WATER GOVERNANCE, POWER RELATIONS AND WATER CONFLICTS

Exploring the Dynamics of Water Conflict and its Resolutions between the Mining and Irrigation Sectors in the Olifants Water Management Area (South Africa)

Mdhlovu Patricia

Supervisor: Prof. Vusilizwe Thebe

A dissertation submitted to the Department of Anthropology and Archaeology of the University of Pretoria, in fulfilment of the requirements for the Degree of Master of Social Sciences in Development Studies.

November 2018

DECLARATION

I, Mdhlovu Patricia, hereby certify that this dissertation “Exploring the Dynamics of Water Conflict and its Resolutions between the Mining and Irrigation Sectors in the Olifants Catchments of South Africa” is my own work and any work from other sources have been stated and acknowledged through references.

Signed..... Date.....

The student

Signed..... Date.....

The supervisor

DEDICATION

The dissertation is dedicated to my late father, Richard Elliot Mahofu-Hofisi Mashaba Mdhlovu, “Rombane Shilumane, shulima intjila shitsike nomu”. On his sick bed, he told me that I should stick to education–that would be my only weapon in life. As a young undergraduate student, I was so naïve that I could not read in his eyes that he was in fact saying his last words and advice that I would cherish my whole life. As he was saying his goodbyes to me, I never saw it coming. I had thought that he will get better and rise up to attend my first graduation day, a day I had always dreamt of celebrating with my father next to me. I was saddened and heartbroken to learn that I will be mourning his death on my first graduation day. Seeing my mom in her black mourning garments on my graduation still haunts my spirit to date. Nevertheless, may your soul rest in peace as I fully dedicate this dissertation to you, dad.

ACKNOWLEDGEMENTS

Special thanks go to my mom, Salmina Dumakudane Mhlongo Njomane-Mashaba Mdhlovu. Ngiyabonga Njomane, for raising me to be a grown-up, mature, intelligent, hardworking, and God-fearing woman. Thank you for imparting these many great attributes to me; I will forever be grateful to you. I will impart the same attributes to my kids, “Ithombezami”. Your sacrifices and unwavering love have made me who I am today. You surrendered all that my siblings and I will live fulfilling and successful lives.

To my siblings, Lawrence, Amelia, Nontuthuko, Zanele, Mayibongwe, Maima-Emmarencia,Na-Nacia, Anele,Idjoma-Nobuhle; my nieces Shirley, Thembela, Snothando, Mandisa, and Andiswa; my nephews Thabiso, Legal, Ayabongwa, Wandile, and Lethokuhle; my cousins, Collen, Zakhele; and UncleSipho, thank you for being there. They say you choose friends, but you do not choose siblings and family; I would not trade you for anything. Your presence kept me going. I had always wanted to prove a point and be an example you would be proud of.

To Professor Thebe – my Doc, my Prof, and my supervisor – what a rare breed. I have no words to express my appreciation for you. I would have given up on my vision, if not for your mentoring, supervision, persuasion, and patience. This vision could have remained a dream in my sleep but you made my dream come true. I owe this dissertation to you. Thank you, Prof, may God continue to richly bless you and your family. You have sacrificed your time with them that we may walk away with outstanding and excellent dissertations. Thank you for being your namesake and continue being your namesake, “Vusilizwe”. We need more people like you to build and raise nations. Through your God-given talents, Xhubeka Thebe “okaDlembodlukhula” uvusamazwe.

Professor Pikirayi, thank you for being there. Your presence in the Department of Anthropology and Archaeology gained me enrolment to the University of Pretoria, a privilege that most want but struggle to attain. You have always been that “dad” I have learned to love and appreciate from a distance.

Dr Khorommbi Konanani, thank you for taking time to peer review my dissertation. Your expertise in the water sector added great value to this dissertation. Continue guiding and shaping others' academic work, on that note, I quote: "if you have knowledge, let others light their candles in it" – Margaret Fuller.

To my friends, colleagues' and prayer warriors, SesShonie, Fungisani Gift, Lorraine-B, Aus Emmah, MaAndy, Hlekani, MaMbele, Celiwe, Thobekile, Vongai and Pamela. You have pushed me to the edge; you all have inspired me in different ways. Together we shared common ideals, same dreams, career aspirations and our love for the Almighty God thank you.

To God be the Glory – the Father, the Son, and the Holy Spirit. He is my fortress and my tower of rest.

He said:
"Lean not in your own knowledge and understanding but on my own knowledge and understanding."
"The beginning of wisdom is the fear of the Lord."
"Ask for wisdom and I will give generously without finding fault."
"Test me with all your tithes and offerings and see if I will not open the windows of heaven and pour out a blessing until you have no room to contain it. I will remove the devourer for your sake and nations will call you blessed."
"Seek first the kingdom of God and all shall be added unto you."
"I will bless you exceedingly, abundantly above all that we ask or think."
"I know the plans I have for you, plans to prosper you and to give you a future, plans not for evil but for hope."
"I will bless the works of your hands."
"I will answer all your prayers if you believe and pray in the name of Jesus."
I thank God for depositing unto me greater wisdom, the spirit of council, knowledge, and understanding. He is my advocate, my greatest teacher, my comforter, my supporter, and my helper. Without God's divine rain of wisdom, I could not have done this, thank you God.

LIST OF ACRONYMS

AMD:	Acid Mine Drainage
CMA:	Catchment Management Agency
CMF:	Catchment Management Forum
CMS:	Catchment Management Strategy
DWA:	Department of Water Affairs
DWAF:	Department of Water Affairs and Forestry
DWS:	Department of Water and Sanitation
ELU:	Existing Lawful Use
HDG:	Historically Disadvantaged Groups
HO:	Head Office
IDP:	Integrated Development Plan
IGR:	Inter-Governmental Relations
IWRM:	Integrated Water Resources Management
ND:	Not dated
NGP:	New Growth Path
NWA:	National Water Act
NWRI:	National Water Resources Infrastructure
NWRS:	National Water Resources Strategy
OWMA:	Olifants Water Management Area
OCMA:	Olifants Catchment Management Agency
RO:	Regional Office
RSA:	Republic of South Africa
TVA:	Tennessee Valley Authority
UNDP:	United Nations Development Programme
UNESCO:	United Nations Educational Scientific and Cultural Organisation

USAID:	United States Agency for International Development
V&V:	Validation and Verification
WB:	Water Board
WMA:	Water Management Area
WMI:	Water Management Institution
WRC:	Water Research Commission
WSA:	Water Service Authority
WSA:	Water Services Act
WUA:	Water User Association

TABLE OF CONTENTS

TABLE OF BOXES

TABLE OF FIGURES

ABSTRACT

This research set out to explore the dynamics of conflicts between two water user groups, the mining and the irrigation sector in the Olifants catchment area in South Africa. The research also sought to explore the role and place of water management institutions in managing water conflicts in the study area. The study adopted two theories–the theories of hydro hegemony and political ecology. These were used to explain the power differentials between the two major water users in the catchment area, and in understanding the potential for conflict. The study adopted a qualitative research design and used a review of the literature and relevant documents together with ethnographic case studies techniques to gather data.

Findings indicated that water conflicts exist between these water users. Inequitable sharing of water resources resulting from unequal power bases, where one water user has more power and influence to contribute to the catchment's economic growth over another, is one of the challenges water users face. The study also revealed that the bulk of water resources are accessible by commercial farmers, which disadvantages emerging farmers in the catchment. The Department of Water and Sanitation has not fully implemented and achieved the objectives of the National Water Act, which aims to address the imbalances in water access caused by previous water laws.

The recognition of the 1956 Water Act as Existing Lawful Use under the National Water Act further exacerbates the emergence and escalation of conflicts between the two different irrigation-farming groups in the catchment. Poor water quality due to acid mine drainage from mining activities in the catchment has proven to be another source for potential conflict between the mining and the irrigation water user groups. The irrigation-farmers complain of poor water quality due to effluent from mining activities. The study concludes that conflicts observed were violent; some were dormant and irregular, and most conflicts were reported to have taken place during the drought of 2014 to 2016. The conflicts were very intense between irrigators (commercial and emerging farmers). Recommendations include fast tracking the implementation of water allocation reform and WMIs policies to ensure efficient and effective implementation of WMIs that will be able to address the issues of concern before they can escalate into serious conflict situations.

CHAPTER ONE

UNDERSTANDING THE DYNAMICS FOR CONFLICT AT THE WATER MANAGEMENT AREA

1.1. Introduction

The study looks at water resources and the conflicts that emanate from power struggles and interests between water users from the mining and irrigation sectors in the Olifant Water Management Area (OWMA) of South Africa. It is an analysis of the dynamics and the potential for conflict in the Olifants WMA and to assess the mechanisms that are put in place to handle or discourage conflicts between water users.

Furthermore, the study acknowledges the work of scholars like, Richard Meissner, Sabine Stuart-Hill and Sharon Pollard, who have done research work at the catchment area level, since the introduction of water management institutions in the country. Adding to this existing literature on catchment management areas, the study provides an analysis of the dynamics of stakeholder interaction between Catchment Management Agencies (CMAs) and Catchment Management Forums (CMFs) in the Olifants WMA.

The study explains the South African local water resources management model and improves our understanding of its operation. In this respect, it carries significant lessons for the South African government, different sector departments, various water users, related stakeholders, and other countries in the region as they face challenges of managing water resources at a time of growing demand and increasing water scarcity.

1.1.1. Background to the study

Critical scholarship on natural resources and conflict has long emphasised the link between natural resources and conflict, including violent conflicts have portrayed these as a key security threat of the 21st century, as global interest in natural

resources continues to grow (Garrett & Piccini, 2011; Roll &Sperling, 2011). For others, conflict is a reality in a context of increasing natural resource scarcity or what is considered as “shrinking resource pie” (de Soysa, 2002: 1).

Other scholars argue that the increased economic activities and increased consumption will cause resource scarcity and competitions over resources, but they emphasise humanity’s capacity to adapt. They particularly emphasise the role of institutions to “provide incentives for resource conservation, resource substitution, development of new stores of scarce resources, and technological innovation” (Homer-Dixon, 1995: 587).

According to Hussein and Turton (2006), worldwide 1.7 million people in over 80 countries; including South Africa, which face water shortages. Evidence suggests that water-related conflicts are bound to intensify in the future. South Africa’s water resources are under increasing pressure in terms of abstraction, habitat destruction, and pollution (Department of Water and Sanitation (DWA), 2012). South Africa is the 30th driest country in the world and has less water per person than countries widely considered much drier, such as Namibia and Botswana (DWA, 2013).

In recognition of the reality of the scarcity of fresh water resources and in an attempt to maintain the level of satisfaction in the catchment areas, the South African water sector adopted models of water governance in nine Water Management Areas (WMAs). The aim was to establish nine water management institutions, such as the Catchment Management Agencies (CMAs). Catchment Management Forums were established as the engine of support in the establishment of the CMAs. Theirs establishment was guided by global trends such as the Integrated Water Resources Management (IWRM).

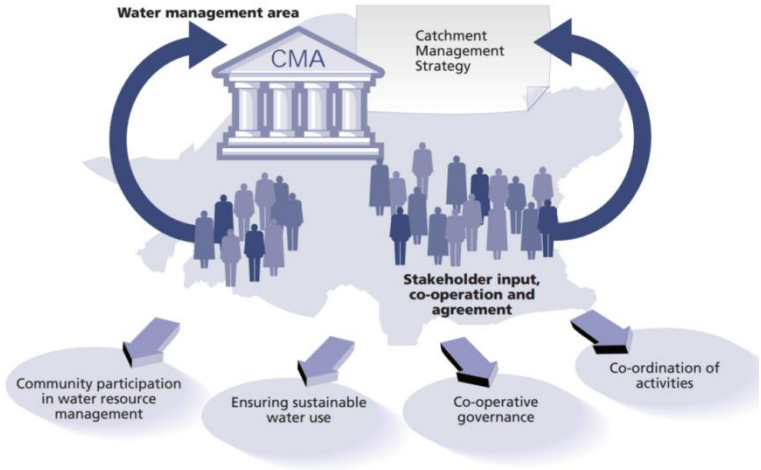
Initially, the former Department of Water and Forestry (DWAF) planned to implement nineteen (19) Water Management Areas in the country (Karar; 2004), but these were later merged to nine (9) Water Management Areas (DWA, 2012; Department of Water and Sanitation, 2013). The first two Catchment Management Agencies were the Inkomati-Usuthu Catchment Management Agency established in 2004 and the Breede-Gouritz Catchment Management Agency was established later in 2006 by

the Department of Water and Forestry. The minister bestowed on these institutions the functions to manage water resources at a local Water Management Area (DWAF, nd).

A Water Management Area is an area of jurisdiction for a Catchment Management Agency, and consists of different water users and various stakeholders with an interest in water resources, i.e. water allocation, water use authorisation, water access, and water quality. In a typical Water Management Area, the water sector stakeholders or water users includes municipalities, commercial farmers, emerging farmers, power generations, and mining companies.

These water users have different water needs, power bases, and influence, and as such the potential for conflict is real. In most Water Management Areas in the country, issues that have the potential for conflict includes backlogs in domestic water supply, population growth, and differences in water use. Water scarcity, water demand, water shortages, water quality challenges, and inefficient use of water resources are issues that pose a potential risk for conflicts, as outlined in the National Water Resources Strategy II (NWRS II), (DWS, 2013). Figure 1 depicts a typical Water Management Area.

Figure 1: A typical Water Management Area



Source: (DWA, nd)

Catchment Management Agencies are defined as statutory bodies established under the National Water Act 36 of 1998 to manage water resources at a local level and have played a crucial role in the establishment and support for Catchment Management Forums (NWRS II, 2013). However, Most of CMFs were established by the DWS and were/are used as consultative institutions both during the establishment and during operation of CMAs.

Catchment Management Forums, on the other hand, are non-statutory institutions established to manage water resources at a quaternary/secondary catchment management under Chapter 8 of the National Water Resources Strategy II (DWAF, 2013). Catchment Management Forums consist of a grouping of water users from a variety of sectors (the mining industry, irrigation, forestry, and domestic sectors) in one setting. These water users have a stake and an interest in the management, use, allocation, protection, and conservation of water resources, and are also referred to as “stakeholders” depending on the particular context they are in (DWAF, 2013).

Apart from the CMAs and the CMFs that are discussed above, the department also established the Water User Associations in terms of the NWA 36 (1998). These institutions played a crucial role in the transformation of the former Irrigation Boards. The 1956 Water Act provided for the establishment of membership-based organisations called Irrigation Boards, through which groups of farmers could join forces to develop infrastructure and jointly manage their water supply – essentially a type of water user association.

These Irrigation Boards were eligible for a one-third capital subsidy on shared water supply infrastructure, but membership was legally restricted to people who had title to the land receiving services from the Irrigation Board. This effectively excluded black membership from white Irrigation Boards, since the previously disadvantaged were excluded from land ownership in white areas, but there was also no similar institution available to groups of black farmers with similar needs. Government supplied irrigation services in the homelands or parastatal corporations and

participating farmers were passive recipients with no power to demand adequate services.

The introduction of these models–Catchment Management Agencies, Water User Association and Catchment Management Forums–of water resources management came at a time of growing pressure on the water resources in the country (DWA, 2013). Despite the innovative transformation brought about by new water policy and legislation in the history of water management in South Africa, the challenges the country faces are enormous (DWA, nd).

1.1.2. Significance of the study

The study is significant in that it will help policy makers direct new policies in addressing the most pressing issues related to water conflicts amongst water users and other relevant stakeholders. This study is also contributing to creating awareness around the water challenges and pressures experienced by water users in the Olifants catchment. The case studies presented will help water managers identify and deal with potential confrontations between water users. In the process, such confrontations may be addressed before they escalate into serious and harmful conflicts.

Policy makers will also realise where it is necessary to give focus when reviewing the water policies affecting the Olifants catchment. The study can contribute in broadening their understanding of the seriousness of water conflict in the catchment. Access to water resources by all citizens of the country is a basic human rights issue that has been globally and nationally recognised. Therefore, anything that may cause a deviation in the provision of this human right must be attended to promptly. Therefore, the study outlines a number of recommendations for policy makers to consider when developing new and reviewing old water policies.

1.1.3. Statement of the problem

Contemporary and historical research on water-related conflict has shown that there is a relationship between conflict and natural resources, particularly water, oil, and land (Le Meur et al., 2006; Le Billon, 2001; Klare, 2001; Warden, 2015). In Southern Africa, exciting research has been conducted into water and conflict-related topics. However, this recent research has been marred by failure to focus on water conflicts

at the local level. South Africa, in particular, not much is written on water conflicts at the water management area level between Catchment Management Agencies, Catchment Management Forums, and various stakeholder interests, which shape local level interaction, claims, and use.

However, because of South Africa's shared water resources, the bulk of this literature has been on water resource conflict at a national or trans-boundary level. For example, Swain (2004) refers to Southern Africa's shared rivers as a potential source of conflict among stakeholder states. The bulk of Ashton's work has also focused on water-related conflicts in Southern Africa and has covered water-related conflicts amongst three countries: Angola, Namibia, and Botswana (see Ashton 2000, 2002, 2006, 2007, 2008).

In his coverage of South Africa's relationship with Lesotho, Swain (2004: 144) refers to potential sources of conflict. These sources include compensation, resettlement, negotiations of the Lesotho Highlands Water Project Treaty, implementation of other phases of the project, and the implications of political instability in Lesotho for the Lesotho Highlands Water Project. These sources of conflict exist even though there is a general willingness by Lesotho to sell water and a need to buy water by South Africa. This may suggest that there is a bias towards interstate conflict, possibly because of its international dimension but also because of an emphasis on regional integration.

However, Wolf et al. (2005: 81) argue that, "water related controversies can be numerous, e.g. power struggles and competing development interests". While recognising that water disputes may be caused by quality, quantity, and timing, they also point out that conflicting interests concerning these factors can occur on many geographic scales, and that the dynamics of conflict play out differently at international, national, and local levels.

Exceptions to this area study include a study by Van Der Hel et al. (2011) that focused on conflict and cooperation because of water scarcity, a study by Langstaff (2010) that focused on conflict between conservation and equity related to freshwater scarcity and pricing. Other studies include the study by Sharon Pollard and Derick Du Toit on 'Integrated water resources management in complex systems: how the catchment management strategies seek to achieve sustainability and equity in water resources in South Africa'. The research work by Sabine Stuart-Hill on climate change is also acknowledged.

The Catchment Management Agencies, Catchment Management Forums, WUAs and irrigation boards in South Africa provide an area of new research on local water management and conflict as models of managing scarce water resources at the local level. This study is an attempt to close this gap in the literature by exploring the dynamics and potential for conflict at the local level, with the Olifants Water Management Area as a case study.

The study is guided by the realisation that, despite the adoption of the Catchment Management Agencies; Water User Association and Catchment Management Forums as institutions to manage water and possible manage conflict, the dynamics of interaction between these institutions, the water users, and other key stakeholders in the catchment have remained a neglected area. The study also endeavours to discover the mechanisms that have been put in place to resolve conflict situations in the catchment. In order to minimise the scope of the research, special focus of the study is only given to two key water users and stakeholders in the Olifants catchments, the mining and the irrigation water users.

1.1.4. Research questions

Main Question

What are the dynamics of conflict and conflict resolution between the mining and irrigation water users within the Olifants Water Management Areas of South Africa?

Research Questions

1. What are the key issues affecting the mining and the irrigation water users in the Olifants Water Management Area?
2. Do these issues have the potential to raise conflict between the two water users?
3. What is the role of water management institutions (Catchment Management Agencies) at the Olifants Water Management Area?
4. How viable are the water management institutions in managing water and mitigating these conflicts between the mining and irrigation water users in the Olifants Water Management Area?

1.1.5. Research objectives

The study on the dynamics of water conflict and its resolution between two main stakeholders in the Olifants Water Management Area was framed into one broad objective and four specific objectives. These research objectives aim to answer the research questions developed.

Main Objective

To explore the dynamics and potential for water conflict and its resolution between mining and irrigation water users in the Olifants Water Management Area in South Africa.

Specific Research Objectives

1. To identify and analyse the key issues around water affecting the mining and irrigation water users in the Olifants Water Management Area.
2. To explore whether the issues identified have the potential to cause conflict between these water users.
3. To identify and discuss the roles of water management institutions within the Olifants Water Management Area.
4. To assess the viability of the Water Management Institutions i.e. Catchment Management Agencies and Catchment Management Forums in mitigating and managing water conflict amongst these water users.

1.2. Defining Relevant Concepts, Institutions, Policies and Legislations

1.2.1 Conflict

The term conflict is generally defined as an antagonistic state of opposition, disagreement or incompatibility between two or more parties (Merriam-Webster Online Dictionary, 2006-2007). The Netherlands Organisation for Social Research (2007) defines conflict as a process that begins when an individual or group perceives differences and opposition between oneself and another individual or group about interests and resources, beliefs, values, or practices that matter to them.

1.2.2 Power relations

According to Hobbes (1968), power flows from society to the individual. Most political studies reformulated Hobbes concept of power. For instance, Dahl (1957) argued that power occurs in a context where actor A has power over actor B to the extent that he can get actor B to do something that actor B would not otherwise do. The argument is that some actors will always have power over other actors. Even though the definition is widely accepted in political studies, it is also applicable in this study, which seeks to explore the dynamics of water conflicts amongst two stakeholder groups, the mining and irrigation water users.

1.2.3 Water governance

The United Nations Development Programme (2004) defines water governance as the range of political, social, economic, and administrative systems that are in place to develop and manage water resources and the delivery of water services at different levels of society.

1.2.4. National Water Act (Act 36 of 1998)

The National Water Act (NWA) is a South African law governing national water resources. It was approved by Parliament in 1998. The Act deals with water resources such as rivers, streams, dams, and ground water. Chapter 1 of the Act sets out equity, sustainability and efficiency as guiding principles in the protection,

use, development, conservation, management, and control of water resources in South Africa.

The Act requires the progressive development of a National Water Resource Strategy that provides the framework for water resources management for the country as a whole and guides the establishment of Catchment Management Agency institutions to manage water resources at a regional or catchment scale in defined Water Management Areas.

In addition, the Act requires the progressive development of a Catchment Management Strategy (CMS) for each Water Management Area by each Catchment Management Agency. This Catchment Management Strategy must be in harmony with the National Water Resources Strategy.

1.2.5. Water Management Area (WMA)

A Water Management Area is an area established as a water management unit as defined by the NWA 36 (1998). A WMA is divided in to a number of segments called a catchment. A catchment is defined as an area within a water management area from which rainfall drains in to the watercourse through surface flow to a common point, e.g. a river (DWAF, nd). A CMA will be established in each water management area to manage water resources. In the absence of a CMA within a WMA, the Department of Water and Sanitation's Regional Office takes over and perform the function of water resources management until a CMA is established and fully functional.

1.2.6. Water Management Institutions (WMIs)

The National Water Act (Act 36 of 1998) provides for the establishment and transformation of water management institutions to assist the Department of Water and Sanitation in giving effect to its core mandate: the development, protection, conservation, allocation of water resources, and the regulation of water services and water use. This water management institution includes the Catchment Management

Agencies (Catchment Management Forums-non-statutory institution), and Water User Associations. The Department of Water and Sanitation is the custodian of the country's water resources and has a regulatory role. Below are a few examples of a WMI:

1.2.6.1. Water User Associations

Water User Associations are established under the National Water Act. They operate at a restricted local level and are represented by a cooperative association of individual water users who wish to undertake water-related activities for their own mutual benefit.

1.2.6.2. Catchment Management Agency

A Catchment Management Agency is a statutory body established in terms of Chapter 7 of the National Water Act. The role of CMAs is to facilitate the delegation of water-resource management functions to a local level. This will enhance stakeholder involvement in water resource management and local decision-making.

1.2.6.3. Catchment Management Forum

Unlike the CMAs and WUAs established through the NWA 36 of 1998, the CMFs are non-statutory bodies established through the National Water Resources Strategy II. Chapter 8 of the strategy defines Catchment Management Forums as non-statutory bodies that are established to democratize stakeholder participation in water resources management and to support the Catchment Management Agencies. Catchment Management Forums may become an appropriate vehicle to foster cooperative governance between the Catchment Management Agencies, local government, and other stakeholder interest groups in the interest of integrated management to support water resources management.

1.2.7. Water Users

According to the NWA 36 of 1998, a water user includes the agricultural sector, forestry, industries, mining, power generation, recreation, bulk storage, and urban and rural users. They are defined as any person who:

- takes water from a water resource,
- stores water to a water source,
- is involved in activities that reduces stream flow,
- discharges waste or water containing waste in to a water source,
- controls activities which impact detrimentally on a water resource,
- changes the physical structure of rivers and streams,
- removes underground water,
- uses water for recreational purposes

This study gives special focus to two types of water users from the mining and the agricultural sector. These water users are sometimes referred to as stakeholders depending on the context they find themselves. Both the mining and irrigation sectors use water and they still have a direct interest and a stake on the water resources. Hence, the study will use the two concepts “water users” and “stakeholders” interchangeably relative to the particular context in which the concepts are employed.

1.2.8. Stakeholders

The concept of a stakeholder has been used and defined by a number of writers. According to Freeman (1984), the concept is credited to students of business administration and corporate management. They defined it as any group or individual who can affect or is affected by the achievement of the firm’s objective. According to Simpungwe (2006), the popular and general image that streams through most definitions within the Natural Resources Management field is that of an individual or sector that has control over or access to a resource or service and/or holds some form of legitimate knowledge that can be brought to the negotiating table. According to Ramirez (1999), the concept of a stakeholder transcends several fields of study,

including business management, international relations, policy development, participatory research, and ecology. Roling and Wagemakers (1998) identify stakeholders simply as natural resource users and managers.

1.2.9. National Water Resource Strategy

The National Water Resource Strategy is a strategy for the water sector that sets out the roadmap for the implementation of the National Water Act. The first version of the National Water Resource Strategy was developed and promulgated in 2004 and a second version in 2013(Department of Water and Sanitation, 2013). It sets out ways in which South Africa aims to achieve Integrated Water Resources Management (Kahinda et al., 2009). The Minister of Water and Sanitation must ensure that a strategy is developed and updated at least every five years in consultation with all stakeholders.

1.2.10. Department of Water and Sanitation

The Department of Water and Sanitation is a national government department acting through the Minister as a public trustee of South Africa's water resources. The department is responsible for administering all aspects of the National Water Act on behalf of the Minister. However, the Act allows the Minister to delegate most of his or her powers and duties to departmental officials, water management institutions, advisory committees, and water boards. In the longer term, the department's role will mainly be to develop national policy and a regulatory framework to govern the way other institutions manage the water resources. The department will also oversee the performance these institutions.

1.2.11. Integrated Water Resources Management

The Global Water Partnership (2002) defines Integrated Water Resources Management as a process that promotes the co-ordinated development and management of water, land, and related resources in order to maximise the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems.

1.3. Dissertation Structure

The dissertation is organised into seven chapters, which focus on different aspects of the dissertation. Chapter 1 is the introduction to the study. It is a discussion of the research problem and includes the background to the study, the problem statement, research objectives and questions. The chapter also introduces and defines key concepts before highlighting the structure of the dissertation. Chapter 2 reveals key literature. It begins by looking at the debates on water and conflict, before discussing the two theories (the water hegemony theory and the Political ecology approach), which have been adopted in an attempt to understand the subject of water and conflict. The chapter then looks at the key concepts used in the study and attempts to provide an analytical framework for the study.

The third chapter provides a detailed discussion of the methodology adopted by the study. The chapter broadly divides into the following key sections, the research design and techniques adopted by the study, the data analysis approach adopted to analyse data, and the ethical considerations. Chapter 4 and 5 are the data chapters. The fourth chapter provides an analysis of stakeholders and water management institutions in the Olifants Water Management Area. It begins by providing a broad overview of the catchment area before profiling the two stakeholders, their interests in water, water needs and their interaction. The chapter concludes by giving a discussion on the water management institutions that were put in place to manage water resources and their viability to manage water conflicts in the Olifants.

Chapter 5provides a discussion on conflict and how, conflict was resolved between the water users. Finally, Chapter 6presents a discussion on the empirical findings presented in chapter 4 and 5, pulling the identified the major themes and have pulled these themes together in an attempt to reach a conclusion and recommendations presented in chapter 7.

CHAPTER TWO

LITERATURE REVIEW

2.1. Introduction

Central to the question of water governance and power relations is managing the nature and dynamics of interaction amongst different stakeholders (the water users, their interests, power bases, and roles). This chapter provides a review of the literature relevant to our understanding of the dynamics of water governance and water conflicts in water resources management. It is divided into five sections. The first section of this chapter discusses literature on the study of water as a natural resource and a major source of conflict.

The aim is to introduce the reader to different views on natural resources and conflict. The second section discusses the theories of hydro hegemony and political ecology that shape the study. The third section discusses the different concepts that frame the study, namely Integrated Water Resources Strategy, water governance, water management, and stakeholder participation. The fourth section discusses perspectives on the history of the South African water laws. These theories and concepts were helpful in shaping and analysing the data presented in Chapter 4, 5 and 6 and in deriving the conclusion and recommendations presented in chapter 7.

2.2. Water a “Natural Resource” and a “Major Source of Conflict”

A number of scholars have emphasised the connection between water resource management and conflict (Dungumaro et al., 2003; Mirumachi et al., nd; Zeitoun & Warner, 2006; Garrett & Piccini, 2011; Roll &Sperling, 2011). As Furber et al. (2016) noted, “…when divergent world views and knowledge are brought in to close proximity, the potential for conflict is great”. They identified a number of reasons why natural resource management is prone to conflict: first, the widespread use of natural resources by a large, diverse, and geographically dispersed groups creates complex networks of people and entities with different power and influence.

Second, the fact that there is an interconnectedness of natural environment means that the actions of one group can have an impact on other groups a great distance away, i.e. upstream and downstream effects. Third, the use of the resources can also have different meanings to different people, i.e. economic livelihood, a way of life, and cultural identity. Lastly, the diminishing supply of some natural resources may result in structural scarcity and unequal distribution.

In a study on 'Oiling Conflict in Ghana', Warden (2015) argues that natural resources have an ambivalent character on development. This was based on the understanding that the exploitation of natural resources would lead to the generation of sizeable revenues, increased employment opportunities, reduced poverty, and raised living standards. On the other hand, natural resources have directly or indirectly fuelled conflict and other forms of violence in some countries, particularly in the post-Cold War era (Collier & Hoeffler, 2004; Le Billion, 2001). However, the interconnection between natural resources and conflict is not that straightforward (Warden, 2015).

Mehta (2005:14) argued that water resources are managed by relations of power and are transmitted by dominant political and economic apparatuses. Critics of Integrated Water Resources Management who have argued that the domain of water resource management is a political process for contestation and negotiation adopt this position. They emphasised the complexities, power dynamics, and the importance of analysing real world situations. They particularly demonstrated how integration could not be achieved given the power dynamics in social interactions (Saravanan et al., 2009).

Stakeholders involved in managing water are numerous and have overlapping roles and interests that create competition to establish supremacy and sometimes conflicts (Saravanan et al., 2009). The argument is that, although stakeholders are concerned with water quality, quantity, and sustainability, they do not all have the same social position with regard to measures proposed or taken to resolve the issues involved and they do not necessarily share the same view about what is desirable or what constitutes the purpose of water resources management (Saravanan et al., 2009).

For Le Meur et al. (2006), analysing conflicts over access to water resources implies taking into account the dialectics between rights and powers, claimants and politico-legal institutions, and access to and control over resources. Anthropological studies have shown that investigating conflicts constitutes a very productive entry-gate in terms of understanding the functioning of social arenas and identifying diverging interests about resources (ibid).

Similarly, neo-institutional theories conceive conflicts as mediation devices between the supply and demand of institutional innovation (Feeny, 1988). This is because access to adequate water supply is usually seen as a life and death issue where any threat to disrupt or prevent access to essential water supplies becomes an emotionally charged and volatile topic of intense debate (Ashton, 1999). Water conflict is described as any disagreement or dispute over or about water, where social, economic, political, or military intervention has been required or will be required to resolve the problem (Ashton, 2007).

Violent conflicts are more of lack of sustainable development or development on a national level that leads to conflicts in a local level (Luzi, 2008; Mason et al., 2009). Gado (2002:161) defines conflicts over natural resources as:

> Latent disputes tending to turn into open conflicts between two individuals, two social groups, or two communities, stemming from a more or less justified claim of access rights to one of the basic family or community resources: land, livestock, grazing, forests, water, etc.

During a Stockholm meeting in August 1995, Ismail Serageldin, the then World Bank Vice President for Environmentally Sustainable Development, confidently declared that, “Wars of the next century will be over water” (Homer-Dixon, 1996:362). According to Gleick (2001), “there has been a long history of conflict and tension over water resources between nations/states, between communities, and within communities”. He noted that sources of conflicts are numerous: some may stem

from a drive by one nation, community, and individuals to control all the available water resources in the area. Other sources of conflict around water result from the inequitable allocation and use of water resources, the results of a regulatory framework that favours one party or water development project which may give the favoured party more access to water resources (Gleick, 1993,1998).

These statements set the scene for this chapter, which deals with the theories, and the concepts used to define and understand the dynamics of conflicts and conflict resolutions. The study adopts a political ecology approach, the theory of hydro-hegemony, and a few other concepts (water management, water governance, Integrated Water Resources Management, power, and stakeholder participation) to understand the dynamics of water conflicts and conflict resolution as produced by complex physical, social, and economic processes in the Olifants Water Management Area.

2.3 Theories

This section will look at the two theoretical approaches adopted in this study: the theory of hydro-hegemony and the political ecology theory. Abdellah (1986) states that theory is an explanation of phenomena or an abstract generalisation that systematically explains the relationships amongst given phenomena, for purposes of explaining, predicting, and controlling such phenomena. Theories are key in the formulation of a conceptual framework. They are concepts that have a direct or indirect outcome on the potential for conflicts within the Olifants catchment. Section two will discuss these concepts to understand their relationship and how they relate to water conflicts. The assessment of water conflicts is the underlying pillar that will make the research findings significant.

2.3.1. Hydro-hegemony theory

The hydro-hegemony framework was developed to analyse the role of power found at the river basin level or trans-boundary water interactions (Warner et al., 2013; Cascao & Zeiton, 2010; Zeiton & Warner, 2006). It is hegemony at the river basin level achieved through water-resource control strategies such as resource capture,

integration, and containment. According to Van der Hel et al. (2011), hegemony is a state in which one is able to dictate “the rule of the game in the international arena”. Antonio Gramsci (1981-1937) is the founding father of this theory (Bayliset al., 2008). The theory originated from Neo-Marxist thinking but is often referred to in realist international relations theories (Van der Hel et al., 2011).

Zeitoun and Warner (2006) identified the role of asymmetric power in a river basin. They defined hydro-hegemony as a powerful state with decisive influence over the activities of the river basin that can determine the status quo of the river basin. Such a state may strategically access water by exploiting existing power asymmetries (Zeitoun & Warner, 2006).According to Zeitoun and Warner (2006), power relations between riparian states are the prime determinants of the degree of control over water resources that each riparian state attains. They argued that in water-scarce situations, non-hegemonic states usually comply with the order preferred by the hegemony whose superior power position effectively discourages any violent resistance against the order. Conflicting interests may exist but the hydro-hegemony has the ability to assure compliance of its neighbouring states through its various power resources. Thus, Cascao and Zeitoun (2010) have argued that this power is coercive, bargaining, geographical, and ideational.

Coercive power refers to material power such as economic strength, military might, technological powers, and international political and financial support. For example, the level of economic development in a river basin could determine whether certain stakeholders cooperate in decision making pertaining to water resource management (Zeitoun & Warner, 2006). Geographic power, on the other hand, is the position of the riparian state on a river. Another source of power is bargaining power, which describes the capability of actors or stakeholders to control the rules of the game and set agendas. The rules of the game are controlled by offering no choice regarding compliance and non-compliance. Added to bargaining power is ideational power, which is power over ideas, e.g. refusal by the powerful state to share data with others (Cascao & Zeitoun, 2010).

Cascao and Zeitoun (2010) have maintained that a deeper examination of trans-boundary water interactions reveal evidence of counter hegemonic mechanisms applied by the non-hegemonic states with the aim of changing the outcomes of water control and allocation towards fair distribution. According to Kim and Glaumann (2011), the challenge facing trans-boundary water management is that most actors in shared water management do not have the necessary skills and knowledge to engage in international negotiations such as international law, hydro politics, conflict resolution, stakeholder participation, etc.

Van der Hel et al. (2011) have supported the view that conflicting interests between states over scarce resources exist. They argued that, in such an instance, both conflict and cooperation over water resources could occur at the same time over different aspects and with different levels of intensity. However, conflict and cooperation should not be viewed as opposites, but rather as different points of a continuum. In their study on trans-boundary water governance, Mirumachi et al. (nd) maintained that international relations over water needs to be understood in the context of co-existing conflict and cooperation determined by power relations and the status of political economies of the respective engaged riparian states.

Many theories of power are behavioural, and are concerned with the degree to which actions by one person or a group can be shown to have a discernible effect on the behaviour of others (Pfeiffer, 1997). Dahl (1961) located power within the boundaries of an actual community. He defines power as the ability to make somebody does something that otherwise he or she would not have done. Dahl (1961) argues that a particular individual exercises power in a community while other individuals are prevented from doing what they prefer to do. Power is exercised in order to cause those who are subject to it to follow the private preferences of those who possess the power. Power is the production of obedience to the preferences of others, including an expansion of the preferences of those subject to it to include those preferences.

According to Gaventa (2003), the analysis of power becomes the study of associations. Society, structure, and power are outcomes as actors become associated. Those who are powerful are not those who hold power, but those who are able to enrol, convince, and enlist others into associations on terms, which allow these initial actors to represent all the others:

> They speak for others that have been deprived of a voice that have been transformed from objects that spoke for themselves in to mere shadows of their former selves (Law & Whittaker 1988:179).

Murdoch and Marsden (1995) argue that power lies in the resources used, defined, and linked by particular actors and, to be successful, an actor must colonise the worlds of others. Thus, actor worlds are not independent, but are tied together in associations that may result in the domination of some by others (Murdoch & Marsden, 1995).

According to Collinson, (2003), those who lack power cannot safeguard their basic political, economic, and social rights and may not be able to protect themselves from violence. Vulnerability and power are therefore analysed as a political and economic process in terms of neglect, exclusion, or exploitation in which a variety of groups and actors play apart (ibid).

2.3.2. Political ecology approach on the relationship between water and social power

Swyngedouw (2004: 28) argues that water is a hybrid concept that captures and embodies processes that are simultaneously material, discursive, and symbolic. Water networks connect the most intimate of socio-spatial relations, insert them into a mesmerising political economy of urban, national, and international development, and are part of a chain of local, regional, national, and global circulations of water, money, texts, and bodies. In this sense, water embodies bio-chemical and physical properties, cultural and symbolic meanings, and socio-economic characteristics simultaneously and inseparably.

These multiple metabolisms of water are structured and organised through socio-natural power relations, relations of domination and subordination, of access and exclusion, and of emancipation and repression, which then become etched into the flow and metabolisms of circulating water. This circulation of water is embedded in a series of multiple power relations along ethnic, gender, and class lines (Swyngedouw, 1996). This is the view of the political ecology approach on water and conflict. Political-ecological analysis inserts the matter of social power within resource uncertainty (Swyngedouw, 2005).

Swyngedouw (1996) emphasised that these power relations, in turn, swirl out and operate at a variety of interrelated geographical scale levels, from the scale of the body up to the political-ecology of the city, to the global scale of uneven development. The capturing, sanitising, and bio-chemical metabolising of water to produce urban drinking or agricultural irrigation water simultaneously homogenises, standardises, and transforms it into a commodity as well as into the real-abstract homogenised qualities of money power in its manifold symbolic, cultural, social, and economic meanings. Swyngedouw (2006) argues that one of the most trivial of truths is that water flows to power. Only in the most exceptional of circumstances, caused by unexpected events, do powerful social groups or individuals lack access to water. It is, of course, equally undisputed that ownership of, or control over, water, its distribution, and allocation are formidable sources of social power.

Swyngedouw (2006) is in agreement with Karl Marx in Capital: the owner of a waterfall possesses a gift of nature that would improve his or her position in the competitive game. Social groups with sufficient social, political, economic, or cultural power do not die of thirst or see their crops go without water. In many instances, controlling water generates considerable social power, while the latter permits re-enforcing or extending this control. In other words, social power and the control of nature are mutually constitutive. Social power relations (whether material, discursive, economic, political, and/or cultural) through which metabolic circulatory processes take place are particularly important. It is these power geometries, the human and

non-human actors, and the socio-natural networks carrying them, that ultimately decide who will have access to or control over, and who will be excluded from access to or control over.

Political-ecological perspectives on water suggest a close correlation between the transformation of the hydrological cycle at local, regional, and global levels and relations of social, political, economic, and cultural power (Swyngedouw, 2004). A significant difference between political ecology and other traditional ways of studying ecological systems is its dedication to taking an explicitly normative approach rather than one that claims the objectivity of disinterest (Robbins, 2011). The human use of the natural environment is fundamentally a political act, and political ecology puts those politics front and centre, without losing sight of the social and ecological context in which these politics are conducted (Robbins, 2011).

According to Robbins (2004), political ecology is a broad based, fragmented field that has evolved and flourished. It is an analytical approach used across disciplines. It combines political economy and cultural ecology and that provides trans-disciplinary frameworks that apply methods of political economy to ecological contexts (Gossling, 2003). As is the case with other political ecologists, the author is concerned with social justice and linking research to action (Derman & Ferguson, 2000). It is a useful analytical framework to understand the impact of global political and economic processes on local environments. It attempts "…to understand how environmental and political forces interact to affect social and environmental changes through the actions of various social actors at different scales" (Stonich, 1998:28).

Forsyth (2003) defines political ecology as "…an approach to environmental politics that allows the successful integration of political analysis with the formation and dissemination of understandings of ecological reality". Political ecology provides the analytical tools needed to develop a critical perspective that helps uncover the often-implicit connections and interactions between political decisions and/or policy choices, the social and cultural context in which they are imbedded, and their direct and indirect effect on the management and mismanagement of natural resources. In

this sense, political ecology emerged as a response to an “apolitical ecology” that often neglected to address, or even acknowledge, the power dimensions in human-environmental relations (Forsyth, 2003: 12).

It is invariably the poor and powerless, who die of inadequate sanitation (Gleick, 2004; Gleick & Cooley, 2006). True scarcity does not reside in the physical absence of water in most cases, but in the lack of monetary resources and political and economic power. Poverty and governance that marginalises make people die of thirst, not the absence of water. It is these urban political-ecological perspectives that bring out the economic and political power relations through which access to, control over, and distribution of water is organised.

Political ecologists consider socio-ecological metabolisms to be inherently part of political processes and, consequently, an integral part of any political or social project. Political visions are, therefore, necessarily also ecological visions; any political project must, of necessity, also be an environmental project and vice versa (Harvey, 1996).

Environmental transformation is not independent from class, gender, ethnic or other power struggles. Socio-ecological sustainability can only be achieved by means of a democratically controlled and organised process of socio-environmental re-construction. The political program of political ecology is to enhance the democratic content of socio-environmental construction by means of identifying the strategies through which a more equitable distribution of social power and a more inclusive mode of the production of nature can be achieved.

2.4. Concepts

The following concepts have been used to frame the study: water management, water governance, Integrated Water Resources Management, power, stakeholder participation, and water conflict. These concepts were analysed to determine their linkages and relationships and how they can relate to rising conflict or the potential for conflicts in the catchment.

2.4.1. Water and conflicts

The concept of “water conflict” is important to understand if we are to explore and understand the dynamics and potential for conflict in the Olifants Water Management Area. The National Water Act No 36 of 1998 defines water as a scarce and unevenly distributed national resource, which occurs in many different forms that are all part of a unitary, interdependent cycle. According to conflict theories, conflict is an unavoidable aspect of human social systems. Many argue that conflict is a necessary fact of life, for it is only through struggle that lasting and meaningful change can be brought about. The Netherlands Organisation for Social Research (2007) defines conflict as:

> A process that begins when an individual or group perceives differences and opposition between oneself and another individual or group about interests and resources, beliefs, values, or practices that matter to them. This process can be applied to all kinds of parties, nations, organisations, groups, or individuals and to all kinds of conflict from latent tensions to manifest violence.

Similarly, Kriesberg (2007:2) argues, “… a social conflict exists when two or more persons or groups manifest the belief that they have incompatible objectives”. In this case, one person’s use of resources may become incompatible with another’s. Likewise, Walker and Daniels (1997) state that conflict is an active stage of disagreement between people having opposing opinions, principles, and practices manifested in different forms (grievances, conflict and disputes).

Former World Bank Vice President Ismail Serageld infamously said in 1995 that, “If the wars of this century were fought over oil, the wars of the next century will be fought over water” (Otis, 2002). During his tenure as United Nations Secretary General, Kofi Annan predicted that, “Fierce competition for fresh water may well become a source of conflict and wars in the future”. The Economist (2000) proclaimed that “water shortages are the stuff of future wars” and that “conditions are ripe for a century of water conflicts”.

Gleick (2000) shows that, through history, water has been involved in conflict as a political or military tool, a military target, an object of terrorism, part of a development dispute, and an object of control. However, according to Wolf et al. (2005: 84), no states have gone to war specifically over water resources since the city-states of Lagash and Umma fought each other in the Tigris-Euphrates basin in 2500 B.C. Instead, according to the United Nations Food and Agricultural Organisation (FAO), more than 3 600 water treaties were signed from AD 805 to 1984. Gleditsch et al. (2006: 373) state that while acute conflicts over single rivers are rare, the presence of a large shared river basin provides the potential for conflict. This is not evidence of water wars but shared water resources can stimulate low-level interstate conflict. This in no way excludes cooperation; indeed the low-level conflict may be an important incentive for more cooperation.

According to Kafle (2011), water conflicts also emerge if there are differences between the priority of water use and the prior appropriation based on state law and customary law. State law does not necessarily regard customary law of remote villages where there is less influence of the state. Such conflicting claims bring different water users into conflict. Similarly, plural legal systems may become a source of water conflict in many places. New water transfer mechanisms to supply drinking water to city areas by transferring water from agriculture is becoming a source of conflict. Agriculture is the backbone of many villages and farmers do not easily compromise on water being diverted for other uses. In many places in the world, especially during the dry season, severe conflicts exist between water transferring agencies and farmers who use water for irrigation and drinking (Kafle, 2011).

The above statements by Kafle (2011) are relative to the current practice of water uses within the Olifants. The Olifants catchment has many uses for water such as power generation, irrigation, mining, and recreation and each type of water use is given priority over the other. For instance, the energy sector has been declared a strategic water user in the National Water Resource Strategy, giving it priority over the other sectors; water for the energy sector gets allocated first because of its strategic importance.

The issue of customary law versus state law is also a source of conflict. Some commercial farmers in the Olifants catchment still hold on to their old water rights according to the Water Act of 1956 and, in so doing, deny water access to historically disadvantaged individuals or the emerging farmers in the area. These emerging farmers believe that water comes naturally and is a provision from God through rain. They furthermore believe that new water legislation such as the National Water Act 36 of 1998 will save them from their challenges. According to Bachelor (2007:8) “insecurity of water rights, mismatches between formal legislation and informal customary water rights, and an unequal distribution of water rights are frequent sources of conflict”.

Given the central importance of water resources to all human communities, it is natural that conflicts arise with regard to access, allocation, development, and management of the resource. It is equally clear, however, that necessity is not only the mother of invention, but also the basis for extensive cooperative activities concerning the management of water resources. Thus, both conflictual and cooperative behaviours across time and space and at all levels of human social organisation constitute the norm where water resources are concerned. It is generally acknowledged that water resources of all types are under increasing pressure from a number of actors, forces, and factors that developed in the early 21st century (World Water Development Report, 2006). Of particular concern is the way in which sovereign states deal with increasing seasonal, absolute, natural, and human-made scarcities in shared river basins.

In summary, the study posits that if adequate measures to improve water use efficiency and to conserve this scarce resource are not taken, attaining water security will be difficult. Therefore, water resource management needs to look at the hydrological cycle in the basin, the interaction of surface water and groundwater, and the interaction of water with other natural and socio-economic systems. It should take into account multiple water users; multiple purposes and conflicting needs; consider interdependence of land, water, and ecosystems; and address the role of water within the context of social and economic development and environmental sustainability.

Hence, the concept of water conflict is vital to this study. The study of water conflicts between different water users and stakeholders is fundamental to understanding the different dynamics, stakes, and interests of these stakeholders in the Olifants catchment.

2.4.2. Water management

Larson (2010) states that the key to water management not only revolves around the need to deal with the scarcity of the resource, but also the complex interactions of the different aspects of water's cultural, social, political, and ecological significance, a view that political ecology theories have held in understanding the dynamics of water resources management. In the modern day, water has been attached to more meanings than simply a natural resource. This has resulted in the definition of water resources management as the application of structural and non-structural measures to control natural and manufactured water resource systems for beneficial human and environmental purposes (Grigg, 1996).

According to Pahl-Wostl et al. (2006), water resources management is the "study, planning, monitoring, and application of quantitative and qualitative control and development techniques for long term, multiple uses of diverse forms of water resources". They argue that more voices have advocated the need for a radical change and a paradigm shift in water management. The arguments put forward for the paradigm shift include a move towards participatory management and collaborative decision making, increased integration of issues and sectors, management of problem sources instead of effects, decentralised and more flexible management approaches, and more attention to management of human behaviour through "soft" measures.

The argument is that, in the past, water resources management focused on well-defined problems that gained urgency with increasing concentration of urban populations and intensification of industrial and agricultural productivity in the 19th and 20th centuries. Hygienic problems within cities and the seemingly insatiable demand for more water drove major efforts in urban water management.

Eutrophication problems in lakes and coastal seas triggered more involved research and legislation.

Rivers were controlled to protect cities and dry land agriculture from flooding. Technological fixes proved to be very efficient in the short term in solving a number of these urgent environmental problems, for example, the increasing sophistication of wastewater treatment plants in addressing hygienic and pollution problems.

Pahl-Wostl et al. (2006) argues that, in general, these problems were dealt with in isolation, and potentially undesirable long-term consequences were not taken into consideration. The system paradigm on which traditional water management has been based can be characterised as a “predict-and-control” approach. System design was typically targeted at high predictability and controllability. A range of changes in perspective has started to undermine the basic assumptions on which traditional water management was based.

Cortner et al. (1994) identified the emergence of a paradigm shift in land and water resources management. They are the only authors who define what they mean by paradigm shift and refer to the literature on scientific revolutions. Their approach is summarised as follows:

> The classical model of a paradigm shift is used to explore changes that are occurring in public lands and water resources management. Recent policy developments suggest that the traditional paradigm, which is characterised by sustained yield, is in the process of being invalidated. While no new paradigm has been fully accepted, the emerging paradigm does appear to be based on two principles: ecosystem management and collaborative decision-making. Implementation of these two principles is likely to require extensive revision of traditional management practices and institutions. Failure to address these issues could result in adoption of the rhetoric of change without any lasting shift in management practices or professional attitudes.

Ward (1995) brought to light the “Integrated Watershed Management as a new Paradigm for Water Management”. He argued that:

> Water management, as it has a number of times in the past, is undergoing considerable change in the 1990s. Past efforts to break down water management activities into highly specialised subject areas (e.g. flood control, water supply, recreation, irrigation, and waste water treatment) have resulted in the creation of large institutions that today are increasingly being questioned relative to their ability to meet the needs of the 21st century. Calls to integrate water management activities into a more holistic approach are increasingly heard (ref).

The goal appears to be to find a more effective way to meet the constantly evolving water-related needs of society. The terms being used to describe this new approach to water management vary. “Integrated Resource Protection”, “Integrated Watershed Management”, and “Ecosystem Management” are but a few of the terms. To some, these words elicit a sigh of, “Here we go again!” while, to others, the words reflect a major paradigm shift in water management. To still others, the terms imply a threat to “take” water from existing users and give it to other uses (Ward, 1995).

Gleick (2000) talks of a “changing water paradigm”. He highlights the following:

> This “changing water paradigm” has many components, including a shift away from sole, or even primary, reliance on finding new sources of supply to address perceived new demands, a growing emphasis on incorporating ecological values into water policy, a re-emphasis on meeting basic human needs for water services, and a conscious breaking of the ties between economic growth and water use. A reliance on physical solutions continues to dominate traditional planning approaches, but these solutions are facing increasing opposition. At the same time, new methods are being developed to meet the demands of growing populations without requiring major new construction or new large-scale water transfers from one region to another.

Pahl-Wostl (2007) concludes by saying that the paradigm shift in water management may be interpreted as a sign of an increased awareness of complexity and a fundamental change in understanding what management implies.

2.4.3. Water governance

Williamson (1996) defines water governance as the means by which order is accomplished between the different stakeholders in the water sector in order to avoid potential conflicts and realise mutual gains in the context of Integrated Water Resource Strategies. Governance related to water appears to have first reached the international stage at the Second World Water Forum in The Hague in 2000, where ministries boldly called for the wise governing of water to ensure good governance (Rogers & Hall, 2003).

According to the United Nations Educational Scientific and Cultural Organisation (UNESCO) (2006), "… the current water crisis has been mainly caused not by a lack of water supply or technology, but rather by a failure in water governance". According to the United Nations Development Programme (UNDP), the water crisis has not resulted from natural limitations in water supply or a lack of financing and appropriate technologies, even though these are important factors, but rather from profound failures in water governance (UNDP, 2004).

Water governance has emerged as perhaps the most important topic of the international water community in the 21st century, and achieving good water governance is now a focus of both policy discourse and innumerable development projects (UNESCO, 2006; UNDP, 2004; Rogers & Hall, 2003). The 2001 Bonn International Conference on freshwater, a precursor to the 2002 Johannesburg World Summit on Sustainable Development, identified water governance as the first of three areas for priority action(Lautze et al.,2011).

The United Nations Development Programme (2004) defines water governance as the range of political, social, economic, and administrative systems that are in place to develop and manage water resources and the delivery of water services at different levels of society. The Dublin Water Principles bring water resources under the state's function of clarifying and maintaining a system of property rights and, through the principle of participatory management, assert the relevance of meaningful decentralisation at the lowest appropriate level (GWP, 2002). Other principles of effective water governance include openness and transparency,

inclusivity and communicativeness, coherence and integration, and equity and ethics (Rogers & Hall, 2003).

The 1992 Dublin Conference on Water and Environment laid down the definition of water as an economic good for the first time. Principle Four of the statement that was produced by the conference states: “Water has an economic value, and should be recognised as an economic good, while also maintaining that access to clean water and sanitation at affordable prices are fundamental human rights” (United Nations, 1992).

How the stakeholders act in relation to the rules and roles that have been taken or assigned to them will determine whether future generations will have water or not. The water sector is a part of broader social, political, and economic development and is affected by decisions taken by actors outside the water sector (Moench et al., 2003:5).

Castro (2007) defines water governance as the interaction between governments, large businesses, political parties, civil, and other organisations representing sector interests (e.g. workers unions, religious organisations, peasant movements, etc); international agencies (e.g. international financial institutions), and other agents of the process of global governance, non-governmental organisations and other relevant power holders.

These actors and institutions are involved in continuing debates and in socio-political confrontation around how water and essential services should be governed by whom and for whom. He maintains that developing water governance and water management practices grounded in the principles of sustainability and social justice is one of the most urgent challenges facing water governance in the 21st century (Castro, 2007).

The challenge of water governance is to reconcile the often-conflicting water-related interests and demands made by different sectors and to provide the means by which order is accomplished in the relations between the various stakeholders in order to avoid potential conflicts and realise gains (Huppert, 2007). According to Green (2007), there is a profound political element to water governance and, as such, systems of water governance usually reflect the political realities at international, national, provincial, and local levels.

As a result, the more general definition of governance (as opposed to water governance) is also contested as those who promote different visions of the future tend to define governance in terms, which are consistent with their own vision. Hence, water governance is much more about the way in which decisions are made (i.e. how, by whom, and under what conditions decisions are made) than the decisions themselves (Moench et al., 2003).

According to Huppert (2007), the actual and future demands of water engineers is to widen their perspectives and take into account the underlying conflicts of interests amongst different stakeholders. This leads to the “holistic” management of water resources, i.e. to integrate and balance various claims and interests through the concept of Integrated Water Resource Management. The propagation of Integrated Water Resource Management is the expression of this objective at the international level (Huppert, 2007).

Hardly any other topics have drawn the attention of water professionals in recent years such as the topics of Water Governance and Integrated Water Resource Management because water is becoming a scarce resource in many countries and awareness is rising (Huppert, 2007).

Lautze et al. (2011:1-8) state that the overall effects of including water governance within the Integrated Water Resource Management approach is that a potentially distinct identity and, more importantly, role of the concept, is lost. On the contrary, an

effective governance process is needed to determine which tenets of Integrated Water Resource Management, if any, are desirable for a specific location. Disregarding local conditions, preferences, and values to uniformly apply Integrated Water Resource Management principles everywhere actually reflects poor water governance (Lautze et al., 2011).

Rogers and Hall (2003) view water governance as a tool or prescription to achieve outcomes associated with Integrated Water Resource Management, and have identified the principles in Box 1 as key to effective water governance.

Box1: Principles of effective water governance

Open and transparent: Water institutions should work in an open and transparent manner, using language understandable to the public; water policy decisions should be transparent, particularly regarding financial transactions.
Inclusive and communicative: Wide participation should be ensured throughout the water policy chain, from conception to implementation and evaluation; governance institutions must communicate amongst water stakeholders both horizontally at the same levels and vertically between levels.
Coherent and integrative: Water policies and actions must be coherent, with political leadership and a strong responsibility taken by institutions at different levels; water institutions should consider all potential water users and sectors and their linkages with, and impacts on, the traditional water sector.
Equitable and ethical: Equity between and amongst various water interest groups, stakeholders, and consumers should be carefully monitored throughout the policy development and implementation process; penalties for corrupt behaviour or sharp practices should be applied equitably – water governance must be strongly based on the ethical principles of the society in which it functions and on the rule of law.
Accountable: The rules of the game, as well as legislative roles and executive processes, must be clear; each water-related institution must explain and take responsibility for its actions; penalties for violating the rules and arbitration-enforcing mechanisms must exist to ensure that satisfactory solutions to water issues can be reached.
Efficient: Concepts of political, social, and environmental efficiency related to water resources must be balanced against simple economic efficiency; governmental systems

should not impede needed actions.
Responsive and sustainable: Water demands, evaluation of future water impacts, and past experiences should be the basis for water policy; policies should be implemented, and decisions made, at the most appropriate level; water policies should be incentive-based, to ensure clear social or economic gain if the policy is followed; long-term sustainability of water resources should be the guiding principle.

Source: Rogers & Hall, 2003

2.4.4. Integrated Water Resource Management

According to the United States Agency for International Development (nd), avoiding or minimising the negative effects of physical and human-induced resource scarcity "will require institutional innovations that allow focusing simultaneously on the goals and trade-offs in food security, poverty reduction, and environmental sustainability".

This perspective has now crystallised the concept of Integrated Water Resources Management, within which conflict resolution is regarded as an important tool. Integrated Water Resources Management considers the full range of sectoral interests as well as water resource allocation decisions, taking into account the relevant constraints and objectives of society. Integrated Water Resource Management has been strongly promoted as being more efficient and effective as a guiding principle for water management.

Over the past decade a range of insights have started to undermine basic assumptions on which traditional water management was based and more and more voices have started to advocate the need for a radical change and a paradigm shift in water management.

The growing perception that a new paradigm is required to better reflect the multidimensional nature of water management has developed amongst water professionals globally (Biswas, 2008). By the early 1990s, these views had been formalised into Integrated Water Resources Management – although, in reality, it merely updated pre-existing integrated approaches with an emphasis on sustainable

development through the inclusion of environmental protection, participation, efficiency, and equity (Biswas, 2008).

The argument was that water crises are often crises of governance and not resource or technological problems (Pahl-Wostl et al., 2006). Therefore, Integrated Water Resources Management has been proposed and strongly promoted as being more efficient and effective and is now practiced as the new approach to land and water resources planning and management that encourages participants to consider a wide array of social and environmental interconnections (Hooper, 2003).

Integrated Water Resources Management is a process that seeks to manage conflicts by changing the way the resource is currently used; changing the process by which decisions regarding allocation and usage are taken; and providing new ways of thinking about the resource so that equitable, efficient, and sustainable use may be achieved. In short, Integrated Water Resources Management is a kind of tool for conflict management and resolution (USAID, nd).

According to Mitchell (1990), Integrated Water Resources Management can be considered as a multi-layered systems approach to water management that attempts to integrate relations between surface and groundwater (quantity and quality), water and land use (environment), water and stakeholder interests, and water-related institutions. Combining these factors seems to be a perfectly logical way forward as their combination results in major challenges, many of which come under the water governance banner.

According to Hooper (2003), Integrated Water Resources Management extends beyond traditional, multipurpose natural resources management to address societal goals and ecosystem functioning. The term Integrated Water Resources Management implies a full array of physical, biological, and socio-economic variables involved in managing a region for environmental values and human use (Hooper, 2003). Many natural resource managers and academics have supported

planning and managing water and related land resources on watershed (catchment, river basin) basis and the approach is now being widely adopted (Hooper, 2003).

Molle (2009) shows how the integration of water resources management at river basin scales dates back many decades and involves several semi-distinct paradigmatic changes. Molle (2009) identifies the Tennessee Valley Authority (TVA) as an early example of a recognisable nexus. A United States federal government agency was created to holistically manage water resources while generating energy, supporting agriculture, and promoting wider socio-economic development. Such integrated water management then became the blueprint for developing countries "as large-scale water engineering projects became a means to drive national development strategies" (Gain et al., 2013: 12).

Codification of Integrated Water Resources Management via a set of universal principles came in 1992 at the United Nations/World Meteorological Organisation Dublin Conference. These principles prioritise water as a finite resource, promote stakeholder participation, and treat water as an economically valuable good (World Meteorological Organisation, 1992). The Dublin Principles subsequently proved highly influential through their promotion by international organisations such as the World Water Partnership, the World Bank, and the Global Water Partnership (GWP).

The United Nations (2014) then adopted these principles as part of its Millennium Development Goals, while some of the principles were incorporated into the European Union's Water Framework Directive. The directive mandates European Union member states to introduce river basin management planning for sustainable water quality, although it is also integrating climate adaptation (Fritsch & Benson, 2013).

The Global Water Partnership (2002) extended the conceptual development of Integrated Water Resources Management. It defines Integrated Water Resource Management as a process that promotes the coordinated development and

management of water, land, and related resources, in order to maximise the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems (GWP, 2002).

This international endorsement of the concept has now been seen at the highest levels, including the 2003 summit on Sustainable Development in Johannesburg, South Africa as well as the second (2000) and third (2003) World Water Forums in Kyoto, Japan (Hopper, 2003).

The United States Agency for International Development (nd) defines Integrated Water Resources Management as “A participatory planning and implementation process, based on sound science that brings stakeholders together to determine how to meet society’s long term needs for water and coastal resources while maintaining essential ecological services and economic benefits”.

According to Huppert (2007), Integrated Water Resources Management and the goal of managing existing water resources in an “integrated” way is today an accepted creed amongst international water experts. His reason for this claim is the worsening water shortages in many parts of the world that pose new problems for various aspects of water management. The need to ensure optimum “production” allocation and utilisation of scarce water resources is confronted with many divergent demands and interests.

Stakeholders in different sectors (suppliers of drinking and service water at rural and urban level, agriculture, fisheries, power generations, waste management, shipping, forestry, tourism, and conservation of water related ecosystems) can rapidly become competitors for the scarce water resources that are of existential importance to all (Huppert, 2007). According to Huppert (2007), this situation is further aggravated by the problem of water quality. In many places, rivers and streams are being transformed into receiving watercourses for wastewater, creating major health

problems, causing ecological problems, and further restricting the availability of usable water (Huppert, 2007).

Huppert (2007) provides a list of aspects that ought to be considered in an integrated or coordinated manner within the framework of Integrated Water Resources Management. This list calls for the integration and coordination of topics, fields, and sectors: various sectors of water use (drinking water, waste water, agriculture, industry, transport, and others), administrative responsibilities, ground and surface water, human and ecological water use, demand and supply management, water quantity and quality, land use, and trans-boundary claims on water use.

According to Huppert (2007), a closer look at this allows us to identify three distinct fields of integration and coordination. Firstly, inter-sectoral integration: the coordinated consideration and handling of different resource sectors and water uses with a view to achieve a common, supra-sectoral management (e.g. coordination between water uses for agriculture, domestic use, and ecology). Secondly, intra-sectoral integration: the coordination of different aspects of management within a particular water sector (e.g. conjunctive use of groundwater and surface water in irrigation). The last field of integration and coordination is the coordination of roles and responsibilities of multiple actors at different levels of decision-making and administration (e.g. water managers at local, district, and national levels).

Hooper (2003) maintains that Integrated Water Resources Management extols the use of integrated, cross-sectoral and coordinated approaches to water resources management across time and space, as well as the river basin scale. It uses co-management but is fraught with the classic problems of commonly managed resources: differing interpretation of property rights, conflicts over use, spatial and temporal variations in access to water, susceptibility to hazards of water surpluses or deficits, and a lack of on-going financing when other spending (military, health, and education) consumes public service delivery budgets, amongst others. According to Hooper (2003), despite these problems, Integrated Water Resources Management provides mechanisms for meeting top-down with bottom-up management.

In practice, Integrated Water Resources Management must bring together a diverse array of people who have a “stake” in a system if it is to collaboratively manage the activities and impacts (Hooper, 2003). These stakeholders include government entities, community groups, business, and industry organisations with a particular concern or interests in water resource management (Hooper, 2003). Integrated Water Resources Management must also involve “the public” who also have an interest in water resources management. For Hooper (2003), this participatory approach produces strategies that are more coordinated, more cognisant of interconnections, and more inclusive of the diversity of goals.

Like the political ecology approach, Integrated Water Resources Management recognises that water problems have become multi-dimensional and multi-sectoral, requiring a resolution for a multi-disciplinary, multi-situational, and multi-stakeholder coordination. However, critics of Integrated Water Resources Management argue that it has not been implemented effectively in the real world and has become a point of debate and criticism amongst scholars (LaVanchy et al., 2017).

Mehta (2005), a critic of Integrated Water Resource Management, has argued that water resources are managed by relations of power and are transmitted by dominant political and economic apparatuses. This statement clearly shows that water resource management is an area that is characterised by the political processes for contestation and negotiation. He emphasised the complexities, power dynamics, and the importance of analysing real world situations. This according to Saravanan et al., (2009) demonstrates how integration cannot be achieved given the power dynamics in social interactions.

2.4.5. Stakeholder participation

Pahl-Wostl (2007:9) argues that Integrated Water Resource Management requires “integrated decision-making” which provides the justification for participation. It implies a paradigm shift towards a systems approach where the human-environment

dimension is reaffirmed by the transformative force of social learning (Pahl-Wostl, 2002).

It is important to note that stakeholder participation is not an end in itself but a means to an end: the results should be improved governance of water resources (Manzungu, 2004). Stakeholders involved in managing water are numerous and have overlapping roles and interests that create competition (to establish supremacy) and sometimes conflicts (Saravanan et al., 2009). The argument is that, although stakeholders are concerned with water quality, quantity, and sustainability, they do not all have the same social position with regard to measures proposed or taken to resolve the issues involved and they do not necessarily share the same views about what is desirable or what constitutes the purpose of water resources (Saravanan et al., 2009).

According to Philip et al. (2008), participation of representatives of all stakeholders in water resources management involves decision-making processes, which are a key requirement of good governance and Integrated Water Resource Management. According to Kujinga (2004), stakeholder participation requires all stakeholders who have an interest, claim, or stake in a particular system to be genuinely involved in any decision-making process that affect them.

A stakeholder in Integrated Water Resource Management can be any group, institution, organisation, business, or individual with an interest or role in water resources management. Users are the most obvious group of stakeholders, but others may exist, such as regulators. All of these stakeholders have different interests, some of which can be contradictory, and therefore representation of all community stakeholders is important to understand needs and demands and also to form a shared agreement on the way that water resources are managed (Philip et al., 2008).

The principles of integrated water management assert that empowerment is meant to challenge the existing power order (Rahaman & Varis, 2005). However, policy incorporation of local knowledge is limited by the overlooking of genuine collective decision-making organs and the insistence on formal institutions and mandatory participation (Cass, 2006; Saravanan et al., 2009; Biswas, 2004; Cleaver, 1999). Therefore, “empowerment differentials” are major impediments to the success of participatory water decision making (Mirumachi & Van Wyk, 2010). In fact, they restrain engagement and effective participation. Mollinga (2008) argues that while Integrated Water Resource Strategy is effective in bringing together the multi-dimensions and inter-linkages of water, it remains weak in addressing power differentials and conflict resolution.

Finally, the added value of Integrated Water Resource Strategy for sustainability is examined in light of the theoretical concerns for participatory methodologies and the practical aspects of integration. The argument for participation in Integrated Water Resource Strategy is structured by the complexity and intersection of social and environmental changes. Facing these changes, it is assumed that only integrated management is able to achieve the goals of equity and sustainability (Pollard & DuToit, 2008; Pahl-Wostl, 2002).

2.4.6. Perspectives on the History of South Africa water laws

The South African water laws dates back as of 1652 with the establishment of the Dutch settlement at the Cape of Good Hope where customary principles governing access to water for stock watering and domestic use were supplemented and gradually replaced with ideas of European origin. As time went by, the Roman, Dutch and English water laws emerged to oversee water resources allocation in South Africa (Thompson, 2001). In the beginning, water allocation policies employed the public trust principles, which gave the state (the Dutch East India Company) the right to control and allocate water use. Soon after, a strong riparian rule was introduced. This move provided individual landowners living next to watercourses the right to use water on those lands, subject to the rights of other similar landowners.

This riparian rule only applied to selected white commercial farmers to secure water for irrigation. Appropriative rights to abstract water and use were granted on a special base. Water became classified as private or public resource. Water became attached to the land and owner's property rights. Flows in public streams were apportioned into "normal" and "surplus" flows, with different rules applying to each. These rules developed as the need arose from intensifying economic activity to regulate use amongst the commercial farms, mines, and urban concentrations of the minority European population.

According to van Koppen et al., (2003), during the apartheid era the white government, commercial farmers, mining firms, and other interests established well-defined formalised laws and institutions based on riparian rights, which excluded a very large majority of the population. After the end of apartheid, government went through many regime changes, which meant that water policies had to change from old apartheid policies, which recognised water under private ownership. A new democratic regime came to existence, which sought to find a balance between riparian, and dominus fluminis principles and introduced the modern rights regime. Water is therefore treated as a semi-public and semi-private commodity and the state adopted the dual economy model to engender economic development (Tewari, 2008; Temple, 2005).

The new democratic dispensation required a drastic shift on the governance of water resources in the country as the distribution of water and sanitation services were much skewed. This called for a comprehensive review of all water-related legislation to develop a modern water policy that is more suitable to the South African context. Various Ministers from the late Minister of Water Affairs and Forestry, Kader Asmal, become part of the transition which led to the formulation of the National Water Act of 1998 widely regarded as an enabling piece of legislation.

The Constitution of the Republic of South Africa (1996) highlighted key policy provisions in the as outlined in the Bill of Rights. These provisions afford the basic

human rights to water and sanitation provisions and the right to a healthy environment, to meet current and future generations.

Two key legislations, the National Water Act and the Water Services Act (WSA) were then formulated. These legislations were guided by a new water policy of South Africa, the White Paper on National Water Policy for South Africa (1997) which marked a major departure from the previous water laws and it highlighted the following key issues of interest to the water sector:

- All other water uses must be beneficial to the public interest
- The riparian system of allocation is abolished
- All water in the water cycle is part of an indivisible national asset
- All water use in the water cycle is subject to one or more charges intended to reflect the full financial costs of protecting and managing the water resource
- Water-based waste disposal is subject to appropriate charges
- Charges for water for basic human needs and for small scale productive purposes may be waived for disadvantaged groups
- This asset is held in trust for society by the national government
- Water to meet basic human needs, to sustain the environment, and to meet legitimate needs of neighbouring countries, is reserved
- Allocations will no longer be permanent but for a reasonable period
- Water resources will be managed on a catchment basis by specialised bodies

2.5. Integration and Application of the Theories to the South African Context

2.5.1. The political ecology of South Africa's water resources

In South Africa, the political ecology of water management implied the adoption of global policies on water resources management. South Africa adopted the Dublin recommendations popularly known as the "Dublin principles" which urge that water has an economic value in all its competing uses and should be recognised as an economic good. Together with this principle, South Africa, amongst other things and through the help of the Constitution of the Republic of SA, recognised water as a basic human right. The constitution enshrined the right to clean water and sanitation

services at an affordable cost for all citizens of the country and therefore recognised water as a social good.

The South African water sector adopted this principle and put policies and legislation such as the National Water Act in place to ensure that managing water as a social and economic good is a way of achieving effective, efficient, affordable, sustainable, and equitable use of water. Hence, the key objectives of the National Water Act are to ensure that water is used, protected, developed, managed, conserved, distributed, allocated, and controlled. These objectives are to be carried out at the appropriate level, considering efficiency benefits related to economies of scale (DWS, 2013).

The adoption of global water laws was in part influenced by the fact that South Africa had just come out of the apartheid regime and was faced with a lot of water and sanitation service backlogs; the country had a need to redress the imbalances of the past water laws. There was a shift of water laws from the 1956 Water Act to the newly formulated piece of legislation, the National Water Act, 36 of 1998.

In this case, South Africa can be defined as a country that went through the political ecology of water commercialisation. Bakker (2003: 331) defines commercialisation as the “reworking of the management institutions, the rules, norms, and customs”. It entails the introduction of markets as allocation mechanisms, market simulation, and decision-making techniques. For the South African water sector, commercialisation meant the implementation of the National Water Act, which made provisions for the establishment of water management Institutions (Catchment Management Agencies, Water User Associations, Catchment Management Forums, Water etc.) to manage and supply water resources at a local water management area.

2.5.1.1. Water flows to power

As argued by the Political Ecologists approach “water flows to power”. This is the case for the South African water sector. For instance, the constitution of the Republic of South Africa has given the overall mandate for the country’s water resources to

the Department of Water and Sanitation. The department act as the custodian of the country's water resources and the Minister became a public trustee for the country's water resources. As such, water resources have rested under the control of the state. In reorganising the water sector, the state had to take major steps to secure its interests in water resources over other actors. These interests included ownership and control of water resources as well as ownership and control of water infrastructure.

In the process, the state acquired its political powers from other stakeholders in the sector. Through following global trends on water resources management and through the pressure exerted by the South African Constitution, the sector nationalised all water resources. This process eliminated competition from other sectors, stakeholders, water users, and general social groups with the potential of making claims of the water resource in certain ecological areas such as wet lands, streams, and river basins.

The South African water sector ensures the rights of water infrastructure through the establishment of regional water utilities, which were designed to manage the infrastructure, and the water resources at the local level. Catchment Management Agencies were given certain delegated functions to control the use, management, and conservation of water resources. However, not all functions and powers were delegated to the Catchment Management Agencies. The state ensured that the Minister of Water and Sanitation may not delegate the powers and the functions to make a regulation, to authorise a water management institution to expropriate, to appoint the Governing Board of a Catchment Management Agency, or to appoint a member of the Water Board.

The Constitution of the Republic of South Africa consolidated its executive powers through the Minister of Water and Sanitation, conferring on them a wide range of powers over the water sector. The Minister is in control of all stakeholders, whether public or private. Even the water sector claims that it has divulged the water business to the local level and is left with the responsibility of policy formulation; the

sector still plays a key role in the management and provision of water services under various states of affairs.

The state, represented by the water sector, retains most power over water resources and it decides which powers can be delegated to the Water Management Institutions, while the rest of the stakeholders remain inactive on issues of water resources management. They may choose to participate in decision making affecting the water resources through the Catchment Management Forums, Water User Associations, and other consultation forums or meetings. It could then be argued that decentralisation of political and economic power, which aimed at transferring state power to the regional and local level has failed.

2.6. Chapter Summary

In trying to explain the dynamics of water conflicts and conflict resolution measures within the Olifants Water Management Area, this chapter has identified and explained two theories, hydro-hegemony and political ecology, as well as the following concepts: water conflicts, water management, water governance, Integrated Water Resources Strategy, and stakeholder participation. The study discovered that there is a link between the theoretical underpinnings and the concepts identified.

For instance, much of the political ecology-inspired water literature adopts what can be termed a “hydro-social” understanding (Wittfogel, 1981; Worster, 1985). Like the hydro-hegemony approach, which identified four types of power asymmetries that exist in river basins, the political ecology approach focuses on the social dimensions of water by looking at how power dynamics in social and political processes are fused into the physical and managerial aspects of water governance.

The work of Swyngedouw (2006), a strong supporter of the political ecology approach, attempts to draw attention to relations between social power and the hydrological cycle such as the rerouting of natural watercourses through constructed

channels, pipes, and dams. Because this water infrastructure is the result of social, political, economic, and cultural processes, we may say that the flows of water running through the infrastructure are embedded, and indeed manifested, via the networks of social power relations such as political, economic, cultural, and discursive power (Islar, 2012). This means that the hydro-social cycle constitutes a flow of not only water, but also social relations. Hydro-social relations in the study are characterised by processes of political problem framing and decision making, influence, and investment strategies through which water is diverted from rivers, through pipelines, and into to urban centres (Swyngedouw, 2006).

CHAPTER THREE

RESEARCH METHODOLOGY

3.1. Introduction

This chapter outlines and discusses the methodology adopted in this study of water conflict and water management institutions. The chapter covers the research design, the research techniques, and data analysis approach adopted by the study and the ethical issues encountered. The chapter begins by providing a brief description of the research design, before discussing the research techniques that guided data collection. While the study adopted a case study design, it supplemented these with secondary sources, mainly documents from the Department of Water and Sanitation. The chapter also provides a description of the thematic approach adopted to analyse the data collected through various techniques at the case study and a review of secondary material. It then looks at ethical issues raised by the study and how these were attended.

3.2. Research Design

The study adopted a qualitative research design. Filstead (1970) refers to qualitative research methodology as strategies that allow the researcher to obtain first-hand knowledge about the empirical social world in question. Examples include participant observation, in-depth interviewing, total participation in the activity being investigated, and field work. I have adopted this type of research design because it is very suitable for the study of social world.

For instance, water is a social issue and people's motives, actions, thinking, and overall behaviour drive conflicts in water resource management, which is very critical to this study. According to Filstead (1970:6) when qualitative methodological procedures are employed, the problem of validity is considerably narrowed and concern over the reliability of the data is increased. Qualitative research design allowed me to work closer to the information required for my study. I was able to make a follow up and validate any data issues with my subjects immediately.

Choosing this type of research design was also motivated by my passion for social sciences. Quantitative research techniques could not have been the best method for me as I am also not good with figures. I have always enjoyed interacting with the social world, something that I could easily obtain through the qualitative research design. As Brynard, et al. (2006:37) have mentioned, that qualitative methodology is the kind of research that produces descriptive data generally the participant's own written or spoken words pertaining to their experience or perception. Usually no numbers or counts are assigned to these observations.

According to Brynard, et.al (2006:37) qualitative methodology allows the researcher to know people personally, to see them as they are, and to experience their daily struggles when confronted with real-life situations. This enables the researcher to interpret and describe the actions of people. This research design has allowed me to build more networks with key experts and stakeholders in the water sector, a platform I could not have obtained through other types of research designs.

3.3. Research Techniques

The study is divided into two levels: the national and local levels. At each level, the study sought to understand different issues pertaining to the study topic. At the national level, it sought to understand the role of different water management institution established by the Department of Water and Sanitation to manage the water resources. This was particularly important since these institutions have effects on the local level.

At the local level, the focus was on the interaction and potential for conflict between two stakeholders in the Olifants Catchment Area – the mining and irrigation water users. At each level, different research techniques were employed to gain an in-depth understanding of phenomena under study. At the national level, a review of literature and other relevant documents were used, while at the local level, a case study was adopted. At the case study level, a variety of techniques was used. These included the interviews and participant observations.

3.3.1. Review of literature

Even for an area that has little scholarly coverage, a literature review was a logical starting point. There is an interesting body of literature on water issues, water crisis, water delivery, and water policies and statutes from the government. The literature review included published academic sources, including journal articles, commissioned Department of Water and Sanitation reports, media material, and other organisational material.

Official documents such as minutes, agendas, memorandums, and attendance registers used during Water Resource Management Meetings were valuable sources of information for the study. The study drew selectively on this literature, extracting material specific to the study and its focus as guided by the questions that the study sought to provide answers. Some of this literature was very key in shaping the direction of this study and are worth mentioning.

The Department has a bulk of commissioned water and sanitation reports, policies, and legislations that played a crucial role in the research. Some literature could easily be accessed online, some of it I collected from the Department of Water and Sanitation library, and some of it was collected during conferences and meetings attended. Commissioned reports and other documents from the Department of Water and Sanitation provided information pertinent to water resource management, particularly the role and functions of the water management institutions.

Minutes from the Catchment Management Forum meetings were equally important, providing information on meeting proceedings and deliberations including incidents of conflict. Although these were internal documents, as an official involved in these meetings, I would receive these from Catchment Management Forum coordinators, if I had failed to attend the meetings. These minutes provided documented information for meetings that I would have missed, allowing me to take note of what transpired.

I made use of the Department of Water and Sanitation's strategies, the NWRS I of 2004 and the NWRS II of 2013. These strategies were important since they clearly

outlined the department's roadmap regarding water governance and water resources management in South Africa. This background helped in developing an understanding the history of the water sector where it was and where it is going. The reading of the National Water Act (1998) was also useful in building up the case of water governance, power relations, and water conflicts in the Olifants Catchment Area.

3.3.2. Case study

According to Bhattacherjee (2012), a case study is a method of intensively studying a phenomenon over time within its natural setting in one or a few sites. Multiple methods of data collection, such as interviews, participant observations, pre-recorded documents, and secondary data, may be employed and inferences about the phenomenon of interest tend to be rich, detailed, and contextualized. I used the case study as the last research technique in an attempt to understand local level dynamics within the Olifants Management Area.

Since the objective of the study was to understand the potential and dynamics of conflict between water users from the mining and irrigation sectors, the case study was the main research technique that provided in-depth information on the research study. The case study was based on the Olifants Water Management Area where different issues of water use and sharing are experienced. This Water Management Area was chosen amongst nine Water Management Areas in the country. For a study of mining and irrigation stakeholders, the Olifants Water Management Area provided a perfect setting because of the dominance of coal mines and both commercial and emerging farmers.

Within this case study, there are five Catchment Management Forums: the Upper Olifants Catchment Management Forum, the Middle Olifants Catchment Management Forum, the Lower Olifants Catchment Management Forum, the Shingwedzi Catchment Management Forum, and the Groot Letaba Catchment Management Forum. The Catchment Management Forums are constituted by representatives from different stakeholders including municipalities, farmers unions

and associations, mining companies, and departmental officials. It is at forum meetings where water issues and challenges are discussed. These Catchment Management Forums were studied for a period of 8 months. A variety of techniques was used to solicit data. These included participant observation during Catchment Management Forum meetings and semi-structured interviews.

3.3.2.1. Participative observations

Participative observation formed the main method of data collection. Participative observation took place over a period of 8 months, from April to December although participation started in 2016 and is continuing. Participative observations took place within Catchment Management Forums. Participative observation became necessary due my position in the Department of Water and Sanitation and my involvement with Catchment Management Forums. It was through my involvement with these forums and my experience with the challenges and complaints by stakeholders that I became interested in understand water conflict between stakeholders and their resolution. Once I registered for a research Masters and was settled on a research topic, I started paying particular attention to these issues during forum meetings.

As an officer in the Department of Water and Sanitation, I am responsible for overseeing the establishment and revitalisation of Catchment Management Forums, and overseeing and supporting the operations of Catchment Management Agencies. Part of my responsibilities include attending various water sector forums, conferences, departmental meetings, imbizos, municipal Integrated Development Plan (IDP) meetings, and community stakeholder engagement and consultation meetings. It is mostly in these meetings where the water sector agenda is discussed, and the challenges, solutions, achievements, future plans, and policy positions are discussed.

Once, I was given permission to conduct my study in the Olifants Catchment Area by both the department's head office and the regional office in the Olifants, I began to pay more attention to stakeholder water problem, and focused more on the irrigation and mining stakeholders. These appeared to have unique water needs and were

prone to conflict. The challenges were often brought to these forum meetings for discussions and for possibly solutions.

As an official of the department attending these meetings, I became a part to these processes. My participation was by default guaranteed. I also became privy to information and pressing challenges affecting these two stakeholders, and every attempt made to provide a solution. I became aware of the complex interactions between the two sectors and within the irrigation sector. I would record my observations and follow emerging issues through interviews with representatives. Participant observation, therefore, provided the basis for my interviews.

I participated in a number of Catchment Management Forums in the Olifants during the period. I also participated in a number of Catchment Management Forums coordinated by the Inkomati-Usuthu Catchment Management Forum to expand my understanding on the issues of concern between the two catchments. My observations were not structured since I wanted to be open to learning more without restricting myself from other issues of the catchment.

3.3.2.2. Interviews with stakeholders

Denzin (1989:103) defines an interview as a face-to-face verbal interchange in which one person, the interviewer, attempts to elicit information or expressions of opinions or belief from another person or persons. I used the interviews to collect data specific to particular stakeholders within the Olifants as a supplementary method to participant observation. As noted already, these interviews were used to follow-up to issues emerging from participant observations. The interviews targeted representatives from the mining and irrigation sectors. I selected participating individuals from all five Catchment Management Forums in the Olifants using a purposive sampling technique (Etikan et al. (2016).

Purposive sampling, or targeted sampling technique, is also called judgment sampling. According to Etikan et al. (2016), purposive sampling is the deliberate

choice of participant due to the qualities the participant possesses. It is a non-random technique that does not need underlying theories or a set number of participants. The researcher decides what needs to be known and sets out to find people who can and are willing to provide the information by virtue of knowledge or experience. Purposive sampling is typically used in qualitative research and involves identification and selection of individuals or groups of individuals that are proficient and well-informed with a phenomenon of interest.

I selected water users from the irrigation and mining sectors within the five CMFs. I selected individual representatives representing both the mining and irrigation sectors: from the irrigation sector, I selected individuals from large-scale commercial farmers and emerging farmers and the other group of individuals were selected from the mining sector. In total, I selected 30 individuals from the irrigation and mining sector, who were subjected to an interview process. The interviews were mostly open-ended and designed to solicit in-depth information from the informants.

According to Yin (2006), open-ended interviews are flexible as they allow the researcher to have an intense discussion with participants and they are able to construct the phenomena under study. Structured interviews on the other hand are highly constraining and tend to limit the scope of responses to the questions asked by the interviewer. At the end, the opportunity for in-depth discussions is lost. By adopting an open-ended format, I wanted to grant the informants the leeway to engage with an array of issues, affecting their sector and their relationship with other sectors, including their views on the water management institutions.

These were not interviews in the sense of question-and-answer type interactions. Based on my knowledge and experience of the Catchment Management Forums in the Olifants Catchment Area and other Water Management Areas in the country, these discussions became more of a conversation. It was easy to bring incidents and experiences into the discussion from other sub-catchments. This proved a very effective strategy to extract more responses from the participants as they became

open to share more on the subject after realising that other catchments have similar concerns(Researcher's Field observation, 2017).

Raw data was used to reflect a respondent's view of water resources management and conflicts situations within the Olifants WMA. These views assisted in drawing conclusions for the study. In this case, the use of pseudo names was adopted to protect the participant under the citation.

The interview timeframe was relative and dependent largely on particular informants. Some interviews took longer than an hour while others took less time. Some were extended and took place over a number of days during the duration of the study. The longest and most detailed interviews were conducted mostly with participants where appointments were scheduled while those that were short were mostly with participants where no appointments were scheduled. These were usually carried out with participants identified during Catchment Management Forum meetings. These interviews did not assist greatly because these participants had other commitments to attend to and could not commit much time for the interviews (Researcher's Field observation, 2017).

3.4. Data Analysis

The data analysis approach adopted in this study was a thematic data analysis. The choice of this technique was guided by its flexibility and the ease with which it is possible to generate conclusions. I collated and allocated codes for the data collected. The various codes were compared and codes that represent similar data were grouped together. The various groups were compared for similarity to develop intermediate themes, and these themes were compared and grouped together to develop broader themes (Spencer et al. 2002).

The themes that emerged were used to build the dissertation. For instance, two broad thematic areas were developed: first, conflict was inherent between the two major water users and among various water users in the irrigation sector; and, two,

the water management institutions put in place to manage water resources are ill equipped to deal with water conflict in the catchment. These themes were further broken down into sub-themes. Some data was collated into tables and charts while other data was used in its raw state as direct quotes (Spencer et al. 2002).

3.5. Ethical Considerations

Meese et al. (2004) refer to ethics as the study of the principles of good conduct and systems of moral values. The study involves different water management institutions, organisations and human beings, and it was critical to observe certain research ethics. As argued by Meese et al. (2004), this study adhered to the ethical standards set by the University of Pretoria and the researcher applied for ethical approval from the university. The university subsequently issued an ethics clearance certificate authorising the researcher to continue with field data collection. This certificate was used during field research as proof for ethical approval by the university. The certificate has been attached in the appendix to this dissertation (Ethics Committee, University of Pretoria, 2016).

I also approached the Department of Water and Sanitation head office and regional offices with a request to conduct research in the Olifants Water Management Area. Both head and regional offices issued me with a letter of acknowledgment and approval to continue conducting the research in the Olifants Water Management Area. These letters have also been attached in the appendix section. The study also adhered to the principle of informed consent. Individuals identified at the CMFs for interviews were asked to volunteer and participate in the study. Informed consent forms that had passed ethics scrutiny at the Faculty of Humanities were administered to these individuals. These introduce me as a research, the study, its purpose and their expected roles in the study. Once they had agreed to participate, they were asked to sign the consent form (the copy is attached in the appendix section). Those who did not wish to sign the consent form were allow to participate without signing the forms (Ethics Committee, University of Pretoria, 2016).

Participants were assured of the confidentiality of the information and how the data will be stored to ensure that it is not accessible to third parties. Anonymity was guaranteed through the use of pseudonyms for both individuals and their organisations. The subject of study was not sensitive although it dealt with conflict issues. These were issues in the public domain since they were in the agenda of CMFs. The study therefore carried no harm to individuals and their organisations. As representatives of their sectors, individuals were carrying a sector mandate and sharing information carried no danger to their person (Babbie, 2007).

3.6. Chapter Summary

The chapter presented the methodology adopted by this study. It began with a brief description of the research design adopted by the study. It then discussed the mixed methods including the review of literature, interviews and participant observations, which were used collect data. The chapter also discussed the data analysis approach adopted by the study, showing the steps followed in determining the themes that informed the direction of the dissertation. Last, and more importantly, the chapter looked at the ethical issues emerging from the research. It described briefly these ethical issues and how they were addressed.

CHAPTER FOUR

STAKEHOLDERS IN THE OLIFANTS WATER MANAGEMENT AREA

4.1. Introduction

The Olifants Water Management Area has always been known as a catchment with diverse stakeholders and is characterised by various economic activities and water uses. Amongst other things, the mining sector has played a major role in the growth and development of the catchment area in terms of poverty alleviation through job creation and corporate social responsibility. New mines continue to emerge in the catchment, resulting in more demands for water resources to conduct mining activities.

The irrigation sector is also one of the sectors that has grown tremendously since the end of the apartheid era. The introduction of new water laws aimed at reforming the water sector has resulted in the growth of farming activities based on irrigation. More black farmers have emerged to join the irrigation sector, adding to the already bigger system of agriculture dominated by the commercial farmers who have long been in the industry.

While the South African water sector is still finding its feet in trying to reform water policies, the pressure on water demand from all sectors is apparent. The growing number of water users means more demand for water resources, resulting in more pressure on the resources. While water is a basic human right and a crucial resource for water users and stakeholders, in the Olifants Water Management Area, it has become a privilege.

According to Gleick (2007: 1), ‘more than a billion people lack access to safe drinking water and adequate sanitation systems”. The United Nations Development Programme (2004) has argued that, “[the current water crisis has been mainly caused not by a lack of water supply or technology, but rather by a failure in water

governance". In addition, as Wester et al. (2003) have argued, water is a dynamic and politically contested resource. These views provide a point of departure in analysing water conflict between the two major stakeholders in the Olifants Catchment Area - the mining and the irrigation water users.

This chapter focuses on two key issues; it discusses the two key water users already identified and closes with a discussion on the water management institutions established to manage water resources and possibly manage conflict situations between the stakeholder groups. The chapter begins by providing an overview of the Olifants Catchment Area in an attempt to provide a terrain of interaction and for conflict between the two stakeholders. This will help in our understanding and identification of the key factors that may contribute to conflict situations amongst stakeholders.

The chapter then focuses on the two stakeholders. It discusses their activities, their economic, social and environmental impacts, their contributions to the economy, communities, and the issues of concern that cause conflict between the two stakeholders. Lastly, the chapter provides a brief overview of the water management institutions that were put in place to manage water and to detect conflict situations and solve conflict between and among water users. These institutions are meant to oversee that the water resource is accessible to all who need it and is used efficiently.

4.2. Overview of the Olifants Water Management Area

The Olifants Water Management Area is located in the North-eastern part of South Africa and includes parts of the following provinces: the eastern part of the Gauteng Province, the northern parts of the Mpumalanga Province, and the South-eastern part of the Limpopo Province. The Olifants Water Management Area is the catchment of the Olifants River with its main stem originating in the far southern Mpumalanga Highveld region of the Water Management Area. The river initially flows northwards through the Mpumalanga and Limpopo Provinces, draining an area of 54,388 km until at the confluence with the Letaba River in the Kruger National Park.

Within this area, there are settlement areas, including towns like Witbank, Middleburg, Steelpoort, Tzaneen, Phalaborwa, Delmas, Dullstroom, Groblersdal, Mable Hall, Lydenburg, Belfast, Dwarsloop, and Orghistard. There are also commercial farms like the ZZ2 and Alzu; agricultural estates; mines like Platinum Group Metals and Phalaborwa Mining Company; other institutions like Eskom; and nature conservation institutions like the Kruger National Park and the Loskop Dam nature reserve (DWAF, 2011).

The Olifants Water Management Area emerged from a move by the government to merge 19 Catchment Management Areas created in 2004 into the nine Water Management Areas as outlined in the National Water Resources Strategy for 2013. Each of the Water Management Areas aimed at housing a Catchment Management Agency, which meant that nine Catchment Management Agencies were planned for implementation in the nine Water Management Areas.

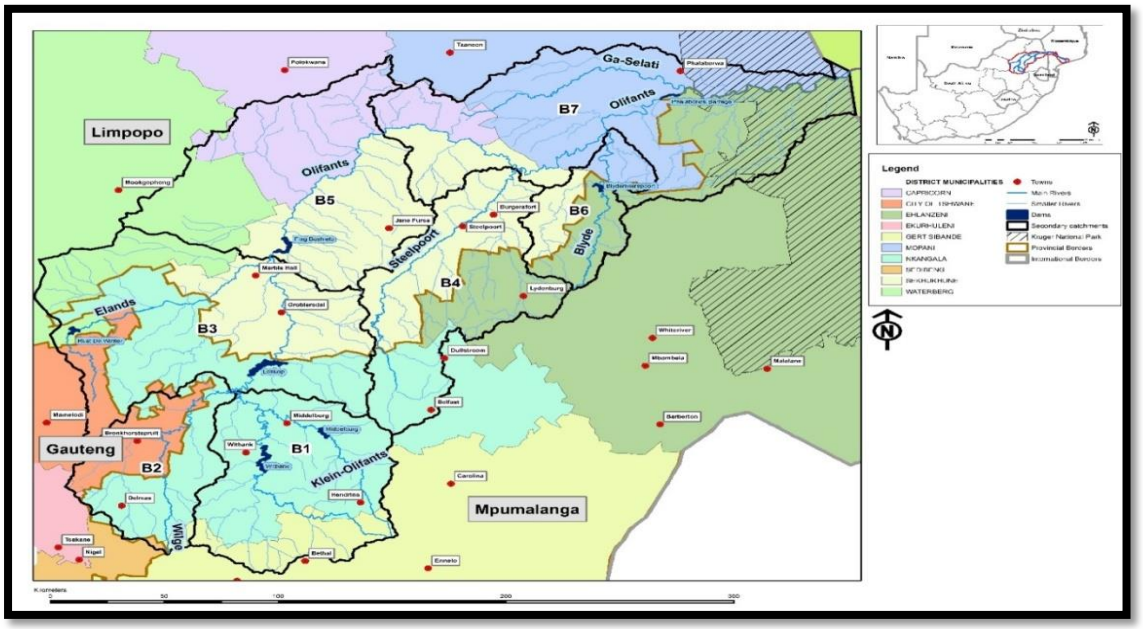
The 19 Water Management Areas then consolidated into nine Water Management Areas after a thorough assessment of the viability of the envisaged Catchment Management Agencies with respect to the availability and allocation of funding, capacity, skills, and expertise for the Water Management Institutions such as Catchment Management Agencies. The adjustment of the boundaries of the Water Management Areas was published in the Government Gazette Number 35517 of 27 July 2012 (Green Gazette, 2012).

The government stated the advantages of reducing the Water Management Areas from 19 to nine as:

- The management of integrated water systems which were previously split across the Water Management Areas will be much easier;
- Scarce technical skills could be better distributed between institutions;
- The establishment of Catchment Management Agencies could be achieved in a shorter time, and;
- Stronger revenue streams will give rise to more sustainable institutions.

The nine Water Management Areas that emerged from the merger of the 19 areas included the following: Limpopo, Olifants, Inkomati-Usuthu, Pongola-Mtamuna, Vaal, Orange, Mzimvubu-Tsitsikamma, Breede-Gouritz, and Berg Olifants. It was envisaged that a Catchment Management Agencywould be established in each Water Management Area to manage the water resources at a defined local level.

Figure 2: Map of the Olifants Water Management Area



Source: DWA (2011)

The Olifants Water Management Area initially comprised of four major rivers:

- Olifants River catchment;
- Elands River catchment;
- Wilge River catchment, and;
- Steelpoort River catchment

These river catchments were later merged with the Letaba River catchment, which had formed part of the Luvuvhu-Letaba Water Management Area. Currently, the Olifants Water Management Area consists of the Olifants River catchment, the Letaba, and the Shingwedzi River Catchments (DWS, 2013).

The Olifants River is one of the major water resources in the area that supports domestic, industrial, irrigation, and mining activities in both rural and urban areas. The major rivers contributing to the Olifants River include the Rietspruit, the Steenkoolspruit, and the Viskuile rivers that confluence to form the main stem of the Olifants River south of Witbank Town. Other rivers within the Olifants include the:

- Klein Olifants River,
- Wilge River,
- Koffiespruit River,
- Moses River,
- Elands Rivers,
- Steelpoort River,
- Blyde,
- Klaserie River that originate from the east of the Steelpoort River,
- Ga-Selati River, and the last and by far the largest tributary and,
- Letaba River, which joins the Olifants River virtually on the Mozambican border.

Scattered communities, most of which do not have secure access to water and sanitation, cover large areas of the catchment area. Major urban areas in the catchment like Tzaneen and Nkowankowa in the Groot Letaba catchment and Giyani in the Klein Letaba catchment are built on commercial agriculture, with a growing base of emerging farmers. Irrigation in the Groot Letaba catchment is supplied primarily via the Tzaneen Dam. Water resources from the Tzaneen Dam have been over-allocated, resulting in high risk to farmers, as the ecological reserve is not being met (DWS, 2013).

As highlighted in the excerpt below, water has become a scarce resource in the catchment, and therefore intensive management of the resource is necessary to ensure much-required sustainable development in the area:

> Our rivers have run dry; water has been diverted to dams that feed farms for the white minorities. In the past, we used to plough maize and harvest in abundance, nowadays our production of crops has declined, ploughing has become a struggle for us emerging farmers, and the department is not doing much to assist us. They have provided us with rainwater harvesting tanks; however, these tanks are useless considering the drought that has stricken the catchment since 2014. How do we harvest water when there is no rain at all? (Interview, Giyani, 22 August 2017).

This statement by Kokwana Chauke, an emerging farmer from Giyani, in the Shingwedzi catchment, highlights potential sources of conflict between the emerging farmers and the white minority farmers who they see as monopolising the water resources.

However, contrary to the statement by Kokwana Chauke, quoting the National Water Resource StrategyII, an official of the department has maintained that the sector has developed key strategic actions to ensure that a National Water Investment Framework is developed in partnership with relevant sector stakeholders (DWA, 2013). This framework seeks to incorporate the costs of the total sector value chain, infrastructure development, and sustainable water management which will include, amongst others, water resource protection, water reallocation, financial support to water-based rural livelihoods, and food security for all.

Even then, Chauke's complaints were not unique, similar issues were raised in other sub-catchments in the Olifants. Emerging farmers, felt that their basic human rights are being violated in respect of water access, despite the fact that water access is a basic human rights enshrined in the Bill of Rights, Chapter 2 of the Constitution of the Republic of South Africa of 1996. This mandate is given to the Department of Water and Sanitation and highlighted in the Department of Water and Sanitation National Water Resources Strategy II. It stipulates that national water resources must be protected, used, developed, conserved, managed, and controlled in an

efficient and sustainable manner towards achieving South Africa's development priorities, in an equitable manner over the next 5 to 10 years (DWS, 2013).

In some instances, the shortage of water has been blamed on the Department of Water and Sanitation. For instance, in Luvuvhu in Venda the department diverted the flow of the river in the Klein Letaba towards the Nandoni Dam. This move left people in the Giyani area without water. In 2015, the communities of Giyani took to the streets to protest against poor service delivery in the area. It is not surprising that water delivery was one of the grievances the community registered.

Reconciliation studies conducted in 2015 by the Department of Water and Sanitation in the Olifants Water Management Area confirmed that the Olifants catchment is experiencing water challenges. The reconciliation study on the Olifants catchment outlined an important issue regarding water supply in the Shingwedzi catchment. In Giyani, for instance, the Middle Letaba Dam was constructed to meet the needs of both irrigation and the town of Giyani, but the dam is unable to meet the growing domestic needs in the area (DWS, 2013). The arrangement, as stated in the National Water Resource Strategy II, is that a temporal transfer of water has been authorised to supply Giyani with water from the Nandoni dam in the Luvuvhu catchment of the Limpopo Water Management Area.

The water resources in the Olifants catchment have become stressed that the required Ecological Reserve cannot be met. The ecological requirements are highlighted by the position of the Kruger National Park at the bottom end of the catchment. The Kruger National Park and other wildlife reserves and recreational facilities are important tourist destinations and significant income generators for the country (DWA, 2013). Major urban areas in the catchment like Tzaneen and in the Groot Letaba are built upon commercial agriculture, with a growing base of emerging farmers. Irrigation in the Groot Letaba is supplied primarily via the Tzaneen Dam. Water resources from the Tzaneen Dam have been over allocated, resulting in high risk to farmers while at the same time the ecological reserve is not being met (DWS, 2013).

The Olifants Water Management Area has the most significant dams, which include the Witbank Dam, Middleburg Dam, Bronkorspruit Dam, Mkhombo Dam, Rust De Winter Dam, Loskop Dam, Flag Boshielo Dam, and Blyderiverspoort Dam. Yet, it is one of South Africa's most stressed catchments in terms of both water quality and water quantity (DWS, 2013). Available water resources are not sufficient to meet the requirements of the users and water requirements have substantially increased in recent years with the mining sector growing rapidly (DWS, 2013).

Residents of the Nkangala District in the Olifants catchment were warned to use water sparingly as the dam water levels have continued to drop as a result of the drought that struck the nation between 2014 and 2016 (DWS, 2018). Reports showed that water restrictions in these areas are still in place even though the dam levels are not dropping dramatically. According to official accounts, the Witbank, Loskop, and Middleburg dams are amongst the affected reservoirs, and this is attributed to a lack of rainfall.

4.2.1. Economic activities and water needs

The major water uses in the Water Management Area include power generation, commercial agriculture (including stock watering, small and large irrigation schemes, dry land farming, and forestry), mining, industry, nature conservation, as well as urban and rural human settlements (DWA, 2011).

The irrigation sector is the biggest use category followed by the power generation industry in the management area. Imported water from the Usuthu and Komati catchment systems is also used mainly to supply the seven coal-fired power stations located in the upper catchment. In the lower part of the Water Management Area, the Thohoyandou area is a significant contributor to the economy, mainly through government and trade, followed by Tzaneen's agriculture irrigation and afforestation.

Tourism also thrives in this area, mainly in the form of the Kruger National Park, and other small conservation-based businesses in the area (DWA, 2011). The economy

of the Water Management Area is largely driven by the mining sector, with large coal deposits found in the Emalahleni and Middelburg areas and large platinum group metal deposits found in the Steelpoort and Phalaborwa areas (DWAF, 2004). Because of extensive mining, the water quality continues to deteriorate, resulting in some water users in the catchment resorting to alternative sources to meet their water needs.

4.3 Stakeholders within the Olifants Water Management Area

The Guide to the National Water Act has highlighted a very important issue about water and stakeholders. It reads:

> Water is fundamental for all life. Without water, no person, plant, animal, or living organism can survive. It waters the fields of farmers, it waters the crops and stock of rural communities, it provides recreation, it supports the environment, it supports towns and cities, mines, industry, and power generation. People need water for drinking, growing and cooking food, washing, and for health. Water is a critical part of social and economic development to alleviate poverty (DWAF, nd).

This statement forms the point of departure in unpacking the stakeholders that are involved in the use, protection, conservation, distribution, control, and management of the water resources both at national, provincial, and local levels. Again, the statement confirms that the Olifants catchment, like many other catchment areas in the country, is very complex and not confined to one form of water use, but has many uses of water such as farming activities, mining activities, recreational activities, and of domestic activities.

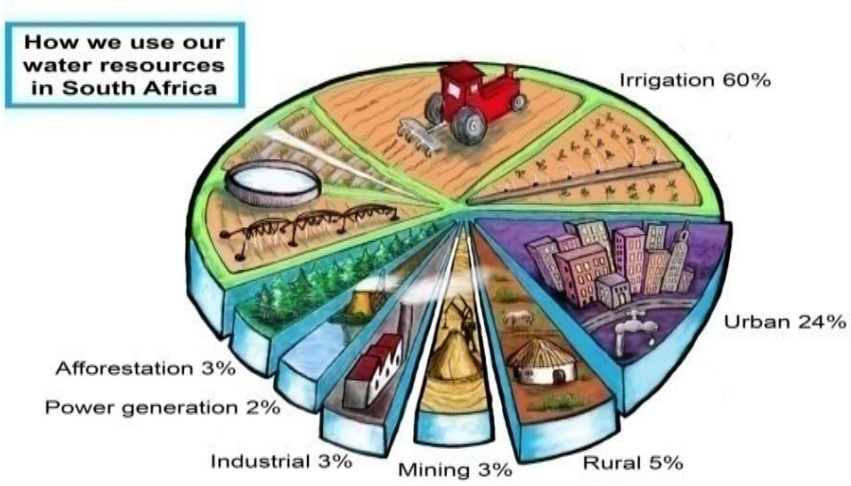
Below is a clear picture that depicts the water users in the Olifants catchment. Even though the picture outlines the general trends in water uses, it is also applicable to the case study. As outlined above, the Olifants catchment is characterised by all these activities shown in the picture. This evidences how complex the catchment is

in terms of the stakeholders and types of water uses. The study has however, been narrowed down to stakeholders from the mining and irrigation sectors and not all water users reflected in this picture were discussed.

Figure 3: Water Users in the water sector

Source: DWAF (nd)

Figure 4: Proportion of water use per main economic sector



Source: DWS (2013)

4.3.1. The mining sector as a stakeholder and water user

The mining sector has always been a foundation on which the modern economy of South Africa is built. As such, the mining industry is one of the most powerful players in the Olifants catchment. Its contribution to the economy is tremendous when

compared to the contribution of a mere emerging farmer who has less capacity to create jobs.

According to a report by the South African Chamber of Mines, the mining industry contributed 8.8% directly, and 10% indirectly, to South Africa's Gross Domestic Product in 2009 (Government Communication and Information Systems, 2011). The sector creates about one million direct and indirect jobs throughout the country. It accounts for approximately one third of the market capitalisation of the Johannesburg Stock Exchange and is a major attractor for foreign investment. The Gross Domestic Product has set a potential employment target of 140,000 new jobs by 2020 for the mining sector (Department of Economic Development, 2010).

The Limpopo Provincial Growth and Development Strategy(2004) identified mining as one of the key drivers of the provincial economy, noting its potential to contribute to economic growth, job creation, enterprise development, and broad-based economic empowerment. The world's largest reserves of platinum group metals are found in the centre of the Limpopo province, which is located within the catchment. These platinum groups also have rich deposits of chrome, vanadium, nickel, diamonds, coal, chrome, iron ore, copper, and titanium.

Large coal reserves occur in most of the western parts of the province, are associated with significant quantities of natural gas or coal bed methane (Jeffrey, 2005). A number of factors drive, and influence future water demands in the mining sector, such as economic policies. This means that the mining sector is seen as a key sector that is expected to drive economic growth and water demands, thereby exerting more stress on water resources (DWS, 2013).

The pressure of water from the mining industry is a result of the fact that the approach and the practice of mine water management in the Highveld Coalfields of the Olifants catchment have changed and evolved substantially over the past 30

years. When coal mining started more than a century ago, water was approached as something to be avoided in the mining operations.

When the large opencast mines were constructed and commissioned in the late 1970s and early 1980s, water was considered in mine planning, but the full impact of water on mining was not appreciated and recognised. More recently, the focus has shifted and mine water is now considered as critical to the management of a mining operation and may affect the public and regulatory approval of the license to operate a mine.

The social and economic development of the upper Olifant catchments is strongly influenced by the Highveld Coal fields, as the region is known for its extensive coal mining operations. Economic activity in the upper Olifants catchments is diverse and interdependent and includes mining, power generation, metallurgic industries, together with farming and eco-tourism. Thus, the Upper Olifants River Catchment is a key economic hub of South Africa that has made and will continue to make a significant contribution to the South African economy. According to a report by the Mining Qualification Authority (2014), the South African coal mining industry is ranked seventh in the world in terms of production and sixth in terms of reserves, contributing 3.6% to global output.

Total coal sales by value increased by 23% f to R87.8 billion in 2010. In 2011, 58% of local coal by value (roughly one quarter in terms of volume) was exported. The main operators in the coal mining sector are Anglo Coal, BHP Billiton, Xstrata Coal, Exxaro mining (the largest BEE mining company in South Africa), and Sasol, a world leader in commercial coal to liquid technologies. The sector has contributed immensely in community development programmes and job creation within the Olifants catchment.

A fact recognised by local residents is that the mines around their area have made a significant contribution through their social responsibility programs. According to one local resident:

> ...these mines have built clinics in our villages and we now have malls around our areas due to the demand from the growing number of people working here. We no longer travel to Polokwane for shopping as we have a shopping complex in our vicinity (interview, Burgersfort, 17 October 2017).

South Africa exports coal to 34 countries, with the European Union being the primary market (84.5%). The five largest mining groups supply over 80% of the country's saleable coal. Coal reserves, and therefore mining activity, are predominantly in Mpumalanga and Limpopo. The mining industry is expanding particularly for coal and platinum and the unavoidable fact is that these mines are located in water scarce catchments, with the Olifants being one of the catchments.

4.3.1.1. Effects of mining activities in the Olifants catchment

Water supplies continue to dwindle because of resource depletion and pollution, whilst demand is rising fast because of population growth, industrialisation, mechanisation, and urbanisation (Falkenmark, 1994). Over 70% of the water used in both rural and urban areas in South Africa is surface water drawn from rivers, streams, lakes, ponds, and springs (DWAF, 2004). This situation is no exception to the current situation in the Olifants Water Management Area that has been flooded with a growing number of mining companies, in particular the coalmines. These mines deposit great amounts of acid mine drainage, which affects the water sources in the areas.

The Upper Olifants catchment plays a key role in providing coal to support numerous power stations in the catchment. Because of the large amount of coal mining in the area, the water quality in this area is under threat from acid mine drainage and significantly high salt loads. Although this challenge is being managed by managed

by the mining industry, on operational mines, the upper Olifants catchment faces continued challenges due to the large number of ownerless mines that are the responsibility of the State.

The rapid expansion of mining in the catchment presents a significant inter-governmental challenge with the Department of Mineral Resources, Environmental Affairs, and Water and Sanitation all having a role to play in various aspects of authorisation and regulation. In addition, phosphate concentrations from inflows of untreated or partially treated sewage from municipal wastewater treatment works is presenting an increasing concern with trophic status of the Loskop Dam becoming an increasing concern.

The effects of mining activities within the Olifants Catchment Area includes acid mine drainage, which is the single most significant threat to South Africa's environment (Younger, 2001). Acid mine drainage is the release of many chemical contaminants into the water resources. The problems associated with acid mine drainage result largely from an era, prior to the National Water Act and the National Environmental Management Act, when control over mining impacts and closure of mines was far less stringent than it is now (DWS, 2013).

Acid generation and metals dissolution are the primary problems associated with pollution from mining activities. Acid mine drainage from coal mining is problematic in the Highveld coalfield in Mpumalanga and has been reflected in the media as a source of severe pollution seen in the Loskop Dam and the Olifants river catchment (Naiker, 2003).

It is likely that new coal mining in the Waterberg coalfield in the Limpopo Province will lead to similar problems in the area in the future if precautions are not taken. The Water for Growth and Development Framework identifies acid mine drainage as the most important threat to water quality in South Africa. Evidence from the study reveals that the mining industry has a substantial interest in water. It utilises a large

amount of water to process coal. For instance, mines use water for cooling, dust suppression, irrigation, and potable water, process water in plants, recreation, and rehabilitation of plants (Pulles et al., 1995).

4.4. The irrigation sector as a stakeholder and a water user

The agricultural sector accounts for approximately 60% of water utilisation in South Africa (DWS, 2013). It is a major land use in the catchment, with 8,160 km2 of dry land agriculture (about 15% of the catchment area) and 800 km2 of irrigated agriculture (about 1.5% of the catchment area). Commercial farming represents approximately 80% of the dryland agriculture and almost the totality of the irrigated agriculture, the rest being subsistence agriculture mainly in the former homelands (areas occupied by black people prior to 1994).

Large parts of the catchment are used for game and stock farming. Other irrigation activities in the Olifants catchment falls within the Limpopo province, which covers an area of 12.46 million hectares and accounts for 10.2% of the total area of South Africa. This catchment is endowed with abundant agricultural resources and it is one of the country's prime agricultural regions noted for its production of livestock, fruits and vegetables, cereals and tea (LDA, 2012).

The sector comprises both the commercial farmers and subsistence farmers working on about 1.3 million hectare of irrigated farmland (DWS, 2013).These two systems of farming evolved because of past policies of the previous governments under the apartheid regime. Commercial farming consists of white farmers who practice a large scale farming using the most advanced production technology. They occupy approximately 70% of the total land area.

These commercial farmers operate large farms which are well organised and situated on prime land. There are approximately 5,000 commercial farming units in Limpopo (Vink et al., 2009). Emerging farmers cover approximately 30% of the farming land. Farming for emerging farmers is characterised by a low level of

production technology and a small size of farm holding of approximately 1.5 hectares per farmer with a production for subsistence and little marketable surplus (Vink et al., 2009).

In South Africa in general, the agriculture sector continues to grow and new emerging farmers have entered the sector through the country's land reform programme (Tapela, 2012). Since the late 1990s, the South African government has implemented a nationwide programme to "revitalise" state-owned smallholder irrigation schemes, which fell into disuse following sudden withdrawal of government subsidies in 1994. Of the 302 smallholder irrigation schemes found in South Africa (Van Averbeke et al., 2011), most are located in the Limpopo Province, which covers a large portion of the Olifants catchment and many of the schemes are located in impoverished former homelands. A smaller proportion consists of former white farmer settlement schemes located in commercial farming areas.

To date, the land reform programme has led to the development of emerging farmers nationally (Tapela, 2012). Within the Olifants Water Management Area, new emerging farmers have entered the fray in the Mpumalanga and Limpopo provinces, joining the already established commercial estates and large-scale commercial operations. The New Growth Path (NGP) has set a target of 300,000 households in small holder schemes by 2020 and 145,000 jobs to be created in Agro-processing by 2020 (DRDLR, 2016).

Irrigated agriculture is the largest single user of water in South Africa and has potential for a huge socio-economic impact in rural communities (NWRSII, 2013). Yet, shortage to water resources is a major limiting factor in the growth of the water sector and the poor water quality has a negative impact on agricultural exports and associated foreign income (NWRSII, 2013). This means that water has become an area of contestation and of potential conflict within the sector.

This is evidenced in the following scenario. Mr. De Kock, a commercial farmer around Loskop Dam in the catchment, reported a case of water theft by emerging farmers from his canal. He had confronted the stakeholder concerned who was identified as a local emerging farmer in the area. During an interview that was organised with the reported emerging farmer, who happened to be identified as Mr Ngovheni, a retired teacher in the area, Ngovheni expressed serious concern around black emerging farmers who have a passion for farming and want to participate in the economy.

However, he says they get no support from the government. He argued that black farmers are denied access to water for their agricultural practices while water passes through the canals next to their fields. He agreed that he had been taking water that belongs to Mr. De Kock illegally because he cannot allow his crops to dry up while there is a canal passing by his field. Various departments, including the Department of Water and Sanitation and the Department of Rural Development and Land Reform (DRDLR), had been engaged on this matter. However, no immediate action had been taken to address both De Kock and Ngovheni's grievances.

Within the Olifants catchment, commercial farmers include big farming establishments. These are the largest agricultural producers within the catchment who supply their products both locally and around Africa. These large agricultural producers contribute to food security and improve the lives of people in the country. One of the informants noted this:

> These are huge producers, with a huge financial muscle. They are involved in year-round production, producing locally consumed products and exports. Their presence cannot be ignored and their water utilisation is massive (interview, Olifants, October 2017).

Their contribution to the economy is massive as they employ a number of people. ZZ2, for instance, is the largest producer of tomatoes in the Southern hemisphere.

The company supplies consumers with tomatoes throughout the year. Within the Limpopo Province, they operate mainly in areas such as Mooketsi, Polokwane, Waterpoort, Ondrift, and Tshipise along the Limpopo River. All these areas are based within the Olifants catchment in the Limpopo side. It is important to note that ZZ2 does not produce tomatoes only; their produce also includes avocadoes, mangoes, onions, garlic, dates, apples, pears, and stone fruits. Their production is very huge at 40% of South Africa's total tomatoes market.

4.4.1. Categories of farmers in the Olifants catchment

Van Zyl et al. (1991) classify farmers into three main categories, namely: commercial, emerging, and subsistence farmers. Each category is defined as follows:

Commercial farmers

Commercial farmers are defined as those who operate in the market economy. Commercial irrigators fall roughly into a number of categories in terms of their access to water. About one-third of the irrigated area in the Olifants catchment falls under Irrigation Boards or Water User Associations as discussed above, while other categories are served from government water schemes, most of which are at some stage of hand-over to user-management.

These commercial farmers derive their water rights from the riparian principle and are withdrawing water directly from rivers and streams. The latter group had no need to participate in user management groups, a situation that is likely to change with the implementation of catchment-based water resources management. Commercial farmers are well organised, but they are often overwhelmed and uncertain about the implications of the National Water Act and have expressed their concern around the establishment and operation of a Catchment Management Agency.

Emerging farmers

The Olifants Water Management Areas is one of the catchments in South Africa with the poorest rural areas. Recently, South Africa's 42 new District Councils were

ranked in terms of poverty indicators for the implementation of the President's Integrated Rural Development Programme (IRDP) and the greater part of the Olifants basin came out amongst the top priorities for development. Emerging farmers have had a troubled history of imposed development and state managed irrigation infrastructure with only a small portion of the irrigated area in the Olifants basin occupied by emerging farmers.

A relatively large number of families derived at least part of their livelihoods from irrigation, either on the formal government schemes, or on much smaller communal vegetable gardens or homestead food gardens. While their need for access to water is desperate, this sector is probably the most disorganised and under-represented of all water user sectors in the Olifants and many other South African river basins.

4.4.2. Impacts of the irrigation sector

Although agriculture directly generates less than 5% of South Africa's Gross Domestic Product, it is only now gaining recognition for its importance in combating widespread rural poverty and as a stabilising factor in the national economy. Taking a broader perspective on the contribution of agriculture to Gross Domestic Product and including associated support services and Agro-industries, agriculture actually accounts for more 14% of the total Gross Domestic Product.

The Gross Domestic Product multiplier of agriculture is 1.51 overall. Further, out of an economically active population of 13.8 million people, at least 35% are directly or indirectly dependent on agriculture. About 10% of total export earnings of the country are from agriculture.

Irrigation produces a quarter of the agricultural output on 11% of the cultivated land (see Hirschowitz, 2000; Mullins, 2002). One of the early actions of the post-apartheid government was to formulate a new and progressive water policy that mandated, among other things, integrated management of water resources at the basin level.

The vehicle for this is the Catchment Management Agency, which is intended to be the primary policymaking and management entity at the basin level.

The country is presently engaged in implementing this policy, and in the process, confronting a number of very challenging issues. These issues include the task of developing integrated representative governance of the Catchment Management Agencies in a bi-polar social and economic environment, sharing of costs amongst water using sectors, and formalisation and reallocation of water use entitlements in a context of growing water scarcity.

4.5. Water Management Institutions

This section builds from the discussion in the previous section. It moves from the water user stakeholders to a discussion of water management institutions that have been put in place to manage water resources at the local level and possible manage conflict situations in the catchment management area.

The section presents findings on the role and the viability of the water management institutions in the management and mitigation of water conflicts between water users as they grapple with water use in their daily activities and interaction with each other in the different catchments of the Olifants WMA. Conflict situations must be managed, and this chapter looks at the institutional terrain, operations, and policies that govern these institutions. It outlines the policies that are in place to resolve or mitigate conflict within the water management area. This section focused specifically on the effectiveness of these institutions in handling stakeholder conflicts. Lastly, the chapter presents the chapter summary.

4.5.1. Department of Water and Sanitation

The 1996 Constitution established water as a national competency, vesting responsibility for water resources and services in the Department of Water Affairs and Forestry. The Department was fundamentally transformed in terms of its functions and staff (i.e. in terms of race, gender, and disciplines) to respond to its

new mandate and it embarked on an aggressive program to speed up basic water and sanitation service delivery to the marginalised areas and change the resources management paradigm from a supply driven to a demand-driven approach.

With the advent of democracy, the Department of Water and Sanitation, then called the Department of Water Affairs and Forestry, is the custodian of the country's water resources, a mandate that has been outlined in the Constitution of the Republic of South Africa, Act 108 of 1996. The Constitution stipulates that:

- Everyone has the right to have access to sufficient food and water;
- Everyone has the right to an environment that is not harmful to their health or well-being;
- The environment must be protected for the benefits of all people living now and in the future;
- National government is the custodian of the sources of water such as rivers, ground water, and dams and local government is in charge of municipal water services.

Based on this constitutional mandate, the Department of Water and Sanitation's role is to set the national objectives for protecting water as a resource. The Minister of Water and Sanitation, as the public trustee of water resources on behalf of National Government, has the overall responsibility for all aspects of water resources management in South Africa. The department formulates policies, strategies, and frameworks for managing South Africa's water resources. These policies and frameworks include the implementation of the National Water Act and the Water Services Act.

The National Water Act provides for the establishment of Water Management Institutions such as the Catchment Management Agencies and Water User Associations to manage water resource and foster stakeholder relations through the Catchment Management Forums at the local catchments (DWS, 2013). The Department has implemented its legislative mandate through the formulation of

strategies such as the 2013 National Water Resources Strategy II. As a custodian of the national water resources, the department has the role to oversee and support these Water Management Institutions to ensure that water resources are well managed, used, controlled, and allocated in an efficient manner (DWS, 2010).

4.5.2. Water User Associations

The National Water Act of 1998 calls for the transformation of existing Irrigation Boards into Water User Associations and removes title deeds as a membership requirement. It thus also enables the establishment of Water User Associations on communally owned tribal or state land. The National Water Act authorises the issuance of water use entitlements – and by extension membership of Water User Associations– to water users rather than landowners.

This is of particular importance in tribal areas where Permission to Occupy certificates have traditionally been issued to men, but where women are predominantly the users of the land and water. As of early 2003, only a few Irrigation Boards nationally have been officially transformed into Water User Associations, and only one formal Water User Associations has been established on a small-scale irrigation scheme in the Olifants Basin, the Groot Letaba WUA.

The formulation of the National Water Act of 1998 created a framework for fundamental institutional transformation for the water resources management sector which outlined that the former irrigation boards (established under the 1956 Water Act) had to change to in order to accommodate transformation processes in the country and to redress the imbalances of the past.

This meant that the irrigation boards had to accept transformation, include previously disadvantaged individuals (e.g. emerging farmers, who were mostly black farmers), allow for equal representation in terms of race and gender in decision making, and allow an equal allocation of the water resources. Irrigation boards were required to

transform into Water User Associations and expand their membership to include all water users of all water resources within an area of jurisdiction (WRC, 2003).

A Water User Association is a statutory body established by the Minister of Water and Sanitation under the National Water Act. It is a Co-operative association of individual water users who wish to undertake water-related activities for their mutual benefit. The objective of a Water User Association is for water users within the community to pool resources (money, human resources, and expertise) to more effectively address local water-related needs and priorities. They operate at a restricted localised level and have an important role to play in terms of poverty eradication and providing food security (DWS, nd).

Water User Associations are established to manage water infrastructure such as irrigation water supply schemes, supply water to an entitled water users, and to implement management decisions agreed upon between the members. Water User Associations face a number of challenges in relation to the policy environment, particularly in relation to their organisation and functions (WRC, 2003). One of the challenges is creating a balance between commercial farmers who have investments in farming and emerging farmers who do not have that level of investment.

The establishment of Water User Associations to replace old 1956 irrigation boards meant that the previously advantaged groups in the country had to decentralise power and decision making around water resources management. They also had to start including previously disadvantaged groups in their discussions of water resource allocation and management. Within the Olifants Water Management Area, there are many Water User Associations; however, the Groot Letaba Water User Association was identified as an example for the policy changes that took place during post-apartheid era which required old irrigation boards to transform in to Water User Associations (WRC, 2003).

The Groot Letaba Water User Association was transformed from the old Groot Letaba Main Irrigation Board. This water management institution covers commercial farming areas around Letaba River as well as some trust land of the former Gazankulu Homeland. Historically, the irrigation board was responsible for irrigation water supply to farmers around the Tzaneen Dam and Ebenezer Dam, fed by the great Letaba River. This covers an area of about 12,000 hectares of land, approximately 9,000 hectares of white-owned and approximately 3 000 hectares of black-owned land (WRC, 2003).

Currently, the Water User Association comprises commercial farmers from the old irrigation board and new members of the former homeland areas which include small-scale farmers and individual water users. The other sectors that use water in the same area such as industry and the municipality are not represented in the Water User Associations. As with the Catchment Management Agencies, the Minister of Water and Sanitation has recalled the establishment of Water User Associations and proposed they be dissolved (DWS, nd).

A due diligence study has been taken by the department to investigate the Water User Associations that are performing well and those that are not achieving their targets of transformation since the irrigation boards were dissolved. To date, the direction of the Water User Associations is not clear which has created fears for many water users, in particular the white commercial farmers. The reason for the proposed disestablishment was their failure to transform. The study learnt that:

> ... the reason for dissolving the Water User Associations after they were being transformed from the irrigation boards was that most Water User Associations are still operating like before; white farmers are still dominating with more powers, resources, knowledge and finances than the emerging farmers, whose interest is mostly not taken in to consideration. These Water User Associations are operated like a family association instead of representing the interest of all the water users, especially the historically disadvantaged individuals who were marginalised in the past (interview, Pretoria, September 2016).

Representatives of the Water User Associations, like other stakeholders and water users in the catchment, are expected to participate in Catchment Management Forum platforms, because most issues discussed in Catchment Management Forums may affect them. Their role in the Catchment Management Forum also includes communicating their projects and their issues and to provide inputs in the management of water resources in the catchment(interview, Pretoria, September 2016).

4.5.3. Catchment Management Agencies

The National Water Act provides for the establishment of Catchment Management Agencies to take responsibility for water resources management at a regional or catchment area level. The role of the Catchment Management Agencies is to ensure that water resources are managed in accordance with national policies, guidelines, and standards in their jurisdiction through the active participation of local communities and other stakeholders in the water sector (National Water Resource StrategyII, 2013).

In the 2004 edition of the National Water Resource Strategy, it was proposed that 19 Catchment Management Agencies be established to take responsibility for all the catchment in South Africa. After assessment of the viability of the envisaged Catchment Management Agencies, the number of these institutions was reduced from 19 to 9 CMAs, in respect of the availability and allocation of funding, capacity, skills, and expertise (DWS, 2012). The nine water management areas are Limpopo, Olifants, Inkomati, Usuthu, Pongolo-Umzimkhulu, Vaal, Orange, Mzimvubu-Tsitsikamma, Breede-Gouritz, and Berg-Olifants. For the purpose of this study, the Olifants Water Management Area was selected as the subject area.

The Catchment Management Agencies are delegated certain water management functions. However, these functions exclude those that have national strategic implications. According to the Department of Water Affairs (2013), the functions delegated to the Catchment Management Agencies include:

- Stakeholder Participation
- water use authorisation;
- water resource protection;
- compliance monitoring and enforcement;
- coordination of water conservation and water demand management programmes;
- water quality management;
- establishment and oversight of Water User Associations, water resources planning, water resources information management;
- billing and collection of water use charges, and;
- coordination of disaster management

Each Catchment Management Agency is responsible for protecting the catchments and aquifers within its Water Management Area in accordance with the national water resource strategy. Protection of a water resources means:

- to maintain the quality of surface and ground water so that it can be used in an ecologically sustainable way;
- to prevent degradation of the river or aquifer, and;
- to rehabilitate the river or aquifer in order to protect the national water resource, the resource needs to be developed, managed, and conserved.

In addition, protection of the resource requires control of use from the resource and control of activities within the resource–for example, controlling abstraction from the resource and controlling the return of effluent and disposal of waste to the resource.

The Catchment Management Agencies also have the role of investigating and advising on the protection, use, development, conservation, management, and control of the water resources in its water management area and to co-ordinate, the activities of water users and of the water management institutions involved.

Amongst other things, they incur costs in protecting and managing the resource, evaluate and issue licences to water users, monitor implementation of the licence conditions, monitor water resource quality against the water resource objectives, detect non-compliance behaviours, issue directives for corrective measures, prosecute unlawful use of water, and promote water conservation.

These costs are recovered by the Catchment Management Agencies from the users (those that abstract raw water from the river or aquifer or those that discharge waste water or treated effluent back into the river) in the form of a Water Resource Management charge.

It is important to indicate that, even though the concept for establishing Catchment Management Agenciesis good, its implementation has been marked by many challenges. To date, only two Catchment Management Agencies (the Breede-Gouritz and the Inkomati-Usuthu Catchment Management Agencies) have been established and are functional.

Even though the Inkomati-Usuthu CMA is considered as the best case study for the functioning of the CMAs, they still exist a number of challenges on the establishment of CMAs and many respondents have questioned their viability. The Olifants Catchment Management Agency is still not yet fully functional and operates as a Proto-CMA. According to a department official:

> This means that the institution is not yet fully functional. The minister has not yet fully delegated all the water management functions for the institution to be declared a Catchment Management Agency (interview, Department of Water and Sanitation Head Office, October 2017).

In 2017, the Minister of Water and Sanitation again proposed the reduction of the nine Catchment Management Agencies to one single Catchment Management Agency, arguing that National Treasury and unions such as NEHAWU recommended that only one Catchment Management Agency should be established

to reduce financial costs. A submission approved by the Minister, stated the following issues on this matter:

- The establishing a single Catchment Management Agency will facilitates the separation of functions: policy, regulation, and operational functions to be managed separately (threat of self-regulation must be eliminated).
- It allows for decentralisation to a local level through regional structures.
- Improved financial viability: having a single Catchment Management Agency will save costs compared to having multiple institutions, which is costly. Previous studies have also argued that the single Catchment Management Agency option will facilitate improved revenue collection, which would reduce reliance on funding from the National Revenue Fund.

The National Education, Health and Allied Workers Union (NEHAWU) went on a full blown nation-wide strike from the 08 March 2018. One of the demands of the union was that the Department “should stop the unilateral process of establishing the single Catchment Management Agency and consult labour” Currently, any activities involving the establishment of the Catchment Management Agencies have been discontinued and further stakeholder consultations are underway regarding the new proposal.

This would mean that DWS as represented by the regional office remains with the full functions of the Catchment Management Agencies until a Catchment Management Agency is also established. This situation has raised uncertainty for water users in the sector and many have expressed dissatisfaction with the management of the water resources in the country. This has also created pessimism amongst water users.

4.5.4. Catchment Management Forums

The Department of Water and Sanitation through the NWRS II (2013), has a mandate to establish Catchment Management Forums to manage water resources at the local level and to foster stakeholder relation to participate in decision making

regarding water resources management in the catchment. The National Water Resource Strategy II defines Catchment Management Forums as non-statutory bodies established to democratise participation in water resource management and to support Catchment Management Agencies (DWA, 2013).

They provide a potentially efficient and effective way to facilitate the coherent participation of stakeholders with diverse interest in decision making about water resources management. They are important structures for facilitating stakeholder representation in the establishment of Catchment Management Agencies and are envisaged to play an active role in assisting the Catchment Management Agencies in carrying out their functions (DWS, 2013).

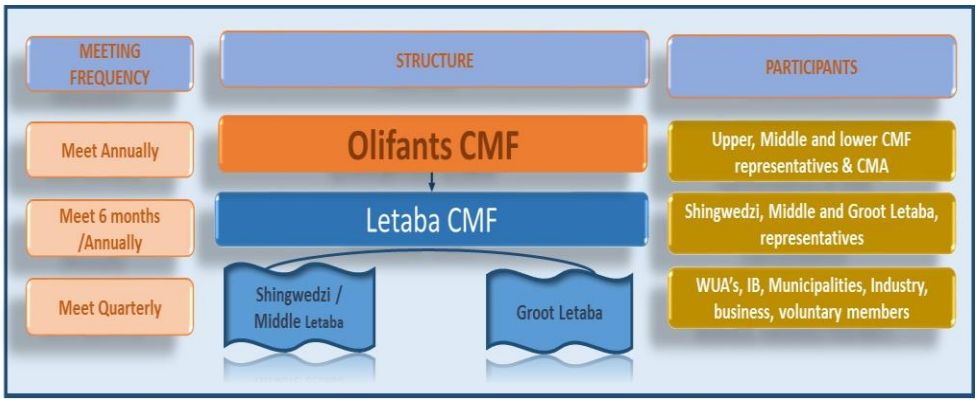
Issues of concern within the catchment that form part of Catchment Management Forum discussions that are also a priority in the management of water resources include: sewage spillages, illegal sand mining, disposable nappies, uncontrolled settlement, water losses, drought, floods, soil erosion, illegal water connections, acid mine drainage, old water infrastructure, and lack of sewage drainage system. The Olifants Water Management Area consists of five Catchment Management Forums:

- Upper Olifants;
- Middle Olifants;
- Lower Olifants;
- Shingwedzi;
- Letaba (Interview, Olifants, 2017)

The Catchment Management Forums are structured throughout the catchment to allow fair representation of stakeholders in water resource management.

The organisation of the Olifants Catchment Management Forum is represented in Figure 5 below.

Figure 5: Organisational structure of the Olifants Catchment Management Forums



Source: Olifants Catchment Management Forum Charter, 2017

Initially, Catchment Management Forums were used as vehicles to facilitate the establishment process of Catchment Management Agencies. The process started around the year 2001 when a number of public meetings were conducted through the Catchment Management Forums to inform the public about plans to establish Catchment Management Agencies. This process led to the establishment of the first Catchment Management Agencies in the country in 2004, the Inkomati Catchment Management Agency followed by the establishment of the second CMA, the Breede-Gouritz Catchment Management Agency in 2006.

Even though the National Water Act does not specifically recognise the Catchment Management Forums, currently, with the process of establishing Catchment Management Agencies within the catchments, the National Water Resources Strategy II has recognised Catchment Management Forums as important structures for facilitating stakeholder representation. It envisages Catchment Management Forums to play an active role in assisting Catchment Management Agencies in carrying out their functions (DWS, 2013).

4.5.4.1. Catchment Management Forum meetings and their challenges

There are Catchment Management Forum meetings that are conducted once every quarter to discuss issues of concern for the catchment. However, there are growing concerns over the frequency with which these meetings are held. The general feeling is that one meeting per quarter does not do justice to the governance of water in the catchment.

Apathy towards meetings emerged as a major area of concern during the study. There were serious concerns over the non-attendance of local municipalities despite the fact that invitations to the meetings are being forwarded to the municipal offices. It emerged that Catchment Management Forum meetings often clash with other important commitments for certain stakeholders. The challenge is that stakeholders do not bother to ask for apologies as revealed:

> Some stakeholders do notify the Catchment Management Forum coordinators in time that they are committed somewhere else. It becomes a problem if a stakeholder fails to attend the meeting and does not even send an apology to the Catchment Management Forum coordinator in time (interview, Middleburg, October 2017).

The weaknesses of Catchment Management Forums identified in the study align with findings elsewhere in South Africa. Munnik et al. (2016) identified these weaknesses as outlined in Box 2.

Box 2: Catchment Management Forum weaknesses

- Catchment Management Forums, with some notable exceptions (those driven by the Catchment Management Agencies or an exceptional regional office like those in KwaZulu-Natal, or by strong active local citizens), are generally weak. They are internally weak in terms of administration, logistics, support to participants, and facilitation that leads to collective action.

- The Catchment Management Forums are also weak in the sense that they are not able to call water abusers to account. They are not able to compel their attendance and accountability or to illicit, a response from the Department of Water and Sanitation on issues that are tabled in Catchment Management Forums meetings.
- Currently, Catchment Management Forums are weakened by uneven participation, particularly the absence of previously disadvantaged groups in the forums. Apart from the obvious flaw that the privileged are not likely to drive transformation in the water sector, this also creates the problem of decisions being made by the strongest stakeholders, either corporate or a strong white local water technocracy. This makes Catchment Management Forums politically isolated, easy to marginalise, and not influential.
- Catchment Management Forums are not busy with reallocation of water, but rather the defence of existing water resources, mainly against such water quality problems as bad effluent from local municipalities' Waste Water Treatment Works (WWTWs), pollution from mines and industry, diffuse pollution from agriculture, informal settlements, and areas without solid waste. They are not involved in the reallocation of productive water and are not paying attention to what is a huge challenge for the majority of South Africans: that of water service delivery and water access to households

4.6. Chapter Summary

The chapter has provided a profile of the Olifants Water Management Area, and highlighted its economic context, the water requirements, and the different types of water uses that could be detrimental to the main business and activities of the other water users. It has shown the catchment as a water-stressed area, where water resources are over-allocated.

This chapter has also shown how the South African water sector has succeeded in putting water reform policies in place as a way of redressing the imbalances of the past water laws. However, implementation of these policies has proven to be a challenge. Conceptualisation of these policies, legislation, and the water

management institutions have been supported by many. However, the implementation, in particular with the Olifants catchment, seems to be failing. The Olifants catchment is a stressed catchment with more and more demands for water from the water users.

CHAPTER FIVE

WATER CONFLICT AND ITS RESOLUTIONS IN THE OLIFANTS WATER MANAGEMENT AREA

5.1. Introduction

This chapter begins with a discussion on the WMIs and the conflict resolution processes in the catchment. The chapter will also highlight key issues that have been identified as having the potential to cause conflict between the mining and the irrigation water users. Narrations of respondents on water theft, water user confrontations and other water related challenges between the water users are also discussed in this chapter. The chapter aims to discuss conflict situations inherent in the catchment area, and how conflicts that ensured were resolved amongst the water users. The chapter begins by looking at the water management institutions and the conflict resolution process.

5.2. WMIs and conflict resolution process

At a water management area level, the CMA or the regional office receives disputes through the individual water users, WUAs, CMFs and the customer relations unit within the Department of Water and Sanitation. The CMA or regional office assumes a role of a mediator. Regarding the Olifants, there is no formal dispute resolution process in place. However, after receiving any dispute, it is recorded and referred to the relevant section in the regional office. The role of the office is to mediate the whole process by conducting an investigation or a fact-finding consultation with the parties involved.

Once the mediation process is complete, the parties will be presented with a solution, which they will have to accept or reject. If both parties agree on the solution, they would implement the resolution taken. However, the regional office has no powers to enforce the resolution and these resolutions are not legally binding to any of the parties. During this period, policy is used to guide the whole process,

especially in the case where one water user is found to have contravened the Act, the particular section will be used to try to enforce the resolution.

If disputes have not been successfully resolved at the water management area level, they are escalated to the national level, represented in this case by a water tribunal that assists in resolving the conflict (DWS, nd).

A water tribunal is an independent body that was established in 1998 and is responsible for holding dispute hearings and appeals against directives and decisions made by responsible authorities such as Catchment Management Agencies or water management agencies on matters covered by the National Water Act, Act 36 of 1998, like the issuing of licenses to use water, (DWS, nd).

5.3. Potential Cause of Conflict due to Mining Activities

According to the World Wildlife Fund (2011), the Olifants Catchment Area is an area that has experienced over 100 years of coal mining, and now has some of the poorest water quality in the country. Other economic developments in the catchment, such as agriculture and tourism, have been threatened because of the impact of coal mining activities. These mining activities include coal, platinum, vanadium, chrome, copper, and phosphate extraction.

Coal mining takes place in the upper reaches of the catchment around including places like Emalahleni, Middelburg, and Delmas, and these areas are also associated with large thermal power stations. The platinum, chrome, and vanadium mines are located in the Steelpoort and Middle Olifants areas of the Water Management Area while copper and phosphate mining occurs in the lower Olifants catchment around Phalaborwa.

This is the most important coal-producing area in South Africa and it supports some 65 collieries working several seams in the Ecca coal belt. The Witbank coalfield contains a large and very important resource of high yield, export quality steam coal.

The Phalaborwa Complex on the other hand, contains large deposits of copper, magnetite (iron ore), and apatite (phosphates), as well as deposits of copper and magnetite (iron ore expanding mica used in horticulture, agriculture, and construction). It also hosts important concentrations of zirconium (in the form of baddeleyite), uranothorianite, nickel, and precious metals. Because of such activities, which impede on the activities of other water users, relations between the mining sector and other water users, have been characterised by conflict.

During my fieldwork in 2017, a local farmer in Phalaborwa, Mr Van Niekerk, mobilised local residents to object to a water licence application by a new mining company called Thanzima Colliery & Co. The locals argued that they do not want mining activities in their area because they will degrade the environment and pollute their water resources.

A petition was circulated during a Catchment Management Forum meeting to object to the approval of the mining rights to the mine. The petitioners made use of an incident, which led to the closure of Ms van de Holf's farm in Lephalale in 2014, as an example. The incidence is presented in Box 3 below. To date, the proposed mining company has not been granted a mining and a water rights licence by the Department of Mineral Resources and the Department of Water and Sanitation.

Box 3: Soil and surface water contamination

This incident was reported at a Catchment Management Forum meeting in the Olifants Water Management Area in 2016. Ms van de Holf complained about the contamination of soil in her farm, which affected production after a discharge of acid mine, drainage/effluent discharge from a nearby mining company.

She requested that the Department of Water and Sanitation to close her water use account due to a polluted Selati River, which had contributed to her failure to continue her irrigation activities. During my field visit to the farm, the following was observed: no irrigation activities were taking place on the farm (see attached pictures below); the Selati River was reportedly to be polluted due to affluent discharged from the mines.

Polluted water source, Olifants 2016

Abandoned farm due to water and soil contamination, Olifants 2016

Catchment Management Forum meeting presentation, Olifants 2016

Furthermore, due to the extensive mining activities in the Olifants catchment area, the water quality continues to deteriorate, resulting in some water users in the catchment resorting to alternative sources to meet their water needs. An environmental campaign manager in the area reported through City Press that:

> Mines use large volumes of water to wash coal and this could have led to the streams running dry. It is possible that this mine uses water from one of the streams and, because the streams are interlinked, it affects the smaller streams, too (City Press, 03 June 2018).

He added that “mining does affect water in many ways, in terms of pollution”, and believed that the mine might also have drilled boreholes so that they have a back-up water source when the stream dries out (ibid).

Lastly, a number of respondents have indicated that “power” plays a major role in the allocation of water resources within the catchment. These respondents felt that, due to its power, the mining industry has always been given priority in the allocation of water by the department. The mining industry is recognised in the Olifants catchment, and there are growing concerns that:

> It is given priority in the water sector because it has the potential to grow the economy, they employ a huge number of people, they contribute to the poverty alleviation, their social labour plans contribute to community development, and they build clinics (Interview, Emalahleni, 06 November 2017).

To support these claims, people point to the construction of the bulk water distribution system for the De Hoop Dam, which began in October 2012 to supply water to the Greater Sekhukhune, Waterberg, and Capricorn district municipalities. The project started in mid-2007, yet local residents have complained that they are still to benefit from the water from the project. A local resident said during an interview:

> The last time we had water coming from taps here was late last year. Now all we see are big (bulk supply) pipes being laid past our village. The water is now going towards Steelpoort mining areas whereas, in the beginning when De Hoop dam was initiated, we were told that the dam will benefit the local people. The mining sector, because of its power to boost the economy of the country, is the first to benefit from the water source while communities struggle to access basic water services. We have become used to fetching water from the nearby river and people get sick from that water because is not treated. Until we see regular water supply, we remain without much hope (Interview, Burgersfort, 03 October 2017).

Contrary to these views are those of Mr. Ndoro, an official from the Department of Minerals Resources in the catchment. During an interview, he stated that the department was aware that opposition parties and a few communities have politicised the water issue by arguing that mining companies benefit the most from the De Hoop Dam. This, he said, was not the case. Rather, the department will ensure that both nearby communities and mines will gain equally from the De Hoop Dam. He promised:

> De Hoop's water will soon reach local households, but the construction is firstly focused on laying the big pipelines to finish the bulk distribution system to the nearby mines. These bulk supply pipes will draw water directly from the dam to municipal purification plants and mines, which will then process the water and move it on to "end-users" which includes local villages (interview, Bronkorspruit, 03 October 2017).

Other issues of power have played a major role in the mining industry amongst the stakeholders from within the same sector. For instance, in the Olifants Catchment Area, there are a number of mining companies, both emerging and old mining companies that have long been operational. The main operators in the coal-mining sector are Anglo Coal, BHP Billiton, Xstrata Coal, and Exxaro mining.

Sasol is also a major player in the coal mining industry, albeit the coal mined by Sasol is used directly to produce coal-derived fuels. The top five producers (Anglo American Thermal Coal, Exxaro Resources, Sasol Mining, BHP Billiton Energy Coal South Africa, and Xstrata) accounted for 88% for total coal sales in 2009.

According to a representative of the small mines in one of the forums, Mr Shivambu, the small emerging mining companies bear the brunt in terms of decisions taken in the catchment affecting the mines. Any decision taken by these top five coal producers affects the small emerging mines. In 2017, a number of emerging mining companies had their water licences taken away due to non-compliance with the licence conditions. According to sources within the catchment area, these mines failed to meet their targets to supply power generators with coal.

The effects of mines can be very brutal for the emerging farmers who depend on irrigation for survival. There are many emerging farmers within the Olifants catchment whose farmland has been taken away for mining purposes. Subsequently, the people lose their source of livelihood. Two farmers in the Steelpoort area complained that a mining company took away their farmland without compensation. They reported that, other people lost large plantations of groundnuts and sugar canes without any compensation from the mines as well. Some of these farmers had to resort to vegetable gardening for sustenance.

The complaints against mines extend beyond mere operations. Mines are generally associated with dispossession of land. These dispossessions have left farmers with no sustainable compensation or alternative livelihoods, while the mines failed to provide sustainable employment.

> As far as we are concerned, poverty levels have increased and not decreased. These mining companies have taken our land and destroyed it. They left us unemployed, and have failed to provide employment for our youths, and has

delivered empty promises to us. They are not concerned with our welfare, but are only interested in the profits at the expense of our future; they have made us the poorest of the poor (interview, Burgersfort, 17 August 2017).

5.4. Issues of Conflict amongst Farmers in the Irrigation Sector

The disparity between the commercial and the emerging farmers within the Olifants catchment cannot be ignored. A sophisticated irrigation sector with extensive manufacturing and equipment distribution capacity serves the commercial sector represented by the white minority while a few hectares are being farmed by the so-called historically disadvantaged emerging farmers who remain isolated from this capacity by insecure land tenure, lack of formal education, lack of capital, lack of market access, and lack of management experience. According to de Lange (1998), large-scale farmers use 95% of water for irrigation, while smallholder farmers only have access to the remaining 5%.

The extract below explains how bad the situation between commercial farmers and emerging farmers has become.

Box 4: Conflict scenario between commercial and emerging farmers

Mr. Le Roux was forced to shut down his small chicken farm due to a vandalised borehole that has dried up. During the field visit, it was observed that he had no electricity on the panel next to the equipped borehole, and due to a lack of water from the borehole, his farm had to a close. Mr. Le Roux stressed that unhealthy relations with the emerging farmers around his farm might be the cause. He suspects that the local emerging farmers are probably the ones who vandalised his borehole because of jealous. The local farmers have complained about their failure to access water for their crops several times and have in the past attempted to steal water from his borehole.

Vandalised Borehole, CMF Meeting, 2016

Vandalised Borehole, CMF Meeting, 2016

Vandalised Borehole, CMF Meeting, 2016

Vandalised Borehole, CMF Meeting, 2016

Electric panel not working, CMF Meeting, 2016

According to respondents, the promulgation of the National Water Act has allowed greater emphasis on basic service provision to historically marginalised communities. The Act has further enabled the establishment of water management institutions for user-management of shared local infrastructure, an option previously open to commercial farmers only. The Act also established mechanisms for public participation that enables reallocation of water to redress past racial and gender discrimination.

However, for black emerging farmers, adequate representation is still hard to achieve for large numbers of people who live in remote areas. They are often excluded from participating in decision-making regarding water resource management due to the cost of transportation and a lack of organisation. Industrialists and commercial irrigation farmers are better endowed to participate in consultation processes. They are concerned about continued access and water quality issues and are at an advantage to make their voice heard on issues of concern affecting their interests.

Agricultural service organisations in South Africa were designed along racial lines. As a result, emerging farmers' needs have not been adequately addressed as major service organisations are geared to white commercial agriculture. While the interests of most commercial farmers were catered to, many emerging farmers either had limited or no access to support services. What makes things even more difficult is the fact that transformation has not yet been achieved in the allocation of water resources in the catchment. Commercial farmers still dominate the irrigation sector and they are more powerful in influencing decisions on water resources management for the catchment.

The relations between black emerging farmers and some white commercial farmers are very bad. This has been observed during Catchment Management Forum meetings where these emerging farmers have confronted their irrigation counterparts and expressed their frustration around the lack of access to water resources. The other issue of concern is the poor representation of black farmers on a number of farmers' associations, including the Water User Associations. These platforms are still dominated by white commercial farmers, making it difficult for the emerging farmers to participate.

According to the respondents, farmers divide themselves in two different groupings; white farmers attend to their own associations and this kind of grouping reduces social harmony. Because of the lack of unity and understanding amongst farmers, potential of conflict is very high. This is what Mr. Mhlungu, an official from the

department of Water and Sanitation, had to say about the conflicting views and scenarios he observed between the emerging and commercial farmers within the catchment. He narrated a conflict scenario over water access and allocation between emerging and commercial farmers:

> A dispute over water access and allocation was reported to the department through the Catchment Management Forum in 2015. The dispute involved two groups of farmers, commercial and emerging farmers. The emerging farmers lodged a complaint against the commercial farmers. These emerging farmers were new in the farming sector; they had been granted land to cultivate their produce in 2010 by the Department of Rural Development and Land Reform. However, they do not have water rights and this makes it difficult for them to cultivate their crops. They rely on the local river that passes nearby their farm. Their hopes of using water from the local river were halted after the commercial farmers realised that they are new emerging farmers who have just been allocated land for irrigation. The commercial farmers channelled all the water resources from the river streams to their dams, making it difficult for the emerging farmers to access water resources. On the upstream of the river where most emerging farmers irrigate, the commercial farmers had bought and leased all the properties and smaller farms surrounding the main stream, giving them total control of the stream flow and allowing them to channel all the water to their dam (Interview Tzaneen 2017).

In the case of the dispute narrated above, the department officials were intervened, but the commercial farmers were rude, and pointed to an existing water licence, which gives them the right to act the way they did. The emerging farmers then took the Catchment Management Forum for intervention by the Department of Water and Sanitation. They argued that the commercial farmers had taken all the water from the source and left them with no water for their production. What made matters even worse was that the commercial farmers did not participate in the Catchment Management Forum meetings and refused to even form part of the Water User Associations in the area. Instead, they belong to their own white association, where they meet and discuss issues of water resource management amongst themselves.

However, the investigation by the Department of Water and Sanitation discovered that the existing licence (ELU) was no longer valid. The existing lawful use license is a water licence that takes into consideration the water rights that were given to commercial farmers, based on the 1956 Water Act prior to 1998 (before the promulgation of the National Water Act of 1998). The existing lawful use license allows commercial farmers to continue using it as per the stipulated licence conditions; guided by the 1956 Water Act until Validation and Verification (V&V) process has been performed and completed by the Department of Water and Sanitation.

The Verification and Validation process aims to check how much water is in the system, if the user taking what they are supposed to take as guided by the 1956 Act, if the user still has the same hectares of farmland, and if they are still ploughing the same crops. If all these conditions have changed, the holder has to apply for a new water licence. Unfortunately, the existing challenge is that verification and validation in the Olifants Catchment Area has not been performed. This means that more water is still in the hands of the white minorities than the black majority.

As a way forward, enforcement action to be taken by the Department of Water and Sanitation will require the commercial farmers to demolish the pipeline they have constructed to allow water to flow in the direction of the stream in order to pass all users. This is also difficult given the contribution of the commercial farming sector to the economy as a whole and in the catchment area specifically. The sector continues to employ thousands of people in the catchment. There are fears that if the Department of Water and Sanitation cuts down their water source, they will cut down on their production, which may lead to retrenchment. The commercial farmers have also carried out social responsibility activities in the catchment; they have built schools and have donated water tanks to surrounding communities.

Another dispute was between two commercial farmers, a game farmer and a citrus farmer (mentioned earlier). This shows the complexity of conflict in the catchment. In

the case of the two farmers, a game commercial farmer reported a dispute involving him and a citrus commercial farmer involved in producing oranges. Both farmers have their existing lawful use licences: the game farmer is located up-stream and has constructed a dam in his farm, which has affected water availability for the citrus farmer who is located downstream.

They are neighbours, divided by a fence and have stopped talking to each other. The citrus farmer's complaint is that the game farmer has deprived him of his water access by blocking water from going downstream despite the fact that he is not authorised to use the water.

This took place during a drought period when every farm wanted to save as much water as they could. The permit of the farmer located on the upstream allowed him to abstract 50% of water from the source and to allow the other 50% to pass through for other users downstream. The drought however created challenges since the water levels had reduced to below 50%.

The game farmer, however, continued to comply with his licence conditions by reducing his off-take from 50% to 25%, allowing the other 25% of water to pass through to the other users downstream. The water user downstream (the citrus farmer) did not understand the conditions of his licence and assumed he was taking more water and disregarding the allocation of the other users downstream.

The root behind this conflict was the 1956 Water Act, which allowed water users to take as much water as they needed without placing conditions on water use such as using measuring devices. The upstream farmer (the game farmer) argued that his water licence did not require him to use measuring devices to measure water coming in and out of his dam.

The game farmer was then instructed to abide by Schedule 3 of the National Water Act, which requires every water user to have a measuring device, even if they have

an existing lawful use licence. The game farmer complied with the request and installed the measuring device at his cost. However, the citrus farmer was still not happy and rejected attempts for mediation by the Department of Water and Sanitation.

After an investigation, it was discovered that there was an underlying agenda by citrus farmers in the area to get rid of the game farmer. Their aim was to frustrate the game farmer until he stops operations so that they can expand their citrus operations and have full usage of the dam. One of my informants observed:

> The citrus farmers made claims that they contribute more to the country by producing food and employing a huge number of people. They used their status over the game farmer to argue their case (Interview, Jane Furse 2017).

This proves that differentiation in power can generate conflict. Powerful stakeholders have used their power at the expense of other stakeholders. These actors play an important social and economic role in the country and it is difficult for small players in the catchment to contest their power.

5.5. Chapter Summary

The chapter has portrayed the Olifants Water Management Area as a terrain for conflict between different water users. These water users have been portrayed as having different interests, power and influence, and often use their power in the contest over water resources. Powerful water user groups, such as mining and large-scale commercial farmers, still have a very strong voice and a strong basis for protecting their access to water. Mining and agriculture in the Olifants basin are major earners of foreign exchange, which gives these stakeholders an unfair advantage in a context of water scarcity.

The socio-economic and political power dimensions have played a key role in the allocation of and access to the water resources amongst different water users and stakeholders. This has led to a number of conflict situations within the catchment. Other cases have not yet escalated into conflict, but they have the potential for conflict unless they are addressed. As Kafle (2011) has argued, “due to the economic and social value of water, multiple claims and contests between stakeholders over water are bound to happen and may result in conflict.”

CHAPTER SIX
DISCUSSION OF RESEARCH FINDINGS

6.1. Introduction

The thesis was guided by extensive views of different scholars on water resources, water management, and water conflicts. Following the adoption of Integrated Water Resource Management by global advocates, South Africa went through drastic policy changes in the management of water resources with an aim to create a balance in the allocation of water resources amongst water users. As a result, many water users in the sector struggled to remain relevant and to maintain the status quo in a changing environment that advocated for equity in the allocation of water resources.

It would be expected that the dismantling of the 1956 Water Act and the formulation of the new National Water Act of 1998 would create fears and tensions between water users over water resources in catchment areas around the Olifants catchment. Therefore, the study set out to explore the dynamics or potential for conflicts between two dominant water users in the catchment - the mining and irrigation sectors - and amongst water users from the irrigation sector. It provided an analysis of the two major water users and their contending interests and the resultant conflict, and assessed the mechanisms or institutions put in place to mitigate conflict situations.

The study also set out to understand the role of institutions put in place by the department to guide the use, distribution, conservation, control, manage water resources, and offer guidance in addressing and mitigating water related conflict amongst stakeholders in the different catchments within the Olifants. The chapter is guided by two broad thematic areas. First, the study identified that conflict is inherent between the two major water users and among various water users in the irrigation sector. Second, the study discovered that water management institutions put in place to manage local water resources are ill equipped to deal with water related conflicts

in the catchment. These themes are further broken down into sub-themes. This chapter then aims to pull these themes together in the form of a discussion on the empirical findings.

6.2. Conflict is inherent in the Olifants

My analysis has shown that conflict between the water users in the mining and irrigation sectors are inevitable. The situation is exacerbated by the fact that the Olifants Catchment is severely water-stressed and has insufficient water to meet new water demands. The water resources in the catchment are over-allocated and this has resulted in a number of confrontations between water users. As indicated in chapter five there is serious contestation of water resources between the water users. This has been attributed to a number of key factors such as power and status of the water users, pollution incidents from mining activities in the catchment, diversity in the use of water resource; the Olifants is a water stressed catchment with substantial demand of water resource. The study showed that the water users with water access will do anything in their power to protect the resources that they have while stakeholders without water access would do anything in their power to gain access to water, causing tension between the stakeholders.

6.2.1. Water Contestation amongst irrigators

The analysis has shown that water is a contested resource in the catchment. The contest has been observed amongst water users from the irrigation sector, the commercial and the emerging farmers. These water users have attached different interests, motivation and meanings in their pursuit of water. For instance, the commercial farmers have used their economic powers and status to secure their water rights. In the process, emerging farmers retaliate by stealing and vandalising the water infrastructure belonging to the commercial farmers.

The study has shown that, for the irrigators, conflicts are embedded in changes from the 1956 Water Act to the newly promulgated National Water Act of 1998. This created competing views on water rights, in particular in the irrigation sector between the emerging and commercial farmers. Since 1994, the water sector took a serious shift in the management of water resources. This shift resulted in the adoption of

global water laws, which also led to the formulation of new national water policies, legislations, and strategies.

The transition has not been an easy task; it has been marked by serious challenges of bridging the gap between the old Water Act and the new National Water Act. The water sector was faced with the responsibility of having to redress the imbalances caused by the 1956 Water Act. This meant that water allocation reform programmes must focus on the allocation of water to historically disadvantaged groups, specifically black people.

The rise of emerging farmers became evident within the Olifants Water Management Area. This shift was a serious threat and created fears amongst water users, in particular the commercial farmers, who were mostly favoured by the 1956 Water Act. However, the experience was not the same for the black emerging farmers who were previously deprived of water rights. For them, this was a new era of hope. Their dreams of becoming active and effective in the economy were becoming a reality.

Most of these emerging farmers did not anticipate that, 24 years after democracy, they will still be facing the same challenges they experienced during the apartheid era. They had dreams of participating meaningfully in the agricultural market but their expectations have not been met. Most emerging farmers are still without water while water is still in the hands of the white minority who own big farms with dams close to river streams. Customary water rights still favour the minority groups, a concern that resulted in many emerging farmers questioning the effectiveness of the National Water Act.

The study has also associated the accumulation of water rights between the commercial and irrigation farmers to the different power bases. As pointed out in section 5.4, the commercial farmers have more power and influence in the catchment area. They have good, sophisticated irrigation systems and their contribution in growing the catchment economically is massive. They are also highly knowledgeable in terms of the National Water Act. They are well informed on the operations of government; they have contacts within government structures and, at

some point in time, one of their directors worked for the government. This gives them exposure and influence since they know who to contact when they require water services and they know the department's strengths and weaknesses. The statement is supported by (Gleick 2004, Gleick & Cooley 2006), they argued that "it is invariably the poor and powerless that die of inadequate water and sanitation". These studies have argued that true scarcity does not reside in the physical absence of water, but in the lack of monetary resources, political and economic power.

Mollinga's (2008) sees water use as a politically contested process and water control as the "heart of water resource management". Both the emerging and commercial farmers claim for water based on their personal point of view. Most historically disadvantaged groups still lack access to water resources while commercial farmers have enough water for their produce. Commercial farmers are still holding on to the old 1956 Water Act conditions which state that they have a stake in the water resources. For them, unless the process of validation and verification is complete, they will keep their Existing Licence Use". This situation has created what resonates well with what Mehta et al (2012) refer as "water grabbing", the situation where powerful actors are able to take control of, or reallocate to their own benefits, water resources already used by local communities or feeding aquatic ecosystems on which their livelihoods are based.

6.2.2. Water Conflict as a result of acid mine drainage

The analysis has revealed that pollution resulting from the effects of acid mine drainage from the mining sector is another key source of conflict. As Ashton (2000: 9) has argued, access to adequate water supply is usually seen as a "life and death" issue where any threat to disrupt or prevent access to essential water supply becomes an emotionally charged and volatile topic of intense debate. Farmers, in particular the commercial farmers have raised complaints that their farmland have degraded due to the growing number of mining operations within the catchment. Most commercial farmers not only produce food for the local market, but they also export their products to other countries and the quality of their products has been comprised due to mining pollutants.

Some of the farmers have expressed a great eagerness for the local mines to close down their operations, stating that mines create noise, they damage the roads by creating potholes because of their big trucks, they damage the culture of their society, they excavate burial sites, and they damage the land through excavations of big holes. In other cases, some farmers have been forced to abandon their farmland due to soil contamination and air pollution.

Water has become a key factor in the operations of the mining sector as a result of the expansion of the mining industry to large open-cast mines. This means that water has become critical to the management of mining operations which impacts on the public and the regulatory approval of water licences for mines. Unless the relevant authorities implement immediate and robust interventions, water conflicts between affected water users will not be avoided.

6.2.3. Power dynamics and stakeholder conflict

This analysis has shown that power asymmetries do exist within the Olifants Catchment Area. Drawing from the two theories adopted by this study – the political ecology and hydro-hegemony - water conflicts are a result of differential power asymmetries that exist in river basins. This can be evidenced in the Olifants Catchment Area, where power is deployed by both irrigation and mining stakeholders, which may pose a risk for potential water conflicts. This approach has argued that powerful river basin state actors use decisive influence through water control strategies to capture, integrate, and contain a situation between the mining sector and the irrigation sector and amongst farmers themselves.

The theory of hydro-hegemony has shown how stakeholders exercised power. For instance, coercive power refers to material power such as economic strength, military might, technological powers, and international political and financial support. The level of economic development in a river basin could determine whether certain stakeholders cooperate in decision making pertaining to water resource management (Zeitoun & Warner, 2006).

This type of power was shown to exist in the catchment, and has resulted in confrontation between water users. For example, due to its ability to contribute to the economic growth of the catchment and the country as a whole, the mining industry has managed to secure water rights over emerging farmers who are still categorised as a historically disadvantaged group 24 years after democracy. This type of power is not only evident between the mining sector and irrigation sector, but has also been seen amongst farmers themselves. The commercial farmers with their sophisticated farming systems have always retained more power over the emerging farmers.

Ideational power is power over ideas, for example refusal by a powerful state to share data with others (Cascao & Zeiton, 2010). Most historically disadvantaged emerging farmers do not have the necessary skills and knowledge to engage in catchment negotiations regarding water management.

This was observed during Catchment Management Forum meetings where historically disadvantaged groups fail to fully engage in discussions because of their lack of knowledge around water policies, legislation, and strategies. The historically disadvantaged still do not have a voice within these structures; they are not empowered to engage meaningfully with issues regarding water resources management in the catchment. Most presentations on water are very technical for them and, therefore, their participation indecision-making is limited.

Commercial farmers in the Olifants Catchment Area have used their knowledge, and socio-economic and political powers to generate their own environmental knowledge systems and power. With their background, they have redirected the flow of water away from other water users, depriving their access to water. They have mobilised resources in their favour, making it very difficult for other users to access water. Bargaining power describes the capability of actors or stakeholders to control the rules of the game and set agendas. The rules of the game are controlled by offering no choice regarding compliance and non-compliance.

The mining sector can be said to have this type of power within the catchment. For example, depriving a mine of a water licence means no operations and work can take place. This may result in the mine closing and the retrenchment of a large

number of workers, which, in turn, hinders the economy of the country. One other issue of importance is that, mining activities are very complex which give them more power, for instance, they supply strategic users of water like Eskom with coal to generate power. Yes, even though, mining companies are subjected to comply with the licence application conditions, their application are treated with great importance and urgency.

Because of its contribution to growth in the economy and the improvement in the livelihoods of the local people, the mining sector has been given priority in the allocation of water resources. During Catchment Management Forum meeting presentations, stakeholders from the mining sector give good reports on their contribution to the economy of the catchment, emphasising their ability to create jobs.

However, this has disadvantaged water users in the irrigation sector, in particular historically disadvantaged groups who were marginalised in the past. Most emerging farmers feel that they are hopeless and powerless to compete against a mining operation because they associate mines with political interferences by powerful politicians. Even though part of DWS's mandate is to give priority to HDIs including emerging farmers in the stressed catchments, there has been serious claims of poor water access and allocation for the emerging farmers.

It was shown that the mining companies in the area have used their power and economic status to expropriate water resources at the detriment of other users. The same can be said of the large-scale irrigation sector. Commercial farmers have more bargaining power because their contribution to the sector is huge. They do not only produce for local consumption but they also export their products to other countries.
This type of power was evident during a dispute that involved two commercial farmers, a game farmer and a citrus farmer where the citrus farmer who was born in the catchment argued that the game farmer who was new in the catchment could not come and take over and participate in game farming in their area or origin.

6.2.4. Conflict occurrences

The research showed that that the frequency with which conflict occurs between stakeholders varies. However, due to the current conditions in the Olifants catchment, the scale of water conflicts seems to be escalating as the gap between demand and supply increases. For instance, many confrontations were observed in the Catchment Management Forums during the drought of 2014 to 2016. This was the most critical time for the water users as they were facing harsh water restrictions. Due to the high demand of water in the Olifants catchment, and considering the fact that the catchment is already stressed, most water users became scared of the effects of the drought.

During this period, there was pressure to extract more water from the river streams. In this case, the water conflict can be said to be irregular and dormant. However, the same cannot be said with regard to the conflicts that result from pollution from mining activities. Conflict has also been observed with regard to the quantity of water shared between upstream and downstream farmers. Downstream farmers have confronted upstream farmers, arguing that they have extracted and stored too much water resulting in less water volumes passing downstream.

6.3. Water Management Institution's Challenges

The analysis has identified the following shortcomings with regard to the water management institutions in the Olifants WMA. As pointed out in section 4.5, the WMIs, in particular the CMA is not yet functional and still operates through the regional office, as a Proto-CMA.

As observed by most scholars of water governance, for instance, UNESCO (2006) stated that the current water crisis has been mainly caused not by a lack of water supply or technology, but, rather, by failure in water governance. In the case of the Olifant WMA, CMFs have been criticised for their failure to resolve issues of concern between the water users. According to Huppert (2007), the challenge of water governance is to reconcile the conflicting water-related interest and demands from different sectors and to provide means by which order is accomplished. This is a

concern for the WMIs in the Olifants catchments because their scope of function is narrowed as other functions are still operated at the Regional or Head office. The following shortcomings on the scope of WMIs have been noted with concern:

6.3.1 Absence of a well functional CMA

Most important, it has emerged that the CMAs were not established to resolve conflict in the catchment. The functions of the CMAs vary from stakeholder participation, water use authorisation; water resource protection; compliance monitoring and enforcement; coordination of water conservation and water demand management programmes; water quality management; establishment and oversight of Water User Associations, water resources planning, water resources information management; billing and collection of water use charges, and; coordination of disaster management. However, it has also emerged that even though CMA's role varies, as local water managers, they still have a role to foster broad based stakeholder engagement platforms as a way to address water related issues that may escalate in to conflict between the water users. CMAs through the CMFs play the role of the mediator in terms of conflict resolution. It is believed that issues of conflict can still be resolved through mediation and can be escalated to other forums such as the Water Tribunal if they could not be resolved at the catchment level.

6.3.2 Absence of a formal conflict resolution framework for water users

The study has revealed that there is no formal conflict resolution framework that guides the WMIs on the management or mitigation of water related conflicts. At the local level, the current conflict resolution practices are not standardised, cause confusion, and do not assist in clear accountabilities and speedy resolution of water problems. The situation is more difficult by the fact that the WMIs have no legal base to enforce any decision taken by parties in resolving their conflict; hence, in such cases the Water Tribunal is engaged to address any matters that the WMIs could not resolve.

6.3.3 Non-statutory nature of the Catchment Management Forums

Catchment Management Forums no legislative mandate in terms of the National Water Act; they are only mentioned in the National Water Resource Strategy II as a vehicle that can be used to foster stakeholder participation and representation in the water business. The study showed that CMFs have been criticised their lack of regulatory teeth. This has resulted in their failure to function effectively. Munnik et al. (2016) in his book titled “Principled, Pragmatic Revitalisation of CMFs in SA” also argued that Catchment Management Forums risk alienating members who are increasingly frustrated at not achieving adequate results regarding the water quality problems they report, putting them under pressure as a result of their lack of official recognition and “teeth”. The study revealed that Catchment Management Forums are there by name and seem to be physically absent as a result of their lack of “teeth to bite”, literally providing no solution to conflict situations between water users.

6.3.4 Difficulty in implementing water policies

The shift from the 1956 Water Act to the 1998 National Water Act has created fear, uncertainty, and disputes between the minority groups (commercial farmers) who own big portions of land with enough water. The introduction of the National Water Act advocated redressing the imbalances of the past, giving priority to historically disadvantaged groups and setting up new water reform laws, policies, and strategies to reallocate water. These changes have created hate, frustrations, and selfishness between the powerful and the powerless water users in the Olifants catchment. Another cause of conflict between stakeholders in the catchment is the adoption of Integrated Water Resource Management from the global landscape to the national level, which affects the operation of water resources management at the catchment level.

Integrated Water Resource Management in South Africa meant that new policies, legislation, and strategies had to be formulated based on the global demands on water resource management. The shift from old ways of managing water to new ways of water management has fostered fear amongst stakeholders and water users. This has resulted in water grabs between the haves and have-nots. To date, the concept of Integrated Water Resource Management has not been fully achieved.

Part of the reason for this is due to political interferences. For example, regular changes in political positions within the water sector affect policies and implementation.

The study analysed that if given a proper mandate, these WMIs could be very instrumental in the management of water conflict, mainly because they bring water users together (e.g. mining companies and irrigation sector) to discuss water issues. To date, these institutions are not operating as envisioned. Within the Olifants catchment, only five Catchment Management Forums have been established to foster issues of stakeholder participation and collaboration, a move that has been seen to address local water resource issues and prevent conflicts. Proper implementation of the principles of water governance as outlined in section 2.4.3 is required. For Rogers & Hall (2003), effective implementation of water governance requires water management institutions to work in an open and transparent manner with a wider stakeholder participation.

6.4. Chapter Summary

This chapter has discussed the empirical findings presented in chapter four and five. Two themes were discussed with sub-themes, first, the study identified that conflict is inherent between the two major water users and among various water users in the irrigation sector. This chapter has outlined that there is serious contestation of water resources amongst stakeholders as a result of the many activities (mining and irrigation) which are taking place in a catchment that is already stressed. These conflicts have varied in terms of their occurrences; however, they seem to have escalated more during the drought season as the gap between demand and supply increased.

Power has been identified as one of the key factors that played a role in rising conflicts between water users and the theory of hydro-hegemony has played a crucial role in analysing the different power bases find in the catchments. Acid mine drainage from mines has also been noted as a key factor in rising conflicts amongst water users, giving rise to conflict situations between the water users. Amongst the

conflict dynamics identified second, the water management institutions put in place are ill equipped to deal with water related conflicts in the catchment.

Very sad is the fact that the situation remains unsolved because the WMIs expected to resolve these conflicting issues seem to be powerless with less mandate to address issues of conflict between water users. As stated by Huppert (2007) that overcoming the challenges facing water governance requires the reconciliation of the often-conflicting water-related interests and demands made by different sectors and to provide the means by which order is accomplished in the relations between the various stakeholders.

CHAPTER SEVEN

CONCLUSION AND RECOMMENDATIONS

7.1. Introduction

This chapter presents the conclusion on the study of conflict, its resolution and the viability of water management institutions in managing water user conflicts. The chapter also recommends and discusses certain policy implications that have emerged from the study.

7.2. Conclusion

In the study area, water conflict exists amongst farmers in the irrigation sectors and between farmers and mines. The study showed that as the gap between demand and supply of water remains, the magnitude of conflict will grow. Conflict has an economic dimension because water possesses economic value. For example, both irrigation and mining uses of water have economic value. The environmental dimensions correspond to the pollution from the mining sector.

Conflict also have a social dimension which has to do with social problems created by the mining sector and the problems caused by the farmers such as lack of social cohesion, water theft, water pollution which affects the quality of agricultural produce, soil contamination, etc. Lastly, in terms of the political dimension, water governance has proven to be a political issue. Water is politicised from the global landscape to the national level and to the local level, in this case, the Olifants Water Management Area.

On the other hand, the theory of hydro-hegemony has explained the study of water conflict in the Olifants catchment through four types of power asymmetries: ideational, material, geographical, and economical. Even though designed to explain water-related conflicts at a transboundary river basin, this theory has proven to be true for the management of water resources within the Olifants catchment. Conflicts

have not been observed as violent as some were dormant and irregular, most having been observed during the drought of 2014 to 2016.

Warner and Jones (1998),supports the statements above by arguing that latent conflicts regularly lie dormant until “re-awakened” by a particular set of pressures. This has been the case in the Olifants Catchment Area where there has been growing pressure on water resources due to water shortages and challenges in the implementation of policies.

7.3. Recommendations

Even though stakeholder conflicts have been attributed to a number of challenges, which includes contestation over water in a stressed catchment, water management is also identified as one of the problems faced in the Olifants. The research has consistently raised policy questions about what may have been done differently in the catchment, and whether we can learn any lessons from the situation. There are specific lessons that have emerged from this study and this section attempt to identify and discuss their implications.

7.3.1. Fast track the implementation of water allocation reform policies

It has been shown that the Olifants Catchment is a water-stressed catchment area and water has been over-allocated, which has closed doors on further water allocations until the Validation and Verification process is completed and water users apply for compulsory licensing. This issue has serious potential for conflict because the department is no longer able to allocate water to other water users.

It is difficult for water users; in particular, the black emerging farmers who lack knowledge and understanding, to believe that the catchment is over-allocated and they will go an extra mile just to get access to water. On the other hand, the commercial farmers will try everything to protect their current water allocation as a result of past water laws.

7.3.2. Promote stability in the deployment and appointment of senior positions

Changes in the departmental structures as well as political deployment of top managers have created an unpleasant environment at the catchment level. This has seen high turnover in senior management in the past five years. Within this period, the department has seen permanent ministers, two permanent Director Generals, and three acting Deputy Director Generals. Such a situation makes it difficult to implement the policies formulated to transform the water sector because each new leadership introduces new policy positions, mandates, and neglects those introduced by the previous leadership. In the process the whole water management system gets affected and the water users are the one who feel the blunt.

7.3.3. Finalise the policy framework for CMAs and CMFs

It is also important to ensure that the policy framework on Catchment Management Agencies and Catchment Management Forums is finalised. Stakeholders should be clear on the status of the Catchment Management Agencies. Once their status has been clarified, the Catchment Management Agencies must be given appropriate delegated powers so that they will have the authority to fulfil certain function and, in so doing, they may govern better, manage water resources, provide better relations, and ensure that stakeholders are better engaged and able to intervene effectively in water conflicts.

A formal policy on Catchment Management Forums that will be binding to all stakeholders should be developed. This will give the Catchment Management Forums legitimacy to exercise full authority on their mandate and help resolve issues of conflict. Unless effective institutional mechanisms are well implemented, water resources management will remain a challenge in the Olifants catchment.

7.3.4. Develop a standardised conflict resolution tool for the Olifants WMA

There is a need for a standard conflict resolution tool that will guide the resolution of conflicts between water users in the catchment.

7.3.5. Capacitate stakeholders on the operations of water management institutions

The Department of Water and Sanitation has a big responsibility to ensure that more efforts are made in engaging stakeholders to better understand what Catchment Management Forums or any other policy initiative. CMFs are not static or fixed but a mechanism that can evolve depending on the roles of the stakeholders. Stakeholders should be made aware that these forums are a new avenue where there can be improved communication and better understanding of each other's roles and where healthier and constructive relations toward the management of water resources can be built. With this in mind, fewer conflicts may arise and more active participation will become evident in the long run.

7.3.6. Enhancing the implementation of the Inter-Governmental Relations Act to allow for meaningful and broader stakeholder representation in water sector forums

The implementation of the Inter-Governmental Relations Act seems to be very difficult to implement. The study of CMFs, WUAs and CMAs in the catchment provides enough evidence that explains that there is still no integration in the governance of water as most water sector stakeholders are still working in silos. It is still difficult to attain a full representation of stakeholders in the CMFs. There is still a lot of work that government must do to ensure that different departments and sectors begin to understand each other's functions and mandates and know where they can interface with each other for improved service delivery. This can also ensure that the country moves towards integrated planning and adaptive management.

7.3.7. Effectiveness and improvement in the implementation of Integrated Water Resource Management

The concept of Integrated Water Resource Management advocated for integration across sectors: integration of use, integration of demand, integration with the environment, integration with the people, and stakeholder participation to encourage wider ownership and to empower stakeholders. This promotes active involvement of

all affected and interested groups in resolving water conflict and promoting general sustainability in order to encourage more resource efficient and socially responsible water management that benefits all sections of society.

It is therefore imperative that this concept of Integrated Water Resource Management is brought to task by ensuring that political leadership, government leadership, sector leadership, and traditional leadership reach an understanding whereby they meet and establish their integrated plans and cooperation. Through this, they may minimise conflicts or the potential for conflict and may ensure that the Olifants catchment progressively fulfils its mandate and meets all its catchment-based targets.

8. REFERENCES

Abdellah, F.G. (1986). The Nature of Nursing Science. In Nicholl, L.H. (ed).Perspectives in Nursing Theory. Boston: Little Brown and Company.

Ashton P.J. (2000). Southern African water conflicts: are they inevitable or preventable?In Solomon, H. &Turton, A.R.(eds).Water wars: Enduring myth or impending reality?Durban:The African Centre for the Constructive Resolution of Disputes (ACCORD).

Ashton, P.J. (2002). Avoiding conflicts over Africa's water resources.Pretoria:Division of Water, Environment & Forestry Technology.

Ashton, P.J. (2007).Disputes and conflict over water in Africa.Pretoria: Division of Water, Environment & Forestry Technology.

Ashton P.J., Turton, A.R., Earle, A.&Malzbender, D. (2006).Hydropolitical vulnerability and resilience along Africa's international waters. Nairobi: UNEP.

Babbie, E., 2007. The practice of social research.Belmont: Thomson Wadsworth.

Baijnah, H.& Singh, Y. (2002).The rebirth of science in Africa. Pretoria: Umdaus Press.

Bakker, K. (2003). Archipelagos and networks: urbanization and water privatization in the South.Geographical Journal, 169(4): 328-341.

Batchelor, C., 2007. Water governance literature assessment. International Institute for Environment and Development. http://www. iied. org/pubs/pdfs G, 2523.

Bhattacherjee, A., 2012. Social science research: Principles, methods, and practices.

Baylis, J., Smith, S. & Owens, P. (2008).The globalization of world politics. New York: Oxford University Press.

Benson, D., Jordan, A.J. & Smith, L. (2013). Is environmental management really more collaborative? A comparative analysis of putative 'paradigm shifts' in

Europe, Australia and the USA. Environment and Planning A, 30(7): 1695-1712.

Biswas, A.K. (2008). Integrated water resources management: Is it working?International Journal of Water Resources Development, 24(1): 5-22.

Cascao, A. &Zeitoun, M. (2010).Power, hegemony and critical hydropolitics. In Earle, A.,Jägerskog, A.&Öjendal, J. (eds). Transboundary water management: Principles and practice.LondonandWashington DC: Earthscan.

Cass, N. (2006). Participatory-Deliberative Engagement: a literature review. [Online] Available from: https://core.ac.uk/download/pdf/16285075.pdf. [Accessed: 12 February 2018].

Castro, J.E. (2007). Water governance in the twentieth-first century.Ambiente&sociedade, 10(2): 97-118.

Centre for Development and Enterprise. (2007). Voices of anger: Protests and conflict in two municipalities. Johannesburg:Centre for Development and Enterprise.

Cleaver, F. (1999).Paradoxes of participation: questioning participatory approaches to development.Journal of international development, 11(4): 597-612.

Collier, P.&Hoeffler, A. (2004). Greed and grievance in civil war.Oxford economic papers, 56(4): 563-595.

Collinson, S. (2003).Power, livelihoods and conflict: case studies in political economy analysis for humanitarian action. London: Overseas Development Institute.

Cooke, B. &Kothari, U. (2001).Participation: The New Tyranny?New York: Zed Books.

Corbridge, S.& Kumar, S. (2002). Community, corruption, landscape: tales from the tree trade. Political Geography, 21(6): 765-788.

Cortner, H.J., Shannon, M.A., Wallace, M.G.,Burke, S.&Moote, M.A. (1994). Institutional barriers and incentives for ecosystem management.Arizona: Water Resource Research Centre.

Dahl, R.A. (1961).Who Governs? Democracy and Power in an American City. New Haven: Yale University Press.

Dahl, R.A., 1957.The concept of power. Behavioral science, 2(3), pp.201-215.

De Lange, M. (1994).Small-scale irrigation in South Africa.Pretoria: Water Research Commission.

De Lange, M. (1998).Irrigation policy draft 4.1. Unpublished discussion paper.

Denzin, N.K., 1989. Interpretive interactionism.Applied social research methods series.

Denzin, N. K., & Lincoln, Y. S. (2013). Collecting and Interpreting Qualitative Materials (4th ed.). London: Sage.

Denzin, N.K., 2008. Collecting and interpreting qualitative materials (Vol. 3). Sage.

De Lange, M., Merrey, D.J., Levite, H. &Svendsen, M. (2003).Water Resources Planning and Management in the Olifants Basin of South Africa: Past, Present and Future. [Online] Available from: http://citeseerx.ist.psu.edu/viewdoc/download. [Accessed: 2 December 2018].

Department of Economic Development. (2010). The New Growth Path: The framework. Pretoria: Department of Economic Development.

Department of Water Affairs. (nd). Contribution of water to the South African economy. [Online] Available from: http://www.dwa.gov.za/nwrs/LinkClick.aspx?fileticket=d-cvjKg1IJI%3D&tabid=72&mid=435.[Accessed: 25 November 2017].

Department of Water Affairs. (nd).Overview of the National Water Act and the effects of past legislation.Pretoria: Department of Water Affairs.

Department of Water Affairs.(2012/2013).Annual National State of Water Report for the Hydrological Year 2012/2013.Pretoria: Department of Water Affairs.

Department of Water Affairs. (2004). National Water Resource Strategy: First Edition.[Online] Available from: http://www.dwa.gov.za/Documents/Policies/NWRS/Default.htm. [Accessed: 22 November 2017].

Department of Water Affairs.(2010). Integrated water resource planning for South Africa: A situation analysis. Pretoria: Department of Water Affairs.

Department of Water Affairs.(2011). Classification of Significant Water Resources in the Olifants Water Management Area: (Wma 4). [Online] Available from: http://www.dwa.gov.za/rdm/WRCS/doc/IUA_Report_Olifants_WRC_Final.pdf.[Accessed: 20 November 2017].

Department of Water Affairs.(2013).National Water Resource Strategy: Water for an equitable and sustainable future (2nd Edition).Pretoria: Department of Water Affairs.

Department of Water Affairs Forestry. (nd). Guide to the National Water Act. [Online] Available from: http://www.dwaf.gov.za/Documents/Publications/NWAguide/NWAguideToC.pdf. [Accessed: 25 November 2017].

Department of Water Affairs Forestry.(1999).Public participation for catchment management agencies and water user associationsGuide 4 (Unpublished Report).Pretoria: Department of Water Affairs Forestry.

Department of Water Affairs Forestry.(2001).Generic Public participation guidelines. Pretoria:Department of Water Affairs Forestry.

Department of Water Affairs Forestry. (2004). Olifants Water Management Area Internal Strategic Perspective.[Online] Available from: http://www.dwaf.gov.za/Documents/Other/WMA/Olifants_ISP.pdf. [Accessed: 30 November 2017].

Department of Water Affairs Forestry. (2011). Planning level review of water quality in South Africa.[Online] Available from: http://www.dwaf.gov.za/Documents/Other/Water%20Resources/DWA%20WQ%20Planning%20Report%20_Final_Version_06-July-2011.PDF. [Accessed: 15 November 2017].

Department of Water Affairs Forestry.(2013). National Water Resource Strategy. [Online] Available from:

http://www.dwaf.gov.za/documents/Other/Strategic%20Plan/NWRS2-Final-email-version.pdf.[Accessed: 1 November 2017].

Department of Water and Environmental Affairs.(2012).Proposed new water management areas of South Africa: Government Gazette No. 547. Pretoria: Department of Water and Environmental Affairs.

Department of Water Affairs.(2002). Proposal for the establishment of a Catchment Management Agency for the Olifants water management area – Draft version 2.2. Pretoria: DWS

Department of Water and Sanitation.(2015). Business case for the Olifants Catchment Management Agency.Draft Version 5.

Department of Water and Sanitation.(2015). Catchment Management Agency. [Online] Available from:http://www.dwa.gov.za/IO/Docs/CATCHMENT MANAGEMENT AGENCIES%20%20Establishment%20Quarterley%20Update.pdf. [Accessed: 25 November 2017].

Department of Water and Sanitation. (2018). Mpumalanga records a 0.4% drop in water volumes. [Online] Available from:http://www.dwa.gov.za/Communications/PressReleases/2018/MS%20-%20Mpumalanga%20records%20a%200.4%20percent%20drop%20in%20water%20volumes.pdf. [Accessed: 22 November 2017].

Derman, B.& Ferguson, A. (2000). The value of water: political ecology and water reform in southern Africa. [Online] Available from:https://pdf.usaid.gov/pdf_docs/PNACL420.pdf. [Accessed: 25 February 2018].

DeSoysa, I. (2002).Ecoviolence: Shrinking pie or honey pot?Global Environmental Politics,2(4): 1-34.

Dungumaro, E.W.&Madulu, N.F. (2003).Public participation in integrated water resources management: The case of Tanzania. Dar es Salaam: Institute of Resource Assessment.

Etikan, I., Musa, S.A. and Alkassim, R.S., 2016.Comparison of convenience sampling and purposive sampling. American Journal of Theoretical and Applied Statistics, 5(1), pp.1-4.

Falkenmark, M. (1994). The dangerous spiral: near-future risks for water related eco-conflicts. In Proceedings of the ICRC Symposium Water and War: Symposium on Water in Armed Conflicts.Montreux: International Committee of the Red Cross.

Feeny, D. (1988). The development of property rights in land: A comparative study, towards a political economy of development.In Bates, R. (ed).Toward a Political Economy of Development: A Rational Choice Perspective. Berkeley: University of California Press.

Filstead, W.J. (1970). Qualitative methodology: Firsthand involvement with the social world.Pennsylvania: Rand McNally College Publishing Company.

Forsyth, T. (2003).Critical political ecology the politics of environmental science. London: Routledge.

Franks, T.& Cleaver, F. (2007). Water governance and poverty: a framework for analysis.Progress in Development Studies, 7(4): 291-306.

Freeman, R.E. (1984). Strategic management: A stakeholder perspective.Boston: Pitman.

Fritsch, O. & Benson, D. (2013).Integrating the principles of IWRM? River basin planning in England and Wales.International Journal of Water Governance, 1(3-4): 265-284.

Furber, A., Medema, W., Adamowski, J., Clamen, M.& Vijay, M. (2016). Conflict management in participatory approaches to water management: A case study of Lake Ontario and the St. Lawrence River Regulation.Water, 8(7): 280.

Gado, B.A. (2002). Arbitration and resolving tenure conflict in Boboye, Niger. In Toulmin, C., Lavigne, D, P. &Traorë, S. (eds).The dynamics of resources tenure in West Africa. Oxford/Portsmouth: James Currey/Heinemann.

Gain, A.K., Apel, H., Renaud, F.G. &Giupponi, C. (2013b). Thresholds of hydrologic flow regime of a river and investigation of climate change impact – The case of the Lower Brahmaputra River Basin. Climatic Change, 120(1-2): 463-475.

Gain, A.K., Rouillard, J.J. & Benson, D. (2013a). Can Integrated Water Resources Management increase adaptive capacity to climate change adaptation? A critical review.Journal of Water Resource and Protection, 5(4A): 11- 20.

Garrett, N.&Piccinni, A. (2012). Natural resources and conflict: A new security challenge for the European Union. Stockholm: International Peace Research Institute.

Gaventa, J. (2003). Power after Lukes: A review of the literature.Brighton: Institute of Development Studies.

GertSibandeAgri-Park Final Master Business Plan 2016, Department of Rural Development and Land Reform

Gleditsch, N.P., Furlong, K., Hegre, H., Lacina, B.& Owen, T. (2006). Conflicts over shared rivers: Resource scarcity or fuzzy boundaries?Political Geography, 25(4): 361-382.

Gleick, P.H. (1993). Water and conflict: Fresh water resources and international security.International Security, 18 (1): 79-112.

Gleick, P.H. (1998). Water in crisis: Paths to sustainable water use.Ecological Applications,8(3): 571-579.

Gleick, P.H. (2000). The World's Water 2000-2001: The Biennial Report on Freshwater Resources. Washington DC: Island Press.

Gleick, P.H.(2004). The World's Water 2004-2005: The biennial report on freshwater resources. Washington DC: Island Press.

Gleick, P.H. (2007). The Human Right to Water. [Online] Available from:http://cymfcca.wecalc.org/reports/human_right_may_07.pdf. [Accessed: 15 February 2018].

Gleick, P.H.&Cooley, H. (2006). The World's Water 2006-2007: The biennial report on freshwater resources. Washington DC: Island Press.

Global Water Partnership.(1998). Regulation and private participation in the water and sanitation sector.Stockholm:Global Water Partnership.

Global Water Partnership.(2000). Integrated Water Resources Management (TAC background paper no. 4). Stockholm: GWP-TAC.

Global Water Partnership.(2002).Introducing Effective Water Governance. [Online] Available from:https://www.gwp.org/globalassets/global/gwp-cee_files/regional/governance-2003.pdf. [Accessed: 22 April 2018].

Gossling, S. (2003).Tourism and development in Tropical Islands: A political ecology perspective. In Gossling, S. (ed).Tourism and Development in Tropical Islands a Political Ecology Perspective. Cheltnam: Edward Elgar Publishing Ltd.

Government Communication and Information Systems.(2011). South Africa Yearbook 2010/11. [Online] Available from:https://www.gcis.gov.za/content/resourcecentre/sa-info/yearbook2010-11. [Accessed: 15 February 2018].

Government Communication and Information Systems.(2015). South Africa Yearbook 2014/15. [Online] Available from: https://www.gcis.gov.za/content/resourcecentre/sa-info/yearbook2014-15.[Accessed: 15 February 2018].

Green, D. (2007). Managing water: avoiding crisis in California.California: University of California Press.

Green Gazette.(2012). National Gazette No. 35517 of 20-July-2012, Volume 565.[Online] Available from: https://www.greengazette.co.za/documents/national-gazette-35517-of-20-july-2012-vol-565_20120720-GGN-35517.pdf.[Accessed: 15 February 2018].

Grigg, N.S.(1996). Water resources management: Principles, regulations, and cases. New York: McGraw-Hill.

Harvey, D. (1996). Justice, Nature and the Geography of Difference.Oxford: Blackwell.

Hirschowitz, R. (2000). Measuring poverty in South Africa.Pretoria: Statistics South Africa.

Hobbes, T., 1968. Leviathan, or Matter, Form, and Power of a Commonwealth Ecclesiastical and Civil.[Edited by CB Macpherson]Harmondsworth : Penguin.

Hodgson, S. (2004).Land and water – the rights interface (FAO Legislative Study 84).Rome: Food and Agriculture Organisation.

Homer-Dixon, T. (1995). The Ingenuity Gap: Can Poor Countries Adapt to Resource Scarcity? Population and Development Review, 21(3): 587-612.

Hooper, B.P. (2003).Integrated water resources management and river basin governance.Water Resources, (126): 12-20.

Huppert, W. (2007).IWRM and Water Governance-Striving for 'Incentive Compatibility'in the Water Sector.In PapierpräsentiertbeidemzweitenLake Abaya Research Symposium, 7(11).

Islar, M. (2012). Privatised hydropower development in Turkey: A case of water grabbing? Water Alternatives,5(2): 376–391.

Jeffrey, L.S. (2005). Characterisation of the coal resources of South Africa. Journal of the Southern African Institute of Mining and Metallurgy, 105(2): 95-102.

Kafle, R.P. (2011). Understanding Water Conflict: A Study of Conflict among Farmers and between Farmers and Companies in the Godavari Watershed, Kathmandu Valley, Nepal. [Online] Available from: https://library.wur.nl/WebQuery/titel/1971779.[Accessed: 17 February 2018].

Kahinda, J.M., Taigbenu, A.E., Sejamoholo, B.B.P., Lillie, E.S.B. &Boroto, R.J. (2009). A GIS-based decision support system for rainwater harvesting (RHADESS).Physics and Chemistry of the Earth, Parts A/B/C, 34(13-16): 767-775.

Karar, M.E. (2004). Water resource management. [Online] Available from:http://www.wrc.org.za/Lists/Knowledge%20Hub%20Items/Attachments/9175/WRC%20Knowledge%20Review%202010-11%20KSA%201.pdf. [Accessed: 25 February 2018].

Kim, K. &Glaumann K.(2011). Transboundary water management: Who Does What, Where? Analysing the Data in SIWI's Transboundary Water Management Database.Stockholm: Swedish Water House.

Klare, M. (2001).Resource wars: The new landscape of global conflict. New York: Henry Holt and Company.

Kriesberg, L. (2007). Constructive conflicts: From escalation to resolution.New York: Rowman& Littlefield Publishers.

Kujinga, K. (2004). The dynamics of stakeholder participation in Water Resource Management in Zimbabwe: A case study of the agricultural sector.Cape Town: University of Western Cape.

Kofi Annan, Text of the Remarks of the Secretary General of the United Nations, March 1, 2001. Accessed February 24, 2009 from http://www.aag.org/News/kofi.html

Langstaff, L. (2010). Freshwater scarcity and pricing in South Africa: Conflicts between conservation and equity in the Post-Apartheid state. SURG Journal, 4(1): 44-50.

Larson, K.L. (2010). An integrated theoretical approach to understanding the socio-cultural basis of multidimensional environmental attitudes.Society and Natural Resources, 23(9): 898-907.

Latour, B. (1999).Pandora's Hope: Essays on the Reality of Science Studies. Cambridge: Harvard University Press.

Lautze, J., De Silva, S., Giordano, M. & Sanford, L. (2011). Putting the cart before the horse: Water governance and IWRM. Oxford: Blackwell Publishing Ltd.

LaVanchy, G.T., Romano, S.T. & Taylor, M.J. (2017).Challenges to Water Security along the “Emerald Coast”: A Political Ecology of Local Water Governance in Nicaragua.Water, 9(9): 655.

Law, J.& Whittaker, J. (1988). On the art of representation: notes on the politics of visualisation. In Law, J. (ed). Picturing power: Visual Depiction and SocialRelations.London: Routledge.

Limpopo Department of Agriculture (LDA).Annual Report 2012/2013.Vol No 4

Le Billon, P. (2001). The political ecology of war: natural resources and armed conflicts.Political geography, 20(5): 561-584.

Le Meur, P., Hochet, P., Shem, M.&Touré, O. (2006).Conflict over access to land and water resources within Sub-Sahara dry lands.Paris:Groupe de rechercheetd’échangestechnologiques (GRET).

Levite, H., Sally, H. &Cour, J.(2002). Testing water demand management scenarios in a water-stressed basin in South Africa. Physics and Chemistry of the Earth, 27: 779–786.

Limpopo Provincial Government.(2004).Growth and Development Strategy 2004-2014.Limpopo: Limpopo Provincial Government.

Luzi, S. (2007).Double-edged hydropolitics on the Nile. Zurich: Swiss Federal Institute of Technology.

Mail & Guardian. (2014). Mothotlung: Fourth person dead after protests. [Online] Available from: https://mg.co.za/article/2014-01-20-fourth-person-dies-after-mothotlung-protests.[Accessed: 22 March 2018].

Manzungu, E. (2004). Water for all: Improving water resource governance in Southern Africa.NewYork:International Institute for Environment and Development Natural Resources Group and Sustainable Agriculture and Rural Livelihoods Programme.

Maseko, N. (2014). South Africa: four killed at protest over water shortages.[Online] Available from:http://www.bbc.co.uk/news/world-africa-25840703.[Accessed: 25 January 2018].

Mason, S.A., Hagmann, T., Bichsel, C., Ludi, E.&Arsano, Y. (2009). Linkages between sub-national and international water conflicts: the Eastern Nile Basin.Berlin: Springer.

Meese, E., Ortmeier, P.J. and Baca, L.D., 2004. Leadership, ethics, and policing: Challenges for the 21st century.Englewood Cliffs, NJ: Prentice Hall.

Mehta, L.(2005). The politics and poetics of water: Naturalising scarcity in western India. New Delhi: Orient Longman Private Limited.

Mining Qualification Authority.(2014).Annual Report 2014. [Online] Available from:https://nationalgovernment.co.za/entity_annual/162/2014-mining-qualification-authority-(mqa)-annual-report.pdf. [Accessed: 6 March 2018].

Miranda, L., Hordijk, M. & Molina, R.T. (2011).Water governance key approaches: an analytical framework.Literature Review,4: 1-23.

Mirumachi, N. & Van Wyk, E. (2010).Cooperation at different scales: challenges for local and international water resource governance in South Africa. Geographical Journal, 176(1): 25-38.

Mirumachi, N.&Allan, J.A. (nd).Revisiting transboundary water governance: Power, conflict, cooperation and the political economy.London:School of Oriental and African Studies & King's College.

Mitchell, B. (1990). Integrated water management.In Mitchell, B. (ed).Integrated Water Management: International Experiences and Perspectives. London and New York: Bellhaven Press.

Moench, M., Dixit, A., Janakarajan, S., Rathore, M.S.&Mudrakartha, S. (2003).The Fluid Mosaic: Water Governance in the Context of Variability. Colorado: Institute for Social and Environmental Transition.

Molle, F. (2009).River-basin planning andmanagement: The social life of a concept.Geoforum 40(3): 484-494.

Mollinga, P.P. (2008). Water, politics and development: Framing a political sociology of water resources management.Water Alternatives, 1(1): 7-23.

Mullins, D.(2002). Calculation of sectoralmultipliers.Pretoria: Conningarth Economists.

Munnik, V., Burt, J., Price, L., Barnes, G., Ashe, B.&Motloung, S. (2016). Principled, Pragmatic Revitalisation of Catchment Management Forums in South Africa. [Online] Available from: http://www.wrc.org.za/Knowledge%20Hub%20Documents/Research%20Reports/TT%20682-17.pdf.[Accessed: 2 March 2018].

Murdoch, J.& Marsden, T. (1995). The spatialization of politics: local and national actor-spaces in environmental conflict. Transactions of the Institute of British Geographers, 20(3): 368-380.

Naicker, K., Cukrowska, E. & McCarthy, T.S. (2003).Acid mine drainage arising from gold mining activity in Johannesburg, South Africa and environs. Environmental pollution, 122(1): 29-40.

Nelson, F.&Agrawal, A. (2008). Patronage or participation?Community-based natural resource management reform in sub-Saharan Africa.Development and change, 39(4): 557-585.

Netherlands Organisation for Social Research.(2007). Conflict Resolution and Negotiation Skills for Integrated Water Resources Management.The Hague: Netherlands Organisation for Social Research.

Norgaard, R.B. (1994).Development betrayed: The end of progress and a coevolutionaryrevisioning of the future.London: Routledge.

Otis, G. (2002).A world without water. [Online] Available from:https://www.globalpolicy.org/component/content/article/174/30630.html. [Accessed: 3 April 2018].

Pahl-Wostl, C. (2002). Towards sustainability in the water sector– the importance of human actors and processes of social learning. Aquatic sciences, 64(4): 394-411.

Pahl-Wostl, C.(2007). Transition towards adaptive management of water facing climate and global change.Water Resources Management, 21(1): 49–62.

Pahl-Wostl, C., Isendahl, N.,Möllenkamp, S.,Brugnach, M., Jeffrey, P., Medema, W. & Tessa de Vries, T. (2006). Paradigms in Water Management: Report of the New Water project – New Approaches to Adaptive Water Management under Uncertainty. [Online] Available from: http://www.newater.uni-osnabrueck.de/deliverables/D112.pdf.[Accessed: 3 April 2018].

Pfeiffer, M. (1997).Sozialstruktur und Verhaltensökologie von RiesenameisenCamponotusgigasLatreille 1802 imRegenwaldMalaysias auf Borneo.Wiss.-und-Technik-Verlag.

Philip, R., Anton, B., Cox, D., Smits, S., Sullivan, C., Chonguiça, E., Monggae, F., Nyagwambo, L., Pule, R. &BerraondoLópez, M. (2008). Local Government and Integrated Water Resources Management (IWRM): Part II: Understanding the Context–The Role of Local Government in IWRM. Durban: ICLEI, Hirtand Carter (Pty) Ltd.

Pollard, S.& Du Toit, D. (2008). Integrated water resource management in complex systems: How the catchment management strategies seek to achieve sustainability and equity in water resources in South Africa. Water SA, 34(6): 671-679.

Pretoria Dispatch. (1999). Dam bomb may be 'aimed at farmers'. [Online] Available from:http://www.dispatch.co.za/1999/07/21southafrica/RESEVOIR.HTM. [Accessed: 1 December 2017].

Pulles, W., Howie, D., Otto, D. & Easton, J.(1995). A manual on mine water treatment and management in South Africa.Pretoria: Water Research Commission.

Rahaman, M.M.&Varis, O. (2005). Integrated water resources management: evolution, prospects and future challenges. Sustainability: science, practice and policy, 1(1): 15-21.

Ramirez, R. (1999). Stakeholder analysis and conflict management. In Buckles, D. (ed).Cultivating peace: Conflict and Collaboration in Natural Resource Management. Ottawa: International Development Research Centre.

Republic of South Africa.(1996).Constitution of the Republic of South Africa, Act No. 108 of 1996.Pretoria: Government Gazette.

Republic of South Africa. (1997). Water Services Act of 1997. Cape Town: Government Gazette.

Republic of South Africa.(1998). National Water Act of 1998 Vol. 398.Cape Town: Government Gazette.

Roberts, R. (1995). Public involvement: From consultation to participation.InVanclay, F. &Bronstein, D.A (eds).Environmental and social impact assessment. London: John Wiley and Sons.

Robbins, P. (2004). Political ecology: A critical introduction.Oxford: Blackwell Publishing.

Robbins, P. (2011). Political ecology: A critical introduction (Vol. 16).West Sussex: John Wiley & Sons.

Rogers, P. & Hall, A.W. (2003).Effective water governance (Vol. 7).Stockholm: Global Water Partnership.

Roling, N. &Wagemakers, M.(1998). Facilitating sustainable agriculture: participatory learning and adaptive management in times of environmental uncertainty. Cambridge: Cambridge University Press.

Roll, M.&Sperling, S. (2011). Fuelling the World–Failing the Region. Oil Governance and Development in Africa's Gulf of Guinea. Berlin: Friedrich-Ebert-Stiftung.

Sabatier, P.A., Weible, C. &Ficker, J. (2005).Eras of water management in the United States: Implications for collaborative watershed approaches. In Sabatier, P.A., Focht, W., Lubell, M., Trachtenberg, Z., Vedlitz, A. & Matlock, M. (eds).Swimming upstream: Collaborative approaches to watershed management. Cambridge: MIT Press.

Saravanan, V.S. (2008). A systems approach to unravel complex water management institutions. Ecological Complexity, 5(3): 202-215.

Saravanan, V.S., McDonald, G.T.&Mollinga, P.P. (2009). Critical review of integrated water resources management: moving beyond polarised discourse.Natural Resources Forum, 33(1): 76-86.

Schreiner, B., van Koppen, B. &Khumbane, T. (2002). From bucket to basin: A new paradigm for water management, poverty eradication, and gender equity. In Turton, A.&Henwood, R.(eds).Hydropolitics in the developing world: A Southern African perspective. Pretoria: African Water Issues Research Unit.

Sehring, J. (2009). Path Dependencies and Institutional Bricolage in Post-Soviet Water Governance.Water Alternatives.

Simpungwe, E. (2006). Water, stakeholders and common ground: Challenges for multi-stakeholder platforms in water resource management in South Africa.Wageningen: WageningenUniversity.

South African Statistics. (2002).South African Statistics 2002: 8th edition. [Online] Available from:http://www.statssa.gov.za/publications/SAStatistics/SAStatistics2002.pdf. [Accessed: 2 December 2017].

Spencer, L. and Ritchie, J., 2002. Qualitative data analysis for applied policy research. In Analyzing qualitative data (pp. 187-208). Routledge.

Stonich, S.C. (1998). Political ecology of tourism.Annals of tourism research, 25(1): 25-54.

Swain, A. (2004).Managing water conflict: Asia, Africa and the Middle East.London: Routledge.

Swyngedouw, E. (1996). The city as a hybrid: on nature, society and cyborg urbanization.Capitalism Nature Socialism, 7(2): 65-80.

Swyngedouw, E.(2004).Social Power and the Urbanization of Water: Flows of Power. Oxford: Oxford University Press.

Swyngedouw, E. (2005). Dispossessing H2O: The contested terrain of water privatization.Capitalism Nature Socialism, 16(1): 81-98.

Swyngedouw, E. (2006). Power, water and money: exploring the nexus. [Online] Available from:http://hdr.undp.org/en/content/power-water-and-money-exploring-nexus. [Accessed: 8 April 2018].

Tapela, B. (2012). Social water scarcity and water use. [Online] Available from:http://www.wrc.org.za/SiteCollectionDocuments/News%20documents/1940.dotx. [Accessed: 6 March 2018].

Temple, J. (2005). Dual economy models: a primer for growth economists.The Manchester School, 73(4): 435-478.

Tewari, D.D. (2008). Engendering economic development through enforcement of justifiable human rights to water in South Africa.Delhi: World Aqua Congress.

The Economist. (1999). “Water fights” Special report: The world in 2000.

Thompson, H., 2006. Water Law: a practical approach to resource management and the provision of services.Juta and Company Ltd.

Thompson, L. (2001). A History of South Africa. New Haven and London: Yale University Press.

Turton, A.R (2003). The political aspects of institutional developments in the water sector: South Africa and its international basins.Submitted in partial fulfilment of the requirements for the degree Doctor Philosophie (International Politics) in the faculty of Humanities.University of Pretoria.

UNESCO. (2006). Water a shared responsibility. United Nations World Water Development Report 2 (WWDR2).Paris: UNESCO.

Union of South Africa. (nd).Water Act, No. 54 of 1956. [Online] Available from:http://goo.gl/PzIISQ. [Accessed: 25 February 2018].

United Nations.(1992). The Dublin statement on water and sustainable development. [Online] Available from:http://www.un-documents.net/h2o-dub.htm. [Accessed: 18 April 2018].

United Nations. (2014). Integrated Water Resources Management (IWRM).[Online] Available from:http://www.un.org/waterforlifedecade/iwrm.shtml. [Accessed: 25 April 2018].

United Nations Development Programme.(2004).Water governance for poverty reduction: Key issues and the UNDP response to Millennium Development Goals. New York: UNDP.

United States Agency for International Development.(nd).What is integrated water resources management?[Online] Available from: http://www.usaid.gov/our_work/environment/water/what_is_iwrm.html. [Accessed: 12 April 2018].

Uys, M. (1996).A Structural analysis of the water allocation mechanism of the water Act 54 of 1956 in the light of the requirements of competing water user sectors with special reference to the allocation of water rights for ecobiotic requirements and the historical development of the South African water law. Pretoria: Water Research Commission.

Van Averbeke, W., Denison, J. &Mnkeni, P.N.S. (2011).Smallholder irrigation schemes in South Africa: A review of knowledge generated by the Water Research Commission.Pretoria: Water Research Commission.

Van Koppen, &Merrey, D.J. (2003).Redressing racial inequities through water law in South Africa: Revisiting old contradictions?Colombo: IWMI.

Van Koppen, B. & Schreiner, B. (2014).Moving beyond integrated water resource management: Developmental water management in South Africa.International Journal of Water Resources Development, 30(3): 543-558.

Van Zyl, J., Vink., N. & van Rooyen, C.J. (1991). Voorstellevir n Landboubedieningstesel in Suid Africa: Uitdagingsenaanpassingsvirlanbouvoorligting in Reaksie op Realiteite van die Negentings. Referaatgelewertydens die jaarlikse symposium van die SuidAfrikaanseVerenigingvirLandbouvoorligting.

Viera, S. (1991).Democracy and development: Themes for a reflection on Mozambique.Southern Africa Political and Economic Monthly, 4(5): 17-22.

Vink, N. & Van Rooyen, J. (2009).The economic performance of agriculture in South Africa since 1994: Implications for food security.Development Planning Division Working Paper Series No.17, DBSA: Midrand.

Walker, G. & Daniels, S. (1997). Foundations of natural resource conflict: Conflict theory and public policy. In Solberg, B. &Miina, S. (eds).Conflict management and public participation in land management.Wageningen: European Forestry Institute.

Ward, R.C. (1995). Special issue on integrated watershed management:A new paradigm for watermanagement?Journal of Contemporary Water Research and Education, 100: 2-2.

Warden, E.W. (2015).Oiling the Wheels of Conflict?Local Grievances, relative deprivation and the potential for conflict in Cape Three Points, Ghana.Agder: University of Agder).

Warner, J., Sebastian, A. &Empinotti, V. (2013).Claiming (back) the land: The geopolitics of Egyptian and South African land and water grabs.Ambiente e Sociedade, 16:1-24.

Warner, J., Wester, P. and Bolding, A., 2008. Going with the flow: River basins as the natural units for water management? Water Policy, 10(S2):121-138.

Warner, M. & Jones, P. (1998). Assessing the need to manage conflict in community-based natural resource projects. London: Overseas Development Institute.

Webster, M., 2006.Merriam-Webster online dictionary: America's most trusted online dictionary.

Wester, P., Merrey, D.J. & de Lange, M. (2003).Boundaries of consent: Stakeholder representation in river basin management in Mexico and South Africa.World Development, 31(5): 797-812.

Williamson, O.E. (1996). The mechanisms of governance. Oxford: Oxford University Press.

Wittfogel, K.A. (1981). Oriental despotism: A comparative study of total power.New York: Vintage Books.

Wolf, A.T., Kramer, A., Carius, A. &Dabelko, G.D. (2005).Managing water conflict and cooperation.State of the World, 80-95.

World Meteorological Organization. (1992). International conference on water and the Environment: The Dublin statement on water and sustainable development. Geneva: WMO

UN. (2006). World Water Development Report, 06 March 2006. [Online] Available from: http://www.unwater.org/publications/water-shared-responsibility/.[Accessed: 5 April 2018].

World Wildlife Fund.(2011). Coal and water futures in South Africa. [Online] Available from: http://www.wwf.org.za/?7000/coal-and-water-report.[Accessed: 26 February 2018].

Worster, D. (1985).Rivers of empire: Water, aridity, and the growth of the American West.New York: Panthenon Books.

Yende S.S. (2018). The mine that took the water. News24. [Online] Available from: https://www.news24.com/SouthAfrica/News/the-mine-that-took-the-water-20180603-2 [Accessed: 22 November 2016]

Yin, R.K., 2006. Mixed methods research: Are the methods genuinely integrated or merely parallel. Research in the Schools, 13(1): 41-47.

Younger, P.L. (2001). Passive treatment of ferruginous mine water using high surface area media. London: Elsevier Science Ltd.

Zeitoun, M. & Warner, J. (2006).Hydro-hegemony–a framework for analysis of trans-boundary water conflicts.Water policy, 8(5): 435-460.

Zeitoun, M. (2008).Power and water in the Middle East: The hidden politics of the Palestinian-Israeli water conflicts. New York: IB Tauris Publishers

Zeitoun, M., Naho, M. &Jeroen, W. (2010).Transboundary water interaction II: The influence of ‘soft’ power. International Environmental Agreements: Politics, Law and Economics, 11(2): 159-178.

9. APPENDICES

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

University of Pretoria
Department of Anthropology and Archaeology
Faculty of Humanities
Pretoria 0002, City of Tshwane, South Africa
Tel. +27 12 4204661, Fax +27 86 542 9204

19 January 2017

REF: INTRODUCING STUDENT PATRICIA MDHLOVU

This note serves to confirm that Ms Patricia Mdhlovu is a *bona fide* student (Student Number 16385404), at the Department of Anthropology and Archaeology of the University of Pretoria, enrolled for a two year MSocSci in Development Studies by dissertation only, under the supervision of Dr V. Thebe. She is doing a research project on 'Water Governance, Power Relations and Water Conflicts at Catchment Area Level in South Africa'. The research project will involve conducting secondary research and discussions with key informants and stakeholders at the catchment level. She will need assistance in order to accomplish this. May you please give her the assistance that she may need.

Thanking you in advance.

Yours

Vusilizwe Thebe (PhD, UEA, UK; MA, UEA, UK)
Programme Coordinator (Development Studies)
Department of Anthropology and Archaeology
University of Pretoria
Private Bag X20, Hatfield 0028, South Africa
Tel. +27 12 420 3526
e.mail: vusi.thebe@up.ac.za

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA
University of Pretoria
Department of Anthropology and Archaeology
Faculty of Humanities
Pretoria 0002, City of Tshwane, South Africa
Tel. +27 12 4204661. Fax +27 86 542 9204

CONSENT FORM

Title of Project: Water Governance, Power Relations and Water Conflicts: Exploring Dynamics of Conflict and its Resolutions at Catchment Level in South Africa

Name of Researcher: Mdhlovu Patricia

Please tick all boxes

1. I hereby agree to participate in Mdhlovu Patricia's Masters Study on Water Governance, Power Relations and Water Conflict in the Olifants Water Management Area. ☐
2. I confirm that I have read and understand the research study information sheet for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily. ☐
3. I understand that my participation in this study is voluntary, I am not forced to participate, and that I am free to withdraw at any time without giving any reason ☐
4. I understand that I will not personally benefit in the study. ☐
5. I understand that my participation will be kept confidential. ☐
6. I also agree and understand that the data that I will provide will be stored electronically and will be used for research purposes now or in future. ☐
7. I agree to be tape-recorded during the interview. ☐
8. I fully agree to take part in the above study. ☐

Date _____ Signature _____

INTERVIEW SCHEDULE

Title of the study

Water Governance, Power Relations and Water Conflict: Exploring Dynamics of Conflict and its Resolutions at Catchment Level in South Africa

SECTION 1:

1.1 Introduction

- Introduce myself to the research participants
- Introduce the study aim, objectives and motivation to the research participants
- Explain the role of their participation in the study
- Outline the interview timeframe.
- Explain ethical issues involved in the study and out consent forms

SECTION 2: THE BODY

2.1 Respondents / Participants (Water Users and Stakeholders)

Interview Themes	**Sub-Themes To Be Covered**
2.2.1 Water Governance	• View on the management of water resources at a catchment level • View on water laws/legislations, policies, strategies, its development, and its review. • The process of stakeholder engagement and consultation on water issues • View on the role of water management institutions (CMAs & CMFs) at the water management area • Role of the CMAs & CMFs in mitigating conflict in the catchment • Are water rights, water allocation, water use, and consumption allocated equitably or efficiently? • Role of stakeholders in the management of water resources in the catchment • Challenges experienced in the catchment • Water quality issues in the catchment • View on compliance, non-compliance, monitoring, and enforcement of water laws
2.2.2 Power Relations	• Financial or political power of water users at catchment area • Power dynamics in the catchment • The control of water resources in the catchments • Decision making powers in the catchments
2.2.3. Water Conflicts	• Potential sources of conflict in the catchment • Recorded cases of conflict • Issues of concern in the catchment, i.e. drought, etc • Stakeholder relations and interests in the catchments, particularly issues of cooperation in water use • Measures/tools for addressing water conflicts in the catchment

SECTION 3: CLOSING REMARKS

- Appreciate the respondents for participating in the study
- Inform them that I will continue communicating with them for any future progress/activities regarding the study, e.g. follow-ups or feedback on the progress of the study.

RESEARCH STUDY INFORMATION SHEET

Good Day,

My name is Patricia Mdhlovu and I am a Masters student in the Department of Anthropology and Archaeology at the University of Pretoria. I am conducting a research study on Water Governance, Power Relations, and Water Conflict. My case study is the Olifants Water Management Area (WMA), a hydrological boundary located within South Africa. The Water Management Area includes some parts of Mpumalanga, Limpopo, and Gauteng.

The objective of my study is to analyse and understand the dynamics and potential for conflict and its resolutions within South Africa's local water management area by tapping in to the institutions (Catchment Management Agencies and Catchment Management Forums) established to manage South Africa's local water resources.

The aim is to assess the viability and role of these institutions in mitigating conflict amongst different stakeholders in the water sector and to understand the roles and interests of mining and irrigation stakeholders/water users in local water resource management and to check if these interactions have a potential for conflict or may foster cooperation. The aim of the study is not only to detail the nature of conflict but also to identify and explore conflict resolutions that foster cooperation, peace, development, and integrated water resource management in the catchment.

I am inviting you to participate in the research study. I have chosen to invite you to participate in the in the study because of your experiences and knowledge in local water resource management in the Olifants Water Management Area. Please allow me to conduct an interview with you about the knowledge you have with regard to my study objectives and aims as outlined above. Should you consent to participate; the interview will take about 45 minutes to an hour.

Please understand that **your participation is voluntary** and you are not being forced to take part in this study. The choice of whether to participate or not depends on you and if you choose not to participate, you will not be affected in any way. If you agree to participate and you decide later that you want to quit participating, it is ok, you may stop and tell me you do not want to continue with the interview. You are not

forced to answer the questions that you are not comfortable answering. There will be no penalties and you will not be prejudiced in any way.

The records from your participation will be kept confidential and may only be reviewed by people responsible for making sure that research is done properly, including members of the ethics committee at the University of Pretoria. The records will also be available to me unless you give permission for other people to see the records.

Your names will also be kept confidential and anonymous in all my records and the use of a pseudonym (another name) may apply in the instance that you request non-disclosure of your identity so that no one will be able to connect you to the answers you will provide.

Your privacy will be kept in all published and written data resulting from the study. I am kindly requesting you to give me permission, where necessary, to tape-record the interview. All transcript and audio tapes will be placed in a safe and lockable cabinet and office/library at the University of Pretoria. The data will be disposed of after a certain period has lapsed as guided by the university requirements.

All your responses will be stored electronically in a secured environment and will only be used for academic purposes subject for approval by the university / Research Ethics Committee. Please note that there are no risks known in this study except for unforeseen situations. There are also no benefits for participating in the study. However, it carries significant lessons for the South African government (policy developers), other stakeholders, and other countries in the region as they face challenges of managing water resources at a time of growing demand and increasing water scarcity.

The study has been presented and approved on 7 November, 2016 by the Faculty of Humanities: Department of Anthropology and Archaeology for further process by the University's Research Ethics Committee. Complaints regarding the ethical aspects of the study, i.e. if you feel I may have harmed you in any way, may be directed to the University of Pretoria Research Ethics Committee, on 012 420 4850/6527.

For further correspondence regarding the study, in case you will require feedback on the progress and outcome of the study, you may provide me with your contact details and I will record them in a safe place for use by me only.

Below are my personal particulars should you need to contact me for any information with regard to the study:

Email Address: Patricia85m@gmail.com

Mobile: 083 799 2383

Telephone: 012 336 8259

Thanking you in advance

Mdhlovu Patricia

water & sanitation

Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

Enquiries: Mr. A Singh
Telephone: 012 336 7531
Reference:

DEPUTY DIRECTOR GENERAL

REQUEST FOR APPROVAL FOR MS MDHLOVU PATRICIA TO CONDUCT A RESEARCH STUDY IN THE WATER SECTOR, WITHIN THE OLIFANTS WATER MANAGEMENT AREA DURING THE ACADEMIC YEAR 2017.

1. PURPOSE

1.1 To request your approval to conduct a research study in the water sector, within the Olifants Water Management area during the academic year 2017.

2. BACKGROUND AND DISCUSSION

2.1 I Patricia Mdhlovu, an employee of the Department of Water and Sanitation with the position of a Development Expert and working within the Chief Directorate: Institutional Oversight, under the Sub-Directorate: Stakeholder Empowerment, I am a *bona fide* student (Student Number 16385404) at the Department of Anthropology and Archaeology of the University of Pretoria, enrolled for a two year Master of Social Science (MSocSci) degree in Development Studies under the supervision of Dr V. Thebe.

2.2 I have presented a MSocSci in Development Studies research proposal to the Department of Anthropology and Archaeology on the 7 November 2016. The department panel made observations and recommended that I should furnish the University of Pretoria Ethics Committee with a letter of approval to conduct a research study in the water sector within the Olifants Water Management area from the department of Water and Sanitation.

2.3 The research study is centered around the concepts of Water Governance, Power Relations and Water Conflicts. The research project is titled "Exploring the dynamics of conflict and its resolutions at catchment level in South Africa". The objectives of the research study is to analyse the dynamics and potential for conflict and its resolution within South Africa's local water management area after the adoption of the Catchment Management Agencies (CMAs) and Catchment Management Forums (CMFs). To assess the viability and role of Water Management Institutions (CMAs & CMFs) in mitigating or managing conflict amongst different stakeholders in the water sector. Lastly, to identify the roles and interests of stakeholders in local Water Resource Management and to check if this may foster conflict or cooperation in local water resource management.

2.4 The research study is guided by the realisation that despite the adoption of the CMAs and CMFs as institutions to manage local water resources and possible manage conflict, the dynamics of interaction between these institutions and other stakeholders in the local water management sector have remained a neglected area, which according to the researcher, this remain a problem for further research.

2.5 The study is important for the student's personal growth and career path. It will enhance her knowledge and understanding of the challenges that are experienced by stakeholders at the local catchment areas. It will contribute to bringing solutions to the many challenges required at the local level. It carries significant lessons for the South African government, in particular the water sector, other stakeholders and other countries in the region as they face challenges of managing water resources at a time of growing demand and increasing water scarcity.

M.AM
PO

REQUEST FOR APPROVAL FOR MS MDHLOVU PATRICIA TO CONDUCT A RESEARCH STUDY IN THE WATER SECTOR, WITHIN THE OLIFANTS WATER MANAGEMENT AREA DURING THE ACADEMIC YEAR 2017.

3. IMPLICATIONS

3.1. **Personnel**

3.2. The study will be conducted by Ms Mdhlovu Patricia, a Development Expert within the Chief Directorate: Institutional Oversight, under the Sub-Directorate: Stakeholder Empowerment. The employee vows that the study will not interfere with her roles and responsibilities in the department. The study will not be a cost to departmental resources, and will not cause harm to the department's reputation and image.

3.3. **Financial**

3.3.1. None- the department is not responsible in funding the study, I am funding myself. However, a bursary application for the study was made within the Directorate: Human Resource Development (HRD) without success. No departmental bursary award has been granted for the employee.

3.4. **Legal**

3.4.1. None

3.5. **Communication**.

3.6. The Directorate: Human Resource Development (HRD) was communicated for funding request for the study.

4. OTHER COMPONENTS CONSULTED

4.1 The CEO (Acting) in the Olifants Proto CMA will be formally requested to provide permission to conduct the study within the catchment.

5. RECOMMENDATIONS

It is recommended that:

5.1 You give approval for Ms Mdhlovu Patricia to conduct a research study in the water sector, within the Olifants Water Management area in fulfilment of her MSocSci degree in Development Studies during the academic year 2017.

RECOMMENDATION IN SUB-PAR 5.1SUPPORTED / ~~NOT SUPPORTED~~

MAHASHA MATOME

DEPUTY DIRECTOR: STAKEHOLDER EMPOWERMENT
DATE: 29 November 2016

M.A.M
PO

REQUEST FOR APPROVAL TO CONDUCT A RESEARCH STUDY IN THE WATER SECTOR, WITHIN THE OLIFANTS WATER MANAGEMENT AREA DURING THE ACADEMIC YEAR 2017.

RECOMMENDATION IN SUB-PAR 5.1SUPPORTED / ~~NOT SUPPORTED~~

CHIEF DIRECTOR: INSTITUTIONAL OVERSIGHT
DATE: 29.11.16

RECOMMENDATION IN SUB-PAR 5.1 APPROVED / ~~NOT APPROVED~~

DEPUTY DIRECTOR GENERAL: WATER SECTOR REGULATION
DATE: 8/12/16

Ms Mdhlovu Patricia
Department of Water and Sanitation
191 Francis Baard Street
150 Waterbrone Building
Pretoria
0002

The CEO Acting
Ms Wendy Ralekoa
Olifants CMA
22 Ruth Street
Bronkorspruit
1020

Dear Ms Ralekoa

REQUEST TO CONDUCT A RESEARCH STUDY WITHIN THE OLIFANTS WATER MANAGEMENT AREA

My name is Mdhlovu Patricia; I work within Institutional Oversight Chief Directorate. I am currently a part time student at the University of Pretoria, registered for a Master of Social Sciences in Development Studies. I'm doing a study titled "Water Governance, Power Relations and Water Conflict: Exploring the dynamics of conflict and its resolutions at a catchment level" the study focuses mainly at the Olifants Water Management Area. The objectives of the study are to analyse the dynamics and potential for conflict and its resolution in the catchment after the implementation of the WMIs around the country. It will be assessing the viability and the role of the WMIs in mitigating or managing conflicts amongst different stakeholders in the catchment. It also seeks to identify the issues of concern that have the potential to strike conflict now and in the future. The study will carry significant lessons for the SA water sector and it will help identify some of the solutions required to the challenges experienced in the catchment, especially those affecting the stakeholders in the sector.

Therefore, the study requires me to interact with various stakeholders/water users within the catchment through interviews. I am targeting water experts, any person with experience in the water sector and have decided to make use of the CMFs as my entrance points as they have a broad stakeholder representation. I hereby request for your approval to continue doing research on the specified topic above in the Olifants WMA.

Approval to conduct research in the water sector have already been sought and granted by the Deputy Director General: Water Sector Regulation, the submission detailing this has been attached to the email accompanying this letter. Even though I had been granted approval to conduct a research study in the water sector by the DDG, I am still required to get approval from the Olifants WMA. This is in line with my ethical obligations with the university. Other attachments includes, my ethical clearance letter from the University of Pretoria and reference may be made to it for any ethical clarities, I have also attached an informed consent form that I will be using when interviewing the research participants, the letter of introduction from my school, the study information sheet outlining the aims and

objective of the study and the ethical issues. Lastly I have attached the interview schedule that will act as a guide for the questions I am going to ask during the interviews.

Once approval is granted from your office, I will then make appointments with specific officials in your office, stakeholders / water users in the WMA. The interviews will be individual with the selected participants at their convenience outside work time.

Kind Regards
Patricia Mdhlovu
083 799 2383
012 336 8259
Mdhlovup@dws.gov.za

Signature

21/06/2017
Date

water & sanitation

Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

MPUMALANGA

Private Bag X11259, MBOMBELA, 1200. Promm Building, Cnr Brown and Paul Kruger, MBOMBELA, 1200.Tel: 013 759 7300
Enquiries: Mr. Nekhoffhe **Telephone:** 013 759 7443 **Reference:** S.9/4/P

University of Pretoria
Department of Anthropology and Archaeology
Faculty of Humanities
PRETORIA
0002

To whom it may concern:

RE: LETTER OF APPROVAL TO CARRY OUT RESEARCH WITHIN THE DEPARTMENT OF WATER AND SANITATION (DWS) UNDER OLIFANTS CATCHMENT MANGEMENT AREA.

This letter acknowledges that I have received and reviewed a request by **Ms Mdhlovu Patricia [student number 16385404]** which received on the 04 September 2017 to conduct a research project entitled 'Water Governance, Power Relations and Water Conflicts at Catchment Area Level in South Africa'. The research project will involve conducting secondary research and discussions with key informants and stakeholders at the Olifants catchment management area.

Ms Mdhlovu P has assured the department that the research will be carried out for academic purposes, will be done in an ethical manner and no remuneration will be expected..

It is in light of above that I grant her an approval to conduct above mentioned research with the department under Olifants Catchment Management Area.

Sincerely,

ACTING PROVINCIAL HEAD: MPUMALANGA
DATE: 06/09/2017

NATIONAL DEVELOPMENT PLAN
Our Future - make it work

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of Humanities
Research Ethics Committee

7 April 2017

Dear Ms Mdhlovu

Project:	**Water governance, power relations and water conflicts: Exploring dynamics of conflict and its resolutions at catchment level in South Africa**
Researcher:	**P Mdhlovu**
Supervisor:	**Dr V Thebe**
Department:	**Anthropology and Archaeology**
Reference number:	**16385404(GW20170221HS)**

Thank you for the response to the Committee's correspondence of 24 February 2017.

I have pleasure in informing you that the Research Ethics Committee formally **approved** the above study at an *ad hoc* meeting held on 6 April 2017. Data collection may therefore commence.

Please note that this approval is based on the assumption that the research will be carried out along the lines laid out in the proposal. Should the actual research depart significantly from the proposed research, it will be necessary to apply for a new research approval and ethical clearance.

The Committee requests you to convey this approval to the researcher.

We wish you success with the project.

Sincerely

Prof Maxi Schoeman
Deputy Dean: Postgraduate Studies and Ethics
Faculty of Humanities
UNIVERSITY OF PRETORIA
e-mail:tracey.andrew@up.ac.za

CC:
Supervisor(s): Dr V Thebe
HoD: Prof Pikirayi