extent on the way the UIWUA is functioning.

Few farmers were dissatisfied with the management of the canal providing their irrigation water. They did, however, explain that when the level of the river is low, farmers situated at the farthest part of the canal tend to get insufficient water that lacks pressure. This compels farmers such as Willie Snyman (pers. comm., 2004) to take measures to improve this. He has built three balancing dams on the farm and he keeps these filled to capacity to prevent water supply shortfalls. He was dissatisfied with the fact that the irrigation board did not want to take the financial responsibility to build these dams, because he pays as much as R400 p/ha/p/y for the water. He plans to build a fourth dam in the near future (Snyman, pers. comm., 2004). In 2009 Snyman said that since 2004 he had been planning to irrigate an additional seven hectares by using his water allocation. He was of the opinion that because he was receiving a certain quantity of water (for which he was paying in any case), he might as well put it to good use (see also Dippenaar, pers. comm., 2005).

Not only did Snyman build the fourth balancing dam (as he had indicated he would) – but he built a fifth one too. He said he had no choice, since the pressure on the capacity of the canal further up from his farm was too high and without these dams, he would simply not have been able to access his full water allocation from the canal (Snyman, pers. comm., 2009). The irrigation board was grateful to him for making the effort, but he still believed that the water was too expensive and that the irrigation board or the UIWUA should have footed the bill for the two balancing dams (Snyman, pers. comm., 2009).

Some farmers voiced their concerns over some of the water management policies that the government wanted to implement. They believe that institutional development policies such as the water user associations (WUAs) will weaken irrigation boards. They kept referring to the Vaalharts irrigation scheme as an example of what they feared would happen in their region. As part of this scheme drainage systems had been installed on an ongoing basis since 1975 because the ground water table had been saturated to the brim since the 1940s, when irrigation started at Vaalharts. The problem, according to the irrigation farmers in the LOWMA region, was caused by the manganese in the soil that was diluted by liquid fertilisers used by farmers. Diluted manganese, they said, blocked the drainage systems. It ended up like liquid tar in the pipes. Nor was cleaning the pipes an option so the pipes simply had to be replaced. Farmers claimed that were there to be an investigation on this problem, it would go a long way towards addressing the issue of water quality. Farmers fear that if such problems persist they could well affect the proper functioning of institutions responsible for water management (pers. comm., Badenhorst, 2005; Visser, 2005; Bergh, 2005).

There is also a fair degree of discontent as far as the national government's attitude towards farmers is concerned. Farmers feel that when the government started with their information sessions and workshops in 1999 (after the new water acts had been approved by parliament), farmers had been extremely negative. They settled down over time, but continued to feel victimised by the authorities. Statements were made to the effect that too much water was still in the hands of white farmers. Farmers maintain that the farming community in this region is one of the most effective sectors of water users when it comes to the implementation of new water policies.

Despite the complaints and concerns, farmers went along with the process of the incorporation of irrigation boards into water user associations and once they committed to this, they worked tirelessly to complete the process. They believe that other sectors of water users do not display the same commitment to implementing new water policies and that farmers should get due recognition from the government for these efforts. Farmers have tended to become so cynical about statements made by government (such as "too much water was still in the hands of white men") that they see this as just another attempt to make things difficult for them. They remain determined to find a way to deal with these obstacles as they always have done. They refuse to let unreasonable statements by the minister break their will to persevere (pers. comm., Badenhorst, 2005; Visser, 2005; Bergh, 2005; Terblanche, 2005).

Some farmers expressed their irritation at the government's lack of recognition; they have after all produced food and provided jobs for a great many South Africans. They do not agree with the impression created by the government that all black farm workers are abused human beings who are exploited by farmers. They point out that sturdy houses have been built for their workers, with running water inside or close to the homes, as well as proper sanitation. They maintain that most farmers in the region are taking good care of their workers, while local municipalities can hardly make the same claim (pers. comm., Badenhorst, 2005; Bergh, 2005; Terblanche, 2005; Van Rensburg, 2005).

However, for the most part, the farmers' concerns focused on new irrigation developments along the canal. They do not believe that the quantity of water available will be sufficient to sustain further irrigation developments (pers. comm., Badenhorst, 2005, Terblanche, 2005; Van Rensburg, 2005; Visser, 2005). Frans Bergh (pers. comm., 2005) indicated that a few farmers had formed a study group in the region to ascertain how much water was used for irrigation closer to the canal and the Orange River, and how much was used by farmers pumping water further away from the canal and the river. The purpose of this exercise was not only to find out how much water was actually used, but also to ascertain whether further developments were actually possible. He says it was found that the farms closer to the river and those further away were at the same level in relation to the river.

However, farmers closer to the river tended to irrigate much more – often unnecessarily so. He could not provide the exact findings of the study but he felt certain of his opinion that farmers who were irrigating too much could make the effort to irrigate more effectively and thus save water. He believes that the UIWUA should take findings such as these into account when they prepare to make additional water allocations (Bergh, pers. comm., 2005).

As far as saving water goes, one farmer gave some practical insights into a method the UIWUA might consider following. Visser (pers. comm., 2005) suggested getting rid of invasive tree species. According to him there were too many *Acacia mearnsii* (black wattle) and *Salix alba* (willow) trees along the banks of the river and the canal. He posited that if these trees were eradicated, not only would it save a great deal of water, but the project could create jobs and provide firewood in the process. Furthermore, sales would typically generate an income for households. He made this suggestion to his Farmers' Association and they were considering the proposal (Visser, pers. comm., 2005). His suggestion is in also in line with existing Working for Water projects undertaken by the DWEA (South Africa, 1998).

4.7.4.5 Additional concerns voiced by farmers

Apart from concerns on water issues, farmers conveyed other problem areas which should be taken into account for further research in this field. Farmers voiced their concerns about Black Economic Empowerment (BEE) and land claims in South Africa. This policy applies to any new applications for water rights and even for the transfer of existing water rights (Kubaie, pers. comm., 2009). Farmers also had their reservations about the government policy which laid down that farm workers who had lived and worked on a farm for an extended time could not summarily be evacuated from their dwellings even if they no longer worked for the farmer. Under such circumstances farmers were reluctant to allow their workers to live on their farms as they had done in years gone by. They preferred to have them stay in town and provide workers with transport to and from work every day. Policies such as these were responsible for reluctance on the part of farmers to accept any new government policy – including those concerned with water (pers. comm., Louw,

2004; Badenhorst, 2005; Visser, 2005; Bergh, 2005; Snyman, 2004; Terblanche, 2005).

Farmers also voiced grievances on the lack of skills among workers. It seems that this is not only a concern for the management of the LOWMA and the UIWUA. Farmers rely on farm workers to judge whether the lands have been irrigated sufficiently, for example, but sometimes they were unable to do so. Since a farmer was allocated a certain amount of time to irrigate from the canal each week, it was important to use irrigation time effectively. When a piece of land took too long to irrigate, the time was lost to irrigate another part of the farm (pers. comm., Badenhorst, 2005; Terblanche, 2005; Van Rensburg, 2005).

There were also concerns about labour costs. In 2004 it cost Johan Badenhorst R180 per week per worker to prune the vines. In 2009 it cost him R250 per week per worker. He did not know how long he would be able to keep raising wages because the high price of diesel and fertilisers were also eroding his profit (Badenhorst, pers. comm., 2005). Other farmers also said that finding affordable labour was becoming increasingly problematic, possibly of greater proportion than any water-related issue. Because of the minimum wage legislation adopted in the country, farmers had to lay off a number their workers. Furthermore, it was becoming increasingly difficult to find seasonal workers in the region to help with pruning and harvesting. Farmers had to recruit labour every season from as far a field as the Western Cape Province (pers. comm., Badenhorst, 2005, 2009; Bergh, 2005, 2009).

Farmers experienced significant problems with high production costs. They also felt that the prices for crops were too low. Grain prices were especially low and they were contemplating whether it was still economically viable to continue growing these crops. This is in line with the recommendations made by Alwyn Dippenaar earlier in this chapter (pers. comm., Badenhorst, 2009; Dippenaar, 2005). Another of Dippenaar's concerns is the age of vineyards. The average life of a productive vine is between 20 and 25 years. On most of these farms there are vines that were planted almost 40 years ago. Some farmers are aware of farms where vines are as much as 50 years old. It is a very expensive exercise to replace vines so some farmers extend the life of a vine to the extreme. This cannot continue and one farmer in particular has had to seriously consider continuing with his farming activities as a

result. In July 2009, a follow-up interview was conducted with Frans Bergh to determine whether his irrigation practices had changed significantly since the interview in 2005. He said that he and his father had decided they were going to put their farm up for sale and if they managed to get their price, they would sell and move. Another alternative would be selling the farm to an export company and staying on the farm in the employ of the new owners (Bergh, pers. comm., 2009).

Bergh provided a several reasons for this decision, beginning with the high production costs and his financial inability to replace old vines. He estimates it would cost R12000.00 p/ha to replace the vines and at the time, six hectares needed replacing. Aside from that, they had received only R10 per kilogram for raisins the previous season, which was very low. The market had been flooded with raisins because of the good prices reached in 2007. Under the circumstances he did not see a future for them on the farm for much longer (Bergh, pers. comm., 2009). This is a contrasting view to those of other farmers. It appears that they are prepared to continue farming under the difficult circumstances reported on in this study.

From the responses of those interviewed certain conclusions can be drawn. While an outline is provided below, they will be discussed in greater detail in Chapter 5.

4.8 CONCLUSION

The history of irrigation in //Khara Hais is the history of Upington. It begins with the influence and contributions of Reverend Schröder and Abraham September and the value of the life-giving Orange River and the canal they both helped to create. The area continues to rely heavily on the irrigation farming sector. There have been substantial long term investments in the industry. As mentioned above, the purpose of this study is not to seek the 'truth' behind the history of irrigation in this region, but to provide perceptions about this issue as it presents itself in the community. These perceptions do affect the orientation of individuals on available water sources in the Lower Orange water management area; they also impact on the way in which water is currently being managed by stakeholders.

The LOWMA is managed by officials in an area office of the DWEA in Upington. The formal establishment of the LOCMA is currently on hold. The local officials of the

DWEA seem to be caught in a rut of 'just keeping things going'. Initiative is lacking and it appears as if these officials are waiting for the ministry of the DWEA to give orders rather than taking the initiative themselves and making plans to improve local IWRM strategies.

The UIWUA is monopolised by irrigation farmers and the irrigation boards that served them in the past. In contrast to the (developing) LOCMA the UIWUA seems to be functioning remarkably well. In many respects its operations are even better than those undertaken by the //Khara Hais Local Municipality. This local authority is in disarray. The department of technical services which deals with water-related issues has three vacant senior positions and an electrical engineer who admits to not know anything about water management. This kind of situation has disaster written all over it, despite Mr Auret's best intentions. This situation cannot continue if the //Khara Hais Local Municipality is to deliver the required water services that are expected of them.

There is a difference between large commercial irrigation farmers and their smaller counterparts. These are very evident in the way they approach the use of water. Commercial farmers follow more precise and scientific strategies to irrigate. They clearly realise the damage that could be caused by both over- and under-irrigation. Of course these farming operations generally have the capital to invest in sophisticated equipment to ensure that their farming is on an efficient footing. Smaller irrigation farms, on the other hand, live, in a manner of speaking, from hand to mouth, producing enough of an annual harvest to continue the following year. For the most part they cannot afford micro-irrigation equipment and rely extensively on basic flood irrigation. Most irrigation farmers have boreholes on their farms, which means that household water is currently used free of charge. Farmers do however pay for electricity used to extract water from boreholes with pumps.

The views of individuals on a variety of water-related use and management issues shed considerable light on their perceptions.

Officials of the Lower Orange water management area are busy implementing WDM policies. The interviews conducted with them were able to highlight some of the problems they face in the process of implementing policies:

- The DWEA does not provide the Lower Orange office with the financial support they need to perform their functions (Kubaie, pers. comm., 2009).
- The decision taken by the DWEA to delay the establishment of the Lower Orange Catchment Management Agency until 2011 has largely stalled the procedures the Lower Orange DWEA office had put in place to complete the process. They are also waiting on the decision of the head office on whether CMAs are going to be limited to fewer that the 19 proposed in the National Water Act (South Africa, 1998; Kubaie, pers. comm., 2007).
- The Lower Orange DWAE office is experiencing a significant human resources problem, especially where technical engineering expertise is concerned. Retaining individuals with appropriate skills seems to be a major challenge (Kubaie, pers. comm., 2007).
- The Upington Islands WUA (IUWUA) has successfully integrated 8 irrigation boards into one institution. Problems include the transfer of personnel from the DWEA to the UIWUA and the difficulties as a result of a clumsy billing system (pers. comm., Chamberlain, 2005; Williams, 2005; Erasmus, 2005).
- The management and public representatives serving on the UIWUA board are frustrated by the slow response to the constitution and business plan they submitted to the DWEA (Chamberlain, pers. comm., 2009).

The //Khara Hais Local Municipality is in the midst of a crisis about water management:

- The municipality has a human resources crisis in departments dealing with water service delivery. Officials in management positions have been accused of corruption and subsequently been fired (Anon, pers. comm., 2007).
- Replacing people in the Technical Services department has been difficult. The acting head of this department, which deals with water supply services, is an electrical engineer who is also still the head of the Electrical Services department. This situation is not conducive to sound water management (Auret, pers. comm., 2009).
- Effective IWRM is barely possible under the current circumstances in the //Khara Hais Local Municipality.

Irrigation farmers had some interesting but passionate responses to some of the IWRM policies they have been subjected to:

- Farmers are aware of WDM and what it means (pers. comm., Snyman, 2004; Badenhorst, 2005 Bergh, 2005).
- Irrigation farmers are uncertain of the future because of allegations that too much water may still be in the hands of white farmers (pers. comm., Snyman, 2004; Badenhorst, 2005; Bergh, 2005; Dippenaar, 2005).
- They are afraid that their water allocations may be reduced which would have a negative effect on their livelihood (pers. comm., Badenhorst, 2005; Visser, 2005; Dippenaar, 2005).
- High production costs, for example the cost of fertilisers and fuel, have farmers worried that the yield they produce will soon be insufficient to cover these costs and bring in a profit high enough to sustain their farming operations (pers. comm., Louw, 2004; Badenhorst, 2009; Bergh, 2009).
- Larger-scale irrigation farmers believe that the smaller farms are no longer viable and that their water allocations should be given to farms that are able to generate a profit, provide jobs and generally put the water to better use (Dippenaar, pers. comm., 2005).

Hydropolitical issues come to the surface in this chapter. Perceptions of individuals interviewed seem to be focused exclusively on themselves. The officials at the Lower Orange Water Management Area (LOWMA), //Khara Hais officials and the farmers do not seem to take other stakeholders into consideration when they respond to questions. This means that they are not looking at the bigger picture. They should realise that effective integrated water resource management requires that all stakeholders should work together. The way in which one sector manages the water sources has an influence on all the others. This is one of the core ideas of IWRM. The situation will need to change if hydropolitical issues between these sectors are to be resolved.

It is important to note that hydropolitics was defined and explained in Chapter 2 in a macro context. Scholars tend to focus on hydropolitical issues in this sense. Hydropolitics in the case of the Lower Orange water management area, however, represents water politics on a micro-level. This is a relevant aspect of efficient IWRM

strategies. There is reason to believe that water policies are better developed and implemented from bottom to top and not from the top downwards as is evident in the findings of this study. An understanding of hydropolitics goes a long way towards comprehending what needs to be done in terms of, for example, public participation to place all stakeholders on the same page. In this type of hydropolitical focus the attention is on the interaction between the water provider (who holds the power) and the individual water user (who needs to be empowered by copious supplies of water). The individual must also have a voice in decisions taken by officialdom. It seems that each of the sectors investigated wants to hide certain realities on the management per se of the water commons. The goal seems to be for each to take a certain point of view and then adapt the information to verify its own particular standpoint.

Issues of sustainable development surfaced strongly. Opportunity for further irrigation development along the Orange River, and especially the Upington canal, is limited. If the management institutions do not restrict further access to the water commons in this region for irrigation purposes, sustainability for domestic water use and industry will surely suffer since this is a semi-arid region with limited rainfall. Policies on payment for water from boreholes need to be implemented as soon as possible to ensure that farmers pay for this water and thus hopefully use the water more sparingly. The dismal human resource issues highlighted in the //Khara Hais Local Municipality and the LOWMA are also detrimental to sustainable development. Continuity and sound practice by qualified personnel is essential to ensure economic, social and environmental development which will ensure sustainable development.

The end goal is to find an effective measure to ensure that the correct information reaches all stakeholders, so that all who are involved become aware of the others' reality. Human resource problems may not be solvable immediately as far as new appointments go, but those who are employed will benefit from effective communication and education with regard to IWRM.

In Chapter 5, the responses to interviews and conversations with respondents are outlined and discussed. And recommendations with a view to solving certain problems on water issues are presented.

CHAPTER FIVE

RESEARCH FINDINGS AND RECOMMENDATIONS

5.1. INTRODUCTION

In previous chapters, data pertaining to legislative and Integrated Water Resource Management policies was discussed. Attention was given to how these policies are implemented in different sectors. The establishment of the Lower Orange Catchment Management Agency and the Upington Islands Water User Association were discussed and the problems encountered by these organisations were highlighted.

Chapter 4 is based on empirical data collected in qualitative contexts from interviews conducted with irrigation farmers in the Lower Orange Water Management Area, as well as officials in the local DWEA area office, and //Khara Hais municipal staff. The objective of these interviews was to gain insight into the views and perceptions of a diverse selection of stakeholders on water legislation and water policies implemented in the areas where they live and use water.

In this chapter, the data collected in previous chapters is interpreted. The main problems and challenges are highlighted. Possible solutions to the problems are presented within the framework of practising good governance; of being able to achieve sustainable development; and of adhering to the hydro-social contract.

The original research objectives are revisited and an explanation is given on how each chapter contends with these objectives. The central theoretical statements are also revisited to ascertain whether the theories were indeed proven by the findings of this study. Finally, we return to the theory of the tragedy of the commons and reapply it to the data presented in this study.

5.2. WATER-RELATED PROBLEMS IDENTIFIED

Problems identified during the course of this study are dealt with under the heading of each of the major role-players in Integrated Water Resource Management that have been discussed. The first of these is the establishment of the Lower Orange Catchment Management Agency.

5.2.1 The Lower Orange Catchment Management Agency

The problems identified, are as follows:

- The slowing down in the process of establishing the LOCMA by the DWEA is a matter of serious concern. The DWEA set a new due date for the establishment of the LOCMA in 2011. It is the last area on the DWEA's list after reprioritising took place on the establishment of Catchment Management Agencies.
- Financial support from the DWEA is insufficient to support the day-to-day operations of the LOWMA.
- Human resources turnover is problematic. Individuals, who began the process, left the DWEA before it was completed. New personnel are in a position where they have to familiarise themselves with procedures. They are unclear about exactly what needs to be done and most importantly, how it needs to be done. They are not always informed on what has already been done.
- Another human resources problem is that the DWEA office in Upington is struggling to retain trained technical experts to manage infrastructure. This is an urgent matter that needs to be addressed soon.
- Communication problems are hampering the process. Afrikaans is the language spoken by most local people in the //Khara Hais municipal area. The DWEA often appoints personnel who cannot speak Afrikaans. This is problematic in the rural areas where inhabitants do not understand English and tend to ignore important information relayed to them regarding the LOCMA. As a result, public participation is not at the required levels to validate the establishment of the LOCMA.

The problems outlined above echo the findings of the UIWUA discussed in the next section.

5.2.2 The Upington Islands Water User Association (UIWUA)

The following problems were identified:

- The UIWUA is struggling with the billing system since the DWEA insists on collecting the revenue from water users (mostly irrigators in and around Upington).
- The WUA is at a stage where they have sent the final draft of their constitution to the DWEA. They have been waiting for a reply from the minister's office since November 2007. The moratorium placed on the establishment of WUAs by the DWEA has delayed the process even further and they now expect a response to their draft early in 2010.
- There is a conflict of interests between the representatives of the municipality and the irrigation farmers. Money allocated for issues of interest to the farmers during the time of the irrigation boards, is subject to being claimed by the municipality for other purposes. This conflict of interests can become full-blown conflict if not managed properly.
- Delays in establishing the LOCMA may have implications for the future functions of the WUA. The UIWUA will be officially established and fully operational by the time the LOCMA is established in 2011. Since the LOCMA will ultimately oversee the functions of the WUA, the LOCMA may alter some of the operations of the WUA once it is established and this creates uncertainty in the management of the WUA.
- There is a delay in transferring personnel from the DWEA payroll to that of the UIWUA. Officials who are to be transferred are resisting the process, involving labour unions in the negotiations.

Despite the problems listed below, the UIWUA seems to have functioned successfully as a group of water managers as far as irrigated agriculture goes. With the exception of one farmer, most of the irrigation farmers are happy with the way the UIWUA serves their interests. This is hardly surprising since the UIWUA incorporated eight established irrigation boards (which have been serving farmers well over the years) into the LOWMA. For these irrigation boards it is business as usual except for the new management they have to answer to. However, when the UIWAU constitution is approved, other stakeholders represented on the board will

inevitably stake a larger claim on the available water commons in the LOWMA. To this end, farmers can expect changes in future as far as water allocations and water pricing is concerned.

5.2.3 The //Khara Hais Local Municipality

Within the //Khara Hais Local Municipality the following weaknesses are identified in the water management plans set out in the municipality's IDP.

- The policy statement says that public participation is essential, but there is no guidance on exactly how this is to be accomplished. Rhetoric in the current state of government is no longer enough in plans like these. Detailed, step-by-step methods to achieve public participation are necessary.
- None of these documents give an indication of how many irrigation farms exist or how much water they use per annum. As irrigation is the sector using most of the available water source, detail in this regard is essential in an IDP or water services plan for this municipality.
- These planning documents give no detailed outline of how exactly the links with the establishment of the LOCMA or any WUA are involved.
- The //Khara Hais Local Municipality has a human resources crisis in water management related departments, as is evident from discussions with Mr Auret (pers. comm., 2009). These problems have the potential to derail IWRM in this municipality. They need to be dealt with decisively.

The previous sections deal with problems identified in water management institutions. The section below highlights problems experienced by water users. Their perceptions on new water policies in South Africa, as well as their impressions of the way in which water management bodies have implemented these policies, are outlined here.

5.2.4 Irrigation farmers

Problems identified after discussions with irrigation farmers include:

- The history of Upington and more particularly the history of irrigation in Upington, still create divisions within the //Khara Hais community.
- The differences between large commercial farming operations and those on smaller farms are evident. The two groups clearly differ on the way irrigation should be conducted and how water should be used. Working together in WUAs could see the two groupings cooperating towards a common goal.
- Smaller farmers do not have the capital to invest in micro-irrigation systems and will continue to use basic flood irrigation to the detriment of the sustainability of the water commons.
- The canal will not be able to carry further irrigation developments for much longer. This crucial matter needs more attention from the WUAs and the //Khara Hais Municipality.
- Water quality must be constantly scrutinised. If irrigation farmers, who can immediately recognise the effects of the poor quality of the water in the success of their harvests, raise questions about the water quality, those responsible would do well to pay attention.
- Farmers are too comfortable with the fact that they get free, unrestricted water from the boreholes on their farms. However fraught this topic has become, the municipality should address this issue sooner rather than later.
- Well-trained technical officers in the DWEA and Provincial Department of Agriculture are necessary to facilitate the implementation of more efficient irrigation practices.

All the problematic issues drawn from the data collected can be addressed by going back to the principles of good governance with the purpose of achieving sustainable development. It is clear that the //Khara Hais Local Municipality is lacking in some of these basic principles and its significant human resources problem stands out in this regard. More specifically, training and development of staff working in water-related departments need basic introduction to the requirements of working in the water sector. The progress this municipality needs to make include its participation in the establishment of the LOCMA and the successful progress of the Upington Islands WUA in which the municipality has a vested interest. The shortcomings in the

establishment of the LOCMA and the WUA are therefore dealt with as shortcomings of the //Khara Hais Local Municipality, because these agencies must also function within this municipality. Such shortcomings impact on all the inhabitants in the region.

5.3. INTERPRETING THE FINDINGS

The //Khara Hais Local Municipality's main problem is one of inefficiency. Equity and inclusiveness may also present problems in future. As mentioned above, the service delivery demands on the //Khara Hais Local Municipality are not merely related to their day-to-day functioning. They have a direct bearing on the responsibilities of the municipality as a stakeholder in the effective management of the UIWUA, as well as the establishment of the LOCMA. This is essential for sound IWRM strategies to promote a sustainable local water commons.

It is generally accepted that a degree of impact and degradation in selected systems will ensue as a trade-off for economic developments in the local irrigation farming industry. The potential pollution of the resource appears to be inevitable (South Africa, 2004). Due to the intimate connection between water resources and land use, the sustainable development of both these natural resources requires that their management to be integrated (Görgens *et al.*, 1998). This creates a dilemma, because a different style of management is necessary. Along with resource exploitation there needs to be resource protection (Rogers *et al.*, 2000), i.e. local authorities are both impactors and regulators. Water serves many different purposes, functions and services and therefore requires holistic management of the demands made of it and threats to its availability (Mazibuko, 2004).

The establishment of the LOCMA is caught up in bureaucratic limbo. Mr Kubaie (pers. comm., 2009) made it clear that the DWEA office in Upington will have to wait for further communication from the DWEA before the process can continue. In the meantime work needs to be done and a shortage of skilled labour has been identified. However, it appears that officials in this office are way to keen to take a 'wait and see' attitude. The processes for the establishment of a CMA are there to ensure better IWRM. Officials like Mr Kubaie are hamstrung in the defunct official administrative system of establishing the CMA. Eventually it should culminate in the

publication of a notice informing the public of the establishment of the LOCMA in the *Government Gazette*. However, the notice is merely a formality. Mr Kubaie and his team should pursue the guidelines of establishing a CMA as vigorously as possible. By actively creating an awareness of the future management task at hand, they would be proactively working towards an effective institution of governance. They could, for example, meanwhile create their own committee, with the same functions as outlined for a CMA, with a few minor changes. Whatever is decided by the ministry of the DWEA, this committee could streamline management of the water commons in the LOWMA. It could integrate fully with the UIWUA and the //Khara Hais Local Municipality, thus bringing synergy between regional and local water management strategies.

The UIWUA is up and running, but is at risk of becoming isolated from the objectives of the LOCMA which will hopefully be established in the near future. It also seems that irrigation is monopolising this WUA. From interviews with officials responsible for the management of the UIWUA and its sub-districts, it appears that they have decided not to fight the idea of establishing a WUA, but rather to speed up the process of establishing the WUA while other institutions are struggling. These officials would seemingly not put up too much resistance to the plans farmers have for the WUA. As is evident in the interviews and the data provided, the UIWUA is mainly made up of previously autonomous irrigation boards. Although the plans reflect that domestic water users, commercial industry and leisure water users are to be included in the management of the UIWUA, circumstantial evidence suggests that irrigation is dominant and that this sector of water users make 'good' use of the apparent chaos in the //Khara Hais Local Municipality and the LOWMA to stake their claim to the management of water resources. Nevertheless, it appears that irrigation boards and farmers associated with them are keen to proceed with the implementation of new policies. They could even be instrumental in trying to speed up the process of establishing these institutions to make their voices heard as powerful drivers in control of the water commons. This being so, there is a need to approach this issue with considerable care to prevent a state of socio-economic and political inequality.

Irrigation farmers in the LOWMA have organised themselves with some success. Most of them have been or are presently members of irrigation boards. They are now working in the UIWUA. As is evident from the interviews, farmers are quite aware of water-related issues (Anon, 2004). They are worried about the apparent deterioration in the quality of the water in the Orange River. They are also inherently afraid that less water might be allocated to them in future. This is why they supported the establishment of the UIWUA and the powerful status of the irrigation boards in this institution.

The following model provides a possible ideal management blueprint to integrate the functions of the CMAs and WUAs and local authorities.

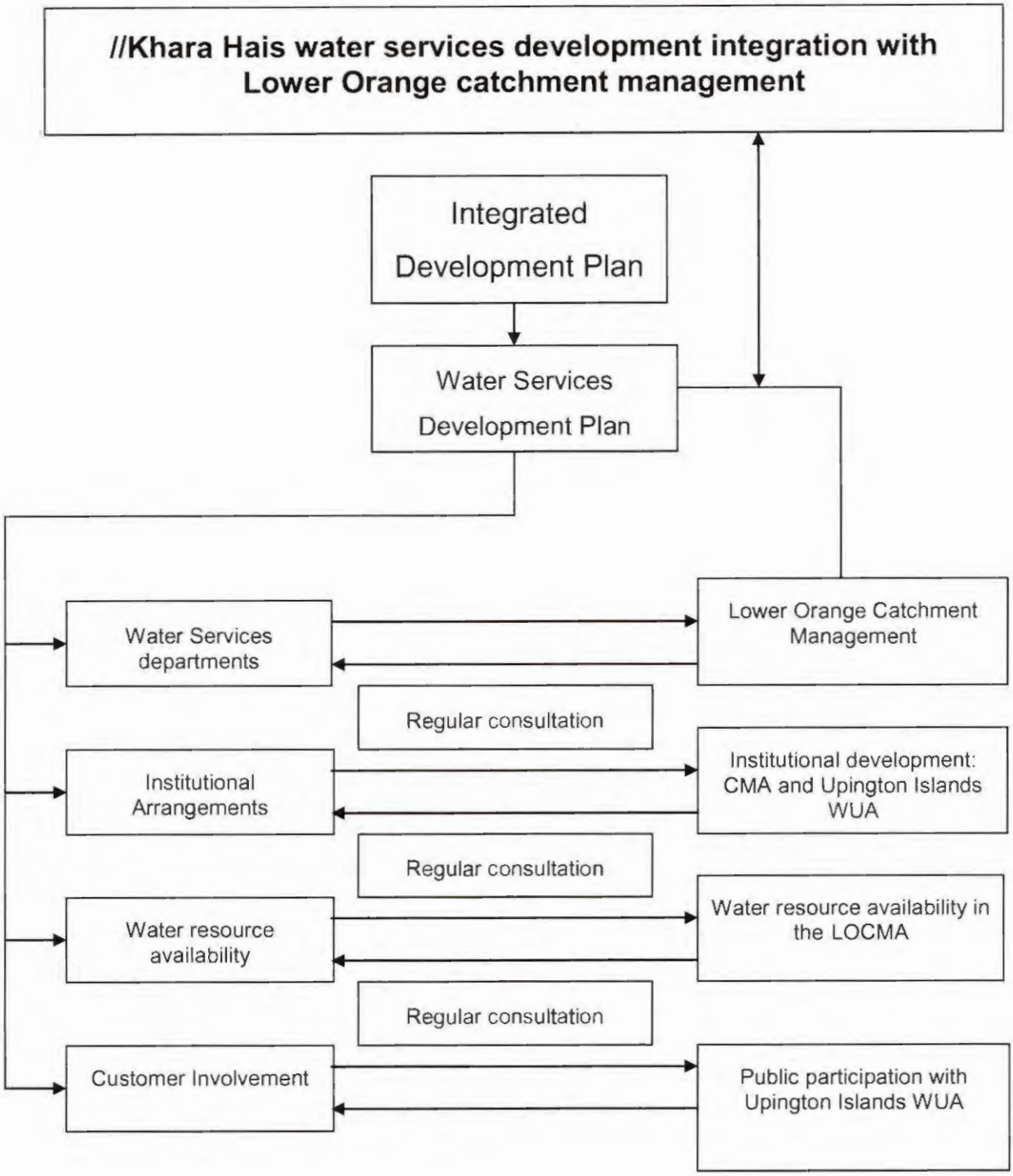


Figure 17: Integration of the //Khara Hais IDP with Lower Orange water management

Although the WSDP is progressive in that it touches on all the important sectors concerned with water service delivery in //Khara Hais, the issue that is obviously missing is integration with the LOWMA's activities. If institutional development in both the //Khara Hais Local Municipality and the Lower Orange catchment

management is to be successful, both these institutions have to realise that they are dependent on one another to achieve their IWRM goals. Both sectors rely on an available water source.

Integration of developmental planning and IWRM is entrenched in the role of local government, which includes developmental planning, governance and administration, regulation, and service delivery to fulfil its constitutional obligations of sustainable service delivery, socio-economic development and a safe and healthy environment. This role is realised through the preparation of Integrated Development Plans (IDPs), which are a requirement of The Municipal Systems Act no. 32 of 2000 and are central to the planning process. IDPs are required to incorporate a spatial development framework and guidelines for a land management system which includes the full range of municipal functions and is co-ordinated and integrated with provincial and private sector initiatives. Local authority functions, such as environment (water and air quality), should be seen as an integral part of the IDP (South Africa, 2004). The Water Services Development Plan is the water services component of the IDP. In addition a responsible local authority must set key performance indicators and targets directly related to the IDP.

These facts clearly illustrate the interdependent nature of this relationship and the importance of integrating efforts to achieve a more streamlined and efficient way to deliver water services to the community. The correct balance between a local authority's developmental role and the need to maintain environmental integrity in fulfilling the constitutional obligations of sustainable development, socio-economic development and a safe and healthy environment, need to be integrated with the constitutional functions outlined for catchment management.

The water services division of the //Khara Hais Local Municipality has to align its management service efforts with those of the LOWMA and the UIWUA in which it functions. The DWEA released guidelines for IWRM in April 2007. The //Khara Hais IDP does not seem to adhere to these guidelines.

Both the local authority and the catchment management institutions have to bear in mind:

- Which departments deal with water services;
- The availability of water resources;

- The need for institutional developments; and
- The needs of the stakeholders (South Africa, 2007).

The //Khara Hais Local Municipality has a water services development department and the technical department (infrastructure and engineering) to deal with water services. In turn, the LOWMA is supposed to have the LOCMA to deal with the management of the water resource in this area. Since the agency has not been established yet, the onus falls on the area office of the DWEA in Upington to perform this function.

The UIWUA is awaiting approval for their constitution from the minister of DWEA, but is already providing the services to the community because this WUA was formed from existing irrigation boards. The //Khara Hais Local Municipality is a major stakeholder in this WUA. This lays a solid foundation for the integration of functions that these institutions have to perform. The problems of co-operation highlighted in Chapter 3 are hampering this process and only a more open and regular consultation will overcome the issue. The fact that the WUA is currently functioning without the important support of a catchment management agency, and with constantly changing support from the area office because of the high human resources turnover, is a matter of grave concern. It is currently barely managed; this will eventually catch up with all parties involved.

The availability of water is central to the delivery of water services. The //Khara Hais Local Municipality and the UIWUA are water services providers. They buy water in bulk from the DWEA and allocate water as they deem fit. The available surface and groundwater in the LOWMA is managed by the area office of the DWEA in the absence of a catchment management agency. There are still some inequalities in the allocation of water resources, since all stakeholders are not yet involved in the management of the larger management area. This means that when holding consultations on this level all stakeholders need to keep in mind that the management of the resource might change in 2011 which is the new due date set for the establishment of the catchment management agency.

Customer involvement is listed as a priority in the //Khara Hais Water Services Development Plan. On the catchment management side, stakeholder involvement is the priority. These two compartments in each of the institutions overlap on some

levels since the same stakeholders are involved, especially in the WUA. Stakeholder participation should be co-ordinated between catchment management institutions and the //Khara Hais Local Municipality. This will bring increased efficiency and avoid duplication of certain processes, which will in turn prevent fatigue among participants. It would also ensure constant and enthusiastic participation of all parties.

This model can be applied to any of the other important functions to be performed in the LOWMA. In practice, however, integration ultimately relies on good governance, no matter how good the developmental framework and legislation. Good governance is built upon an effective interface between officials from different water services providers, strong links between financial and technical divisions, and an appropriate organisational structure.

Irrigation farmers, who are using the largest percentage of the water resources in this area, are aware of water management processes and have positioned themselves in such a way that the allocation of the water sources that they receive is not threatened as yet. This situation is bound to change and a more integrated approach must to be pursued between the future LOCMA, the UIWUA and the //Khara Hais Local Municipality.

Returning to the characteristics of hydropolitics and policy implementation depicted in Chapter 2, the following deductions can be made:

5.3.1. Conflict

Conflict is certainly present in the three main management areas examined. Conflict may not manifest as usual in open disagreements and brawls. In the activities of the LOCMA the conflict lies between the area office and the ministry of Water and Environmental Affairs. They do not receive the funds they need and they are not satisfied with the lack of support for the establishment of the LOCMA. The uncertainty of whether the CMA will come into existence at all does not help matters either. The biggest problem is that they do not have enough funds to attract and retain competent professionals to perform key functions, especially in the technical departments.

Relationships with the //Khara Hais Local Municipality seem to be stable. However, in the opinion of this researcher, the current stability in relations between the LOWMA office and the UIWUA, and therefore the irrigation farmers, is not going to last. Irrigation boards and the UIWUA that serve them are inevitably going to have to give up some of the power they currently hold over the available water commons. This will begin happening the moment the UIWUA is formally established and starts to include other water users in the prescribed manner. Irrigators will only be able to retain their monopoly if representatives of the other water consumers are unaware of their responsibilities or are not as water literate as they should be. This will almost certainly be the case, since these representatives are average citizens and not experts in water-related issues.

Conflict in the //Khara Hais Local Municipality is a serious problem. As indicated in Chapter 4, this municipality has not had stable and sustainable leadership in its water services division since 2005. The previous head of the Department of Technical Services responsible for water provision and sanitation was accused of corruption and has allegedly fled, taking two officials with him. This left the municipality with no other option but to appoint an electrical engineer in the vacant position. The new incumbent admits himself that he does not know much about water management. It stands to reason that this situation will inevitably escalate to explicit conflict situations when responsibilities are not carried out or functions are not properly performed.

5.3.2. Environment

The environment in the LOWMA is certainly a hydropolitical factor. As mentioned in Chapters 2 and 3, this is a semi-arid to arid region of South Africa. Rainfall is low and the only sustainable water source is the Orange River. Since the largest allocation from the Orange River is currently available for irrigation farming, it stands to reason that other water consumers are going to start claiming more of this resource, thus decreasing the allocation for irrigation. We have established that water is a finite resource and this commons will be redirected firstly for domestic use and then to other sectors, depending on the escalating scarcity of the water commons.

5.3.3. Security

Hydropolitical factors where security is concerned lie in the fact that the water commons secures certain ways of life for certain sectors of water users. Over the decades, farmers in the LOWMA have become accustomed to water being readily available, without question, for their irrigation needs. They have made long-term plans for their future assuming that water will always be available. To that end, securing their allocation of the water commons is as important as ever, especially with the policy changes they have had to contend with since the implementation of the National Water Act began in 1998.

On the other hand, other groups of water consumers are slowly but surely starting to stake their claim on the water commons. These users include domestic users, industry, and new up-and-coming farmers, usually from previously disadvantaged groups. This state of affairs will manifest all the more when the UIWUA begins functioning as it should in this region. It must be emphasised that the establishment of water management institutions like the LOCMA and the UIWUA is essential to ensure that all sectors of water users can secure their share of the water commons, not to mention the importance of the //Khara Hais Local Municipality, which is responsible for providing safe drinking water.

5.3.4. Society and culture

The influence of society and culture also affects the hydropolitical situation in the LOWMA. As far as race goes, white, African and coloured people live together in this region. Because of the former segregation policies and particularly in the apartheid era from 1948 to 1994, the white community enjoyed a distinct advantage in the water commons of this region. A culture of entitlement developed within this community and they will do what they can to hold on to their claim on the water commons.

Development of water management institutions is designed to change this culture. Previously advantaged communities must learn that those who are still disadvantaged must be allowed access to the water commons, especially when basic human rights such as having access to safe potable water are concerned. To

this end the //Khara Hais Local Municipality also has a responsibility to society to provide safe drinking water. In the recent past the water management departments in this local municipality have not earned the trust of the local people. Rumours of corruption are rife. The politics involved are evident, with the ruling party being blamed for appointing corrupt officials and then leaving individuals from other departments to save the day.

5.4. TEACHING AND LEARNING OPTION

The most important issue highlighted in all three institutional areas of water management is the human resources problem. Key positions in the //Khara Hais Local Municipality are not filled, and those who act in certain positions are not sufficiently water literate. In the LOWMA office, Mr Kubaie and his staff are appropriately trained, but technical positions are still vacant and lower level labour is not water literate. The UIWUA has to contend with workers who do not understand why they no longer work for the DWEA, but for the UIWUA. If they were to become aware of the changes in policy in South Africa, they would at least understand, even if they do not necessarily agree with the changes.

As is evident in chapter 4, there is a general lack of knowledge with public officials, DWEA managers and irrigation farmers as far as basic concepts and in water management goes. They may have heard about the National Water Act or Free Basic Water, or that access to water for irrigation might be restricted in future, but they do not have the knowledge to know how these policies are going to be implemented, why these policies are being implemented or how it is going to affect them (pers. comm., Auret, 2009; Badenhorst, 2005; Snyman, 2009). Significant changes took place in the water realm in South Africa in the past decade and public participation stands centre stage in the successful implementation of new water legislation (chapter 2 and 3). Municipal councillors are more often than civilians who may have political aspirations but do not have experience with water policies. Irrigation farmers are dependent on the availability of water for their livelihoods and are encouraged to get involved in public water forums and water user associations such as the UIWUA. However, many of them are only interested in retaining their water allocation, instead of participating in all aspects of water management. They

also tend to be misinformed, or interpret certain policies incorrectly as a result of a lack of knowledge on their part. To barrage such individuals with workshops and week long intensive courses may be prudent in the long run, but to start with they must be introduced to concepts and issues in the water realm with which they may not be familiar.

To this end the researcher has developed a short course in conjunction with a broad municipal management course presented by the Skills Development Unit of North-West University. This module was developed as a mere introduction to certain water-related concepts such as integrated water resource management and water demand management. The module also aims at explaining what a catchment is, what river basin management is and how they fit into water management. International policies are also discussed, so that participants can form an idea of where South African policies come from. The module can be modified to suit municipal councillors, municipal officials working in water-related departments and even civilians who find themselves working with water institutions such as WUAs for the first time in their lives. This module has the potential to be developed into a more advanced IWRM module for supplementary learning for individuals such as those mentioned above, or for those familiar with basic concepts, but who would like to acquire more in-depth knowledge of IWRM issues. Most of the study material has been adapted from Chapters 2 and 3 of this study. The empirical evidence is used as case studies.

This module was presented twice in the Emfuleni Local Municipality, with great success. In the first case, the module was presented to municipal councillors of the Emfuleni Local Municipality and the second time to officials from the local water authority in this municipality namely, Metsi a Lekoa. It is envisaged to present this module to the //Khara Hais Local Municipality, the UIWUA and the LOWMA as an introductory course to IWRM. The module can be adjusted to suit each institution.

Study Unit 1:

STUDY UNIT OUTCOMES

After completion of this study unit you should have a basic understanding of the following:

- Definition of Integrated Water Resource Management (IWRM)
- International trends in IWRM
- National Trends in IWRM
- Legislative issues in IWRM in South Africa

Study Unit 2:

STUDY UNIT OUTCOMES

After completion of this study unit you should have a basic understanding of the following:

- The definition of catchment management and catchment management agency
- The organisation of catchment management in South Africa
- The ability to relay the case study to your municipality's participation in catchment management

Study Unit 3:

STUDY UNIT OUTCOMES

After completion of this study unit you should have a basic understanding of the following:

- The definition of Water User Associations
- The organisation of WUAs in South Africa
- Ability to relay the case study to your municipality's participation in WUAs.

Study Unit 4:

STUDY UNIT OUTCOMES

After completion of this study unit you should be able to integrate the following knowledge you have obtained in the following functions:

- What you have learnt about IWRM
- Your municipality's responsibilities with regard to good governance and the influence of this on effective IWRM
- Your municipality's involvement in CMAs
- Your municipality's involvement in WUAs

As mentioned earlier, the outcomes can be modified to a CMA, WUA or any other organisation in need of an introduction to the concepts in this module. This module is suited for a one-day session of four hours. It is accredited by the International Centre of Applied Sciences and carries a weight of four credits. This module will be made available to the LOWMA, the UIWUA and the //Khara Hais Local Municipality. Since these institutions function in a remote part of South Africa, training opportunities such as this are rare and the researcher believes that this IWRM module will be favourably received. As is evident from the accounts from all respondents and the empirical findings in relevant documentation, stakeholder involvement is the key component to the successful establishment of the LOCMA, the final approval of the UIWUA and the involvement of the //Khara Hais Local Municipality in these institutions as well as its own municipal responsibilities. These stakeholders are every-day water users such as irrigation farmers who will need to become water literate. Simply throwing these individuals into the operations of these institutions is not advisable. Introducing them to key concepts in IWRM is therefore important. The possible solutions outlined above are practical and achievable. These may seem like insignificant changes in the outlook on the functions of a municipality, but taking responsibility for these steps and achieving the objectives successfully will result in substantial changes in the effective management of the water commons. Furthermore, there will be improved ownership of the water commons by the relevant groups if the municipality takes the lead towards promoting an awareness of positive perceptions with all stakeholders.

In the light of these findings and suggestions, it is necessary to make sure the objectives of the study were successfully dealt with and we therefore need to return to the original research objectives outlined in Chapter 1.

5.5. RESEARCH OBJECTIVES

In Chapter 1, the following research objectives were set out:

- To provide an in-depth discussion of internationally accepted policy guidelines on WDM and IWRM;
- To provide a theoretical exposition of the concept sustainable development within the context of IWRM in LOWMA;

- To explain what IWRM entails;
- To show the importance of IWRM, specifically in southern Africa;
- To discuss the current statutory framework for IWRM in South Africa;
- To conduct an in-depth investigation into the current South African IWRM policy-framework;
- To conduct a micro-investigation of IWRM strategies in the Lower Orange Water Management Area, //Khara Hais Local Municipality and organised agriculture in this region;
- To investigate and report on the current climate of interaction between stakeholders as far as IWRM is concerned; and
- To provide //Khara Hais Local Municipality, the local DWEA agency and organised agriculture with a set of recommendations that are in line with current trends in public management and governance, specifically in respect of IWRM.

These objectives have been addressed in the chapters of this document in the following manner:

In Chapter 1, the research methodology and problem statement was outlined. In this chapter the motivation for this study was explained along with definitions and introductions were provided for certain concepts and terminology.

Chapter 2 dealt with the definition and explanation of Integrated Water Resource Management (IWRM) and internationally accepted policies for IWRM. These international policies ranged from the Dublin Agreement to the Agenda 21 strategies accepted by the international community at the Earth Summit for Sustainable Development in 2002. Also in this chapter, the concepts of hydropolitics, sustainable development and good governance are discussed. Focus is placed on the hydropolitical issues prevalent in the southern African region. Thereafter the South African legislation on Integrated Water Resource Management as an answer to the international polices was discussed.

The main theme of this chapter is a discussion of Garret Hardin's theory of the tragedy of the commons. This sets the tone for the following chapters in highlighting the tragedy of having to manage the water commons with legislation and policies to ensure optimum use of the resource.

In Chapter 3 the role of Catchment Management Agencies and Water User Associations was discussed. Institutional development and the role of stakeholders in establishing Catchment Management Agencies and Water User Associations are also discussed. In addition, the history and importance of irrigation in South Africa is investigated and lastly, the responsibilities of municipalities with regard to water management are highlighted.

In Chapter 4, the LOWMA and the way the water commons is managed was discussed. This chapter deals with a short history of Upington, the town that houses the //Khara Hais Local Municipality and explains the //Khara Hais Integrated Development Plan and the Water Services Development Plan that was developed from the IDP. The chapter also focuses on the history of irrigation in //Khara Hais and how this history shaped the mindsets of the inhabitants of the town. The process of establishing the Lower Orange Catchment Management agency and the Upington Islands Water User Association was also dealt with. Discussing these two organisations was an attempt to explain how the National Water Act no 36 of 1998 is practically implemented and highlights some of the difficulties encountered. Thereafter this chapter provides the perceptions of local irrigation farmers about the implementation of the National Water Act as well as the influence of institutional development of water management institutions on their farming activities.

In Chapter 5, the data set out in the previous chapters is interpreted and a specific problem identified in each of these areas is provided; possible solutions are also made. Lastly, the research objectives identified in Chapter 1 were reintroduced to ascertain whether these objectives were reached and whether the leading theoretical arguments were indeed proven.

5.6. LEADING THEORETICAL ARGUMENTS

These leading theoretical arguments were stated in Chapter 1:

- Implementing policies within IWRM on local government level in South Africa is multi-faceted (Turton & Henwood, 2002:23). In the case of the Lower Orange Water Management Area and its local water consumers, there is a distinct breach of confidence as a result of apparent misunderstandings (Conradie, 2004).

- There are significant challenges in respect of effective communication, commitment and expertise among stakeholders (local government, DWEA, and irrigation farmers). It is therefore necessary to determine how an effective strategy of IWRM can be introduced in this region.

From the interpretations of the data collected and included in each chapter, both these arguments were proven to be correct. There is indeed a breach of confidence between water consumers and the water management institutions in the LOWMA, as is evident in this chapter. Furthermore, the challenges outlined in this statement indeed proved to be the challenges faced by the stakeholders, communication being the most difficult. The strategy of focusing on the principles of good governance is presented as being the best way to practise Integrated Water Resource Management to reach a situation of sustainable development.

5.7. CONCLUSION

To end the discussions generated in the course of collecting the data for this study, the theory of Garret Hardin needs to be revisited. As explained in Chapter 2, water plays a vital role in the social and economic development of any society. The demand for this resource is increasing and because of over-consumption, mismanagement and climate change, the scarcity also increases.

Eventually, the moral responsibility lies in the potential to recognise natural resources as common. We then recognise that they require management. Various restrictions, such as legislation, are then placed on the use of this resource, which detracts from the freedom of individuals, but will ultimately preserve and nurture other freedoms. Complete freedom, will only lead to tragedy. Herein rests the tragedy of the commons.

South Africa places restrictions on the use of the water commons by developing and implementing legislation. The effects of legislation differ from one part of the community in //Khara Hais to the next and from one group of stakeholders to the other. Does the theory still apply to people who have never experienced anything but restricted access? The answer is yes. In contrast, the irrigation farmers have always had access to water and the quantity of water allocated to them for irrigation is

enough to maintain the status quo for the moment. For domestic use, they have unrestricted access to water from boreholes. It seems that they will never have to experience the tragedy of the commons. Yet, restrictions are indeed imposed on this community as well. The tragedy in this community manifests itself in the fear that they live with, knowing in the back of their minds that the relatively comfortable situation they find themselves in for the time being may change overnight when legislation governing payment for borehole water is implemented, or the water allocation for irrigation is reduced. Personal freedom in the form of free and unrestricted access to the water commons is in all likelihood going to end soon.

The moral responsibility remains. As individuals, inhabitants of this country must realise that giving up personal freedom and unrestricted access to the water commons is inevitable if they want the water commons to be available in any form in the future. Legislation will be the way in which the government acts on its moral responsibility to restrict access to the water commons and manage the resource in a manner that is fair to all and sustainable for the future.

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