



MONASH University

**The nexus of drought and power dynamics in water governance:
The case of UMngeni catchment area**

Hlengiwe Dube

Student Number: [REDACTED]

Faculty of Arts

**A thesis submitted in partial fulfilment for the degree of Master of
Philosophy in Integrated Water Management**

Monash University

Supervisor: Dr Fay Hodza

Co- supervisor: Dr Agnes Babugura

June, 2017

Copyright notice

© The author (2017). Except as provided in the Copyright Act 1968, this thesis may not be reproduced in any form without the written permission of the author.

Abstract

When water is scarce in a community, various stakeholders strive to influence its distribution to their own advantage. Power thus becomes an important factor, in that it can be used to control decisions on water governance. However, discourse on water crisis often fails to address the prevailing social, economic and political power dynamics when it comes to relational and distributional aspects of water scarcity. As such, the purpose of this study was to examine the nexus between drought and water governance by critically examining power dynamics in water governance in the context of the 2015-2016 drought in the UMngeni, a catchment area in KZN, South Africa that is frequented by droughts.

To achieve this aim, power dynamics were viewed through the lens of classical and modern power theories – mainly the political ecology theory, power elite theory, classical pluralist theory and Lukes’ three-dimensional power theory. Moreover, the study followed the interpretivist research tradition, employing a qualitative approach. Both primary and secondary qualitative data was collected. Primary data was obtained through stakeholder analysis, the observation method, face-to-face in-depth interviews and focus groups. A total of nineteen participants were interviewed. Of these nineteen, only three were female. Secondary data was collected through an extensive review of existing published and unpublished literature on the subject. Such data included journal and newspaper articles, books, farmers’ magazines and minutes of meetings. The collected data was analysed through framework thematic analysis.

The following themes were identified through the field research: race and privilege, economic elite domination, technocracy, civil society power and state arbitration. The results of the study show that droughts triggered “social water scarcity”, which refers to constructs of water resource management determined by economic, social and political power dynamics. The study then established that power dynamics based on race, economic status, technical knowledge and political status prevented previously disadvantaged individuals from participating in water governance issues. Similarly, indigenous subsistence farmers also felt that water distribution was still skewed along racial lines, such that during periods of drought these farmers were

more at risk from losing their crops and livestock due to water scarcity than commercial white farmers.

Linked to the issues of race and privilege was the economic dimension of power in water governance in a period of drought. Participants felt that commercial farmers had more influence over water allocation and distribution policies, owing to the structure of agribusiness in the economy of South Africa and its importance in food security. Such unequal power affects subsistence farmers and domestic water users, especially those from black communities, as they receive less water when more water is channelled towards commercial farms.

However, the study also found that inasmuch as previously disadvantaged individuals had no technical expertise in water governance; they possessed power through social movements such as *AbahlalibaseMjondolo* and the Anti-Privatisation Forum. Power in water governance issues in periods of scarcity was thus identified as being “everywhere and comes from anywhere.” Moreover, in investigating how power relations could be improved among different stakeholders in the UMngeni, the study established that the solution lay in capacity building, which would both increase access to resources and transform power relations between stakeholders.

Declaration

I, Hlengiwe Dube, hereby declare that this dissertation contains no material that has been accepted for the award of any other degree or diploma at any university or equivalent institution and that, to the best of my knowledge and belief, this dissertation contains no material previously published or written by another person, except where due reference is made in the text of the dissertation.



Hlengiwe Dube

Acknowledgement

First and foremost, I give thanks to the Almighty for bringing me this far.

I also wish to express my sincere thanks and gratitude to the International Water Security Network, which not only awarded me with a scholarship to pursue this degree, but also generously sponsored my attendance at the 2015 Young Water Professional Conference, where I was able to both network and get valuable ideas for my research.

Special thanks go to my supervisors, Dr Fay Hodza and Dr Agnes Babugura, for your unwavering support and guidance, and to Kelly, for her help in editing this document.

To Professor Nkhata, Dr Muchara and Linda Downsborough: I run short of words to truly express my gratitude for your academic and morale support. The knowledge you imparted during the course work enabled me to finish this degree, and your morale and support made Monash a second home for me.

To Dr Rosemarie Bezuidenhout, who took me through the baby steps of Research Methods and to all Social Science staff members whose doors I constantly knocked upon to discuss about theories and concepts applied in my research: thank you for the knowledge that you shared.

To Duncan Hay and the Natural Resources Institute members: thank you for providing office space during my field work and for ensuring my safe stay in the field.

To my colleagues at the Water Node, Thandi, Victor, Musi, Machaya and Busani: thank you for your encouragement and support.

Finally, to my family: I am grateful for your patience and support.

TABLE OF CONTENTS

Declaration	V
Acknowledgement	VI
CHAPTER ONE: INTRODUCTION TO THE STUDY	1
1.1 Introduction	1
1.2 Problem statement	3
1.3 Research Aim	5
1.4 Research Objectives	5
1.5 Research Questions	5
1.6 Significance of the research	5
1.7 Description of the study area	6
1.7.1 Geographical description of the UMngeni catchment area	6
1.7.2 Economic activities supported by UMngeni.....	8
1.7.3 Water governance in the UMngeni.....	8
1.8 Dissertation structure	10
CHAPTER TWO: LITERATURE REVIEW	11
2.1 Introduction	11
2.2 Conceptual and theoretical framework	11
2.2.1 The political ecology theory	14
2.2.3 The power elite theory	15
2.2.4 Lukes' three dimensions of power theory.....	18
2.3.1 A global overview of drought and water governance: the case of Ancient Egypt and present day Egypt	19
2.3.2 China and India	21
2.3.3 America and Canada	23
2.3.4 Overview of drought and water governance in South Africa.....	24
2.3.5 Overview of drought and water governance in the UMngeni catchment area.....	28
CHAPTER THREE: RESEARCH METHODOLOGIES	32
3.1 Introduction	32
3.2 Research Methodology	33
3.3 Data collection techniques, processes and tools	35
3.4 Primary data	36
3.4.1 Stakeholder analysis.....	36
3.5 Semi-structured, face-to-face, in-depth interviews	39
3.6 Sampling technique	42

3.7 Focus groups	45
3.8 Observation method	46
3.9 Secondary data	47
3.10 Data analysis	49
3.10.1 Transcription	50
3.10.2 Familiarisation	50
3.10.3 Identifying the thematic framework.....	50
3.10.4 Indexing	51
3.10.5 Charting	52
3.10.6 Mapping and interpretation	53
3.10.7 Ensuring credibility.....	53
3.10.8 Truth value.....	54
3.10.9 Consistency/neutrality	54
3.11 Ethical considerations	55
3.12 Limitations of the study	57
3.12.1 Methodological limitations.....	57
3.12.2 Measures used to collect data	57
3.12.3 Limitations of the researcher.....	58
CHAPTER FOUR: FINDINGS AND DISCUSSIONS	60
4.0 Introduction	60
4.1 Alienation of the PDIs through race and privilege: “continued legacies of Apartheid”	63
4.2 Economic elite domination: “water flows where money comes from”	68
4.4 Technocracy	73
4.5 Non-decision power: the invisible face of power in water governance	73
4.6 Political party cronyism in water allocation	75
4.7 The state: arbitral powers in water governance in times of scarcity	77
4.8 <i>Toi-toing</i>: the weapon of the masses	80
4.2 How power dynamics affect stakeholder participation in water governance	82
4.2.1 Knowledge power and stakeholder participation	82
4.2.2 Socio-economic status and participation	84
4.2.3 How power relations among different stakeholders in water management can be improved	85
4.2.4 Transfer of knowledge and skills.....	86
4.2.5 Improving power relations through dialogue and policy frameworks	86
CHAPTER FIVE: CONCLUSION AND RECOMMENDATIONS	91
5.0 Introduction	91

5.1 Recommendations.....	96
5.2 Ideas for future research	98
REFERENCES	99
ANNEX A: CONSENT FORM.....	115
ANNEX B: EXPLANATORY STATEMENT	116
ANNEX C: INTERVIEW QUESTIONS	119
ANNEX D: ETHICS CERTIFICATE	121

LIST OF FIGURES

Figure 1: Geographical location of the UMngeni catchment.....	15
Figure 2: The development of a thematic framework.....	32
Figure 3: An illustration of how Indexing was done.....	34
Figure 4: Water source.....	50
Figure 5: Water allocation pie chart.....	51

List of Diagrams

Diagram 2.1: The centrality of power dynamics in water governance in drought contexts.....	14
Diagram2.2:Venn diagram.....	23
Diagram3.1: Limitations of qualitative approaches	33
Diagram 4.1: A sketch map showing water distribution.....	49

List of Tables

Table 3.1: Limitations of qualitative approaches.....	20
Table 3.2: Interest influence matrix tool.....	37
Table 3.3:Limitations of semi-structured interviews	41
Table 3.4: Details of the participants of the study.....	44-45
Table 5.1 Examples of interventions.....	95

LIST OF ACRONYMS AND ABBREVIATIONS

AD	Anno Domini
BBC	British Broadcasting Corporation

BC	Before Christ
CMA	Catchment Management Agency
CMF	Catchment Management Forum
DARD	Department of Agriculture and Rural Development
DUCT	Duzi-uMngeni Conservation Trust
DWA	Department of Water Affairs
ENSO	El Nino Southern Oscillation
IB	Irrigation Board
IMF	International Monetary Fund
JOC	Joint Operations Committee
KZN	KwaZulu-Natal
NAFU	National African Farmers' Union
NWA	National Water Act
PDIs	Previously disadvantaged individuals
PPMs	Pre-paid meters
SANBI	South African National Biodiversity Institute
UKZN	University of KwaZulu-Natal
UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural Organisation
USBR	United States Bureau of Reclamation
WB	World Bank
WESSA	Wildlife and Environment Society of South Africa
WMA	Water management area
WRC	Water Research Commission
WUA	Water Users Associations
WWF	World Wildlife Fund

REFERENCING ABBREVIATIONS

et al. et alia (and others)

ibid. ibidem (exactly the same as the previous one)

Referencing has been done in compliance with the Harvard Referencing Guide, Monash University, 2012.

CHAPTER ONE: INTRODUCTION TO THE STUDY

1.1 Introduction

This chapter presents the overall context and background of the study, followed by the problem statement, the research aim, objectives and questions, and the significance of the study. Thereafter, a geographical map of the UMngeni catchment area is provided, followed by an overview of the current water governance structure of the area, as well as its key economic, political and social characteristics.

South African catchment areas have been affected by serious spells of drought in the past twenty years (Fauchereau et al. 2003). Many scholars have suggested that these droughts have been caused by the natural climatological processes related to climate variability and change (Nicholson 2001; Collier; Conway & Venables 2008; Fauchereau et al. 2003). Climate variability refers to the natural fluctuations of the climate system at a particular location from one year to another, or from one decade to another (Conde, Ferrer & Orozco 2006). Common drivers of climate variability include El Nino and La Nina events. Climate change, in contrast, refers to long term weather changes that result from human activities (Pittock 2009).

However, the problem with focussing on drought as a purely natural phenomenon is that the political nature and consequences of droughts tend to be ignored and underestimated (Kaika 2006; Davis 2004). Indeed, discourses on water crises often tend to obscure underlying social economic and political inequalities, forgetting or ignoring the fact that the water crisis is not only a natural climatological process linked to precipitation and climate change, but also represents a crisis of unequal power relations and skewed control over a finite resource.

Undeniably, wherever and whenever there is scarcity of resources, competition and resource capture is bound to occur (Howitt & Vaux 1995; Postel 2000; Falkenmark 2007; Gleditschet al. 2006). Moreover, resource

capture by powerful groups within communities has the effect of shifting resource distribution in their favour and subjecting the remaining population to resource scarcity. In other instances the powerful individuals, institutions and groups tend to dominate and disenfranchise the weaker ones (Wester; Merrey & De Lange 2003). Yet despite such evidence, previous studies on water governance have neglected to address how the total absence or limited availability of water in drought situations gives rise to open and subtle exercise of power for and against different stakeholders in affected areas (Tapela 2012), (Mehta 2000) and (Harris, Goldin and Sneddon 2015). This study was therefore conducted in order to examine the power dynamics in water governance in the context of drought, using the UMngeni catchment area in the KwaZulu-Natal Province (KZN) of South Africa as a case study.

The fact that power dynamics are important in the governance of water in drought situations is recognised in the World Water Development Report of 2006 (Water United Nations [UN] 2006). This report on power relations in water management made a ground-breaking contribution regarding the role of power dynamics in water management discourse and practice (Loftus 2009). The report led to the release of a string of papers authored by leading political ecologists, who advocated for a focus on power dynamics among stakeholders involved in the governance of shared water resources, especially those under drought conditions (Ekers & Loftus 2008; Swyngedouw 2009; Truelove 2011; Zeitoun, Mirumachi & Warner 2011). These authors' primary concern was that in earlier water governance discourse, "power dynamics were seen as an anathema" (Mollinga 2008:8). However, more recent studies have given rise to a new paradigm that recognises the role of politics and culture in water management and governance.

This new focus on water governance as a political process challenged the dominant thinking in the late 20th century, in which water management was seen as a purely techno-scientific process. For example, Rogers & Hall (2003), the two main authors associated with the Global Water Partnership,

a major promoter of the concept of water governance, regarded power dynamics as an issue external to water institutions. In addition, the first United Nations Educational, Scientific and Cultural Organisation (UNESCO) World Water Development Report of 2003 did not explicitly make reference to power dynamics in water governance, relegating it to a position of obscurity in water issues.

Unfortunately, ignoring the reality of power dynamics makes collaborative water management a difficult task – one in which stakeholders strive to work towards hydro-solidarity, yet are adversely affected by largely unrecognised power dynamics. Such overt or covert fighting for and against other stakeholders in an attempt to determine who gets water, and in what quantities and when, is a reality that many individuals, groups, institutions and communities experience in their day-to-day lives in drought-stricken communities. For this reason, this study examines power dynamics in the governance of water, specifically in the context of the drought in the UMngeni catchment area in KwaZulu-Natal that occurred in the 2015-2016 agricultural season in South Africa.

1.2 Problem statement

This study addresses the problem of power dynamics in water governance in the context of the 2015-2016 drought in the UMngeni catchment area. Moreover, it supports the growing recognition among water practitioners that the governance of water under drought conditions is a fluid process, in which different stakeholders should participate equally in managing water at catchment levels (Mollinga 2008; Molle 2008 & Sultan & Loftus 2013). Unfortunately, in reality inequality and power imbalance continue to characterise water management.

Emphatically, water governance under drought conditions has what Wegerich, Warnerb & Tortajadac (2014:1) refer to as “the darker side.” This “darker side” refers to power dynamics that determine “who gets what, where, why and how.” Moreover, this power imbalance remains hidden from

the public arena. Too often, in water governance and participation discourse, attention is drawn away from the social, political and economic differences that exist between stakeholders involved in water governance (Molobela & Sinha 2011). What remains largely unknown is the fact that less powerful groups and communities, such as previously disadvantaged individuals (PDIs) in post-colonial countries, subsistence farmers, rural municipalities and township domestic water users who rely on communal water tapes are often neglected and prejudiced against. They are allocated little to no water, while powerful groups get the lion's share.

In addition, less powerful or weak groups and communities suffer more in drought situations, in which they receive little water, or no water at all. The short and long-term consequences of this injustice include outbreaks of water-related diseases such as cholera (for instance, in the 2004 drought the Ngwelezane township was badly affected by cholera, which had less severe effects in the suburban areas in the Empangeni municipality) (Bond 2004). Other ill-effects include failure to plant winter crops (which are highly dependent on irrigation), failure to enhance food security, reduction in economic output of agro-based business and reduction of livestock.

To understand the power dynamics among stakeholders in water governance during droughts, this study employs 1) the political ecology theory, 2) the power elite theory, 3) the classical pluralist theory and 4) Lukes' three-dimensional power theory. The political ecology theory (1) attempts to study the interplay between the political, economic and social factors and environmental issues, noting that power dynamics account for an uneven distribution of resources (Forsyth 2004). The power elite theory (2) relies on the assumption that power and decision making are located mostly in the framework of government and the elite (Scott & Sullivan 2000). The classical pluralist theory (3) posits that although power lies mostly with the government, many non-governmental groups use their resources to exert influence, so that power is "everywhere" (Dahl 1957). Finally, Lukes' three-dimensional power theory (4) assumes that power has three dimensions: decision making power, agenda setting power, which is

exercised behind closed doors, and ideological power (Lukes 2004). A full discussion of these four theories and how they are used in the study is provided in Chapter Two.

1.3 Research Aim

The aim of this study is to explore the nexus of drought and power dynamics in water governance.

1.4 Research Objectives

The key objectives of this study are:

- To establish the power dynamics that exists in the UMngeni catchment area, with a specific focus on the 2015-2016 drought.
- To examine how power dynamics affect stakeholder participation in water governance in both positive and negative ways in the UMngeni catchment area in the context of the 2015-2016 drought.
- To identify how unequal power relations among different stakeholders in water management can be improved.

1.5 Research Questions

The key research questions of this study are:

1. What are the power dynamics that exist in the UMngeni catchment area in the context of the 2015-2016 drought?
2. How have power dynamics affected stakeholder participation in water governance?
3. How can power relations among different stakeholders in water management be improved?

1.6 Significance of the research

This study is of importance because its findings will add to existing knowledge on the impact of power dynamics in water governance in periods of drought. For example,

the study reveals both overt and covert forms of power that exist in catchment areas in drought contexts. These forms of power are discussed in Chapter Five.

This research also raises awareness of power disparities and inequalities pertaining to knowledge power, social capital and race dynamics that exist among different stakeholders at catchment management levels, with a particular focus on the UMngeni catchment area. The study posits that relative power differences can cause inequitable sharing of water. In addition, this study serves to inform water practitioners in, for example, the engineering, hydrology and technical departments, of these power dynamics. These water professionals, who focus on techno-scientific solutions to water management, would otherwise often neglect the “soft path” (human interactions), including stakeholder participation.

1.7 Description of the study area

This study was carried out in the UMngeni catchment area, because of its exposure to recurrent droughts and the existence of power dynamics in water governance issues. UMngeni is also an area of interest to the International Water Security Network (the sponsors of this degree), who are concerned about water management in context of droughts. The section below provides information about the chosen area.

1.7.1 Geographical description of the UMngeni catchment area

The UMngeni catchment area is located in KwaZulu-Natal (KZN), South Africa. It lies in the Mvoti Mzimkhulu Water Management Area (WMA) and it covers an area of 7,963 square kilometres. The main water source of the area is the 255km long UMngeni River and a number of tributaries, including the Msunduzi River that runs through Pietermaritzburg, the capital city of KwaZulu-Natal (Hay et al. 2014). The map showing the geographical location of the UMngeni is provided in Fig 1 below.

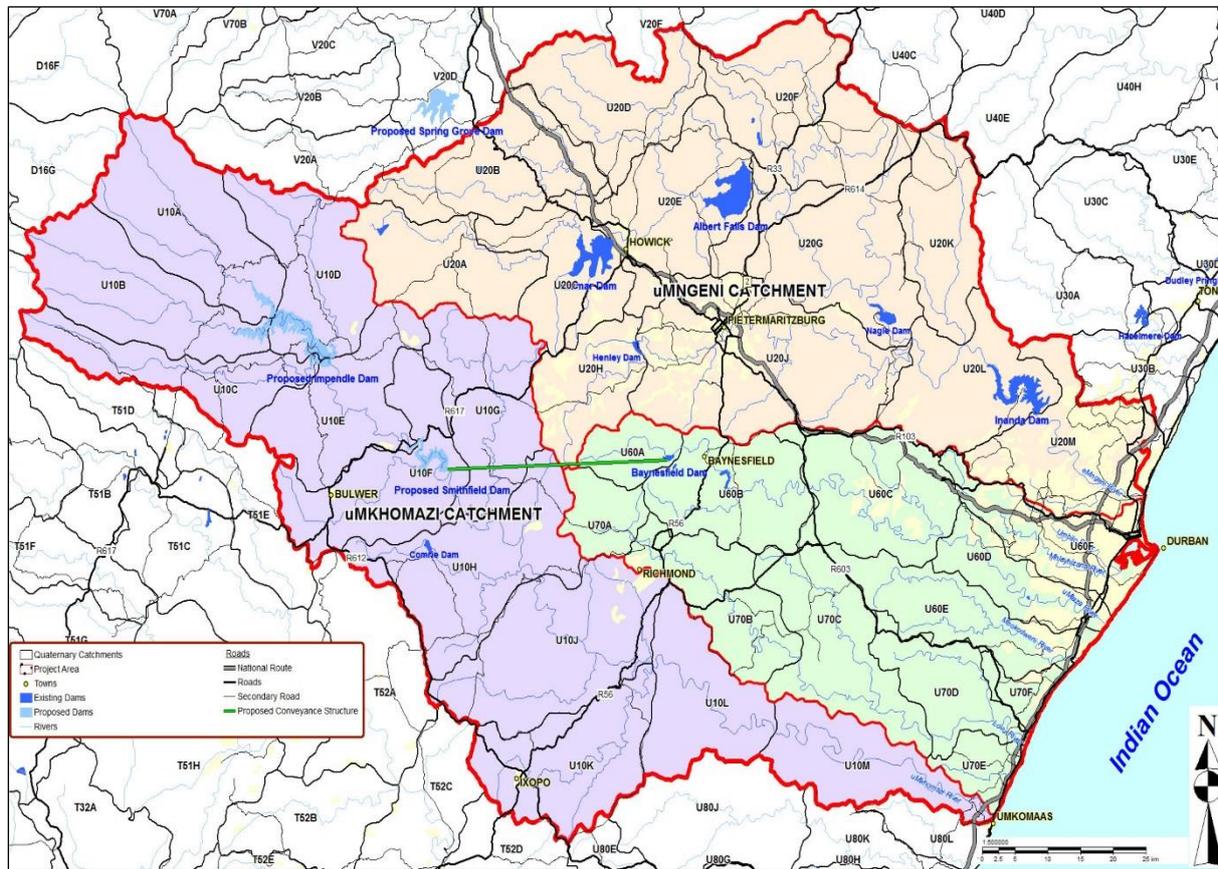


Fig 1:The geographical location of the UMngeni catchment area (Lorimer 2012)

The UMngeni catchment area is generally prone to meteorological droughts that are caused by El Nino Southern Oscillation (ENSO) phenomena (Nel 2009). El Nino is a name given to a weather pattern associated with a period of warming in the central and eastern tropical Pacific, which triggers climate extremes in most parts of the world (Kane 2009). In Southern Africa, the El Nino is closely associated with rainfall variability (Kane 2009). The recent El Nino (2015-2016) caused the most devastating drought in 35 years in Southern Africa. The region normally receives rains between the month of October and April, but the 2015-2016 rains did not fall until late February (<https://reliefweb.int/sites/reliefweb.int/files/resources/FEWS NET Southern Africa 2015>), affecting water availability to the extent that demand exceeded the available yield (Pulwarty & Sivakumar 2014).

1.7.2 Economic activities supported by UMngeni

The catchment area supports economic activities such as commercial farming (sugarcane, animal husbandry, horticulture and forestry). Sugar cane growing in KZN generates R4.2 billion per annum, and the industry provides jobs mainly to the rural population around KZN. The forestry sector contributes about 1% of the South African Gross Domestic Product (GDP), of which 4.4% comes from KZN, and also has a significant contribution to economic growth and job creation. Moreover, Early Bird Farm, located in KZN, is one of the largest poultry farms that contribute to the meat market in South Africa, while Sunfoil, also located in KZN, is the largest sponsor of the Proteas (South Africa cricket team).

Water resources in KZN also support the indigenous medicinal plant trade, which is worth R62 million annually. In addition, the catchment area supports recreational activities (canoeing). These economic activities contribute 11.5% to South Africa's GDP, with 80% of this contribution coming from the Durban-Pietermaritzburg region (Hay et al. 2014). UMngeni also provides water to the following municipalities: Msunduzi, uMngeni, eThekweni, uMgungundlovu, Howick, Richmond and Mbofana (Hay et al. 2014). The total population of these municipalities is around 4.45 million (Landie 2016).

1.7.3 Water governance in the UMngeni

The water in the UMngeni catchment area, like all such areas in South Africa, is governed by the 1998 National Water Act (NWA). The enactment of this legislation brought about profound transition in water governance, in which there was a shift from the Dutch, British colonial and Apartheid style of command and control type of governance to a decentralised and collaborative type of governance (Funke et al. 2008). More information about the history of the Dutch, the British and the Apartheid water governance systems and their effect on power dynamics in water governance in the UMngeni in the context of drought is provided in Chapter Two.

The UMngeni catchment area is mandated by the 1988 NWA to establish a Catchment Management Agency (CMA) – a self-regulatory body with a governing body and an executive or administrative structure that has the statutory responsibility, power and financial autonomy to perform a range of catchment management functions. To adequately allow for stakeholder participation in the establishment of a CMA, all CMAs are required to establish a Catchment Management Forum (CMF) – a non-statutory body that represents all stakeholders and organs of state in the catchment (Warner 2007).

Irrigation boards are *required to transform* into WUAs in terms of section 98(4) of the Water Act, thus forming the Water Users Associations (WUA). A WUA is a statutory body that has representatives from all sectors in the CMA. It has the power to develop water supply management plans (Warner 2007). However, the UMngeni catchment area is currently being governed through CMFs, as the WMA has not yet established a CMA or WUA. The stakeholders that are involved in water governance in the UMngeni are: the Department of Water Affairs (DWA), UMngeni Water (a government parastatal responsible for bulk water distribution, the uMngeni, eThekwini, uMgungundlovu, Howick, Richmond and Mbofana municipalities, the Duzi Umngeni Conservation Trust (DUCT), the South African National Biodiversity Institute, the Mbofana Irrigation Board, the World Wide Fund (WWF), the Pietermaritzburg Chamber of Business and the University of KwaZulu-Natal (UKZN), the National Department of Agriculture, and the National Disaster Management centre.

1.8 Dissertation structure

The general organisation of the study is as follows:

Chapter One provides the general background to the problem under research, presenting the aim and objectives, research questions and significance of the study. This chapter also illustrates the geographical layout of the UMngeni, as well as the climatic conditions that relate to hydrological droughts. Next, an overview is provided of the socio-political landmarks that have and continue to shape water governance in the UMngeni, the current water governance structure, the economic activities that the UMngeni catchment supports, and the water quality problems the catchment faces.

Chapter Two focuses on relevant literature and the theoretical underpinnings regarding power dynamics in water governance in the context of drought. This chapter covers literature on power, drought and water governance.

Chapter Three focuses on the methodological framework and methodological components adopted to achieve the objectives of the study. The choice of method was influenced by the nature of the problem and by time availability. The methods include both primary and secondary methods of data collection.

Chapter Four presents analyses and consequently discusses and interprets the data collected.

Chapter Five offers concluding remarks and recommendations.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter explores the work that has been done on the nexus between drought and water governance, both globally and in South Africa. More specifically, in line with the objectives of the study, the literature review examines how power dynamics have influenced the governance of water in drought situations in Egypt, the USA, Canada, South Africa in general and the UMngeni catchment area in particular. First, however, the chapter presents the conceptual and theoretical framework employed in this study.

2.2 Conceptual and theoretical framework

This study examines the nexus between drought and water governance. In this study, drought refers to a shortage of precipitation over a long period, normally referred to as a meteorological drought. This definition distinguishes this type of drought from other classes of droughts, namely agriculture droughts, hydrological droughts and socio-economic droughts, all of which do not fall into scope of this study. As the study is within the field of water management, it only focuses on the meteorological drought experienced in the UMngeni catchment area in 2015-2016.

Water governance refers to a range of political, social, economic and administrative systems that are put in place to develop and manage water resources (Rogers & Hall 2003). This definition addresses the nexus between water management and water governance. Water management is concerned with developing and using water resources and delivering water services. Water governance, however, sets the operational rules for water management (Rogers & Hall 2003).

The concept of water governance gained popularity in the 1990s, after the Dublin Conference on water and environment and the Earth Summit in Rio de Janeiro (Hansen & Curtis 2012; Benson et.al 2015). Governance refers to concepts regarding “good water governance.” Although this concept has many definitions, with no consensus about its meaning (Lautze 2011), one of its fundamental expectations is the collaboration of different actors towards achieving positive outcomes. In the

context of a drought, such outcomes could be hydro solidarity (unified management of the shared watercourse) and equitable sharing of the water resources (Rogers & Hall 2003; Rossi 2015). Moreover, as governance is concerned with the exercise of authority and allocation of rights, discussions about power dynamics become difficult to avoid (De Boer et al. 2013).

Indeed, central to the concept of water governance in the context of droughts is the issue of power. The definition of power is vast, contested and complicated (Lukes 2005; Clegg & Haugaard 2009). Thus, applying the power lens to this study of water governance in the context of drought required working through a broad classification of definitions of the term and then making decisions about the value of applying one perspective of power over others. For instance, power can be seen, among other ways, as domination (Weber 1978), capacity for action (Arendt 1970; Parsons 1963), or omnipresence (Foucault & Gordon 1980). It can be distributive (where one person has power over another) (Dahl 1957), collective (where two or more parties have power together) (Parsons 1963), networked (Mann 2012), instrumental (imposed through state laws and conventions), structural (Lindblom 1982; or three dimensional (the first dimension is concerned the decision making process— whoever gets their way has the power –while Lukes’ dimensions refer to managing the agenda or influencing and shaping ideas (Lukes 1986)).

The definition of power used in this research encompasses most modern definitions that include multifaceted concepts, such as domination, manipulation, agenda setting, opinion making, knowledge, technology and structural and instrumental power. Power also refers to the ability to control resources. Resources become “power-laden” when they are mobilised by stakeholders to achieve certain goals (Pretty 2003). Literature on power dynamics in the context of drought has cited examples of:

- Constitutive power: the ability to constitute (establish, institute or enact) the distribution of resources (an example is the formulation of dam rules that create new rules of governing the water resources (Pretty 2003).
- Systematic power: the combined effort by stakeholders to mobilize resources for the survival of a societal system (an example is the system of water rights and permits to regulate the water resources (Pretty 2003).

Frameworks for analysing power are as numerous as the definitions of power. Influential frameworks are Lukes' three dimensions of power and Gaventa's power cube (Brisbois 2015). The power cube, an approach used to analyse and understand power, is specifically a framework for analysing levels, spaces and forms of power and their interrelationships. While "forms" refers to the ways in which power manifests itself, including its visible and invisible forms, "spaces" refers to the potential arenas for participation and action, including what is referred to as closed and invited claimed spaces. "Levels" refer to the different layers of decision-making and authority held, including at national and global levels (Gaventa 2006).

Of interest to the researcher is how power dynamics play out to influence water governance in drought situations. How drought and water governance are linked in this study is illustrated in diagram 2.1 overleaf. The diagram shows the centrality of power dynamics in water governance in drought contexts. This relationship is enacted through interaction between complex systems, for example (1) a complex hydrological system, (2) socio-biological systems, where humans and animals must have water for survival, and (3) socio-economic systems, where water is the major contributor for economic production and food production. Viewed holistically, these three systems become interdependent and form a complex macro system in which there are clashes between interdependent actors, such as individuals, local regulatory authorities and international bodies (Eppel 2014).

The importance of the study of power dynamics in the described interaction cannot be overemphasised. There are numerous stories of transboundary and local water wars, conflict and tensions that have been recorded in history, such as the Karnataka and Tamil Nadu water clashes in India (BBC 2016), the water tensions between Israel and Ethiopia (Barnaby 2009) and the water clashes between farmers and cattle herders in Tanzania (Benjaminsen et al 2009). However, there has been little work done that analyses how water governance is influenced by power dynamics (Tapela 2012). This study therefore employs classical and modern power theories to understand the relationship between drought and water governance. These theories are the political ecology theory, power elite theory, classical pluralist theory and Lukes' three-dimensional power theory.

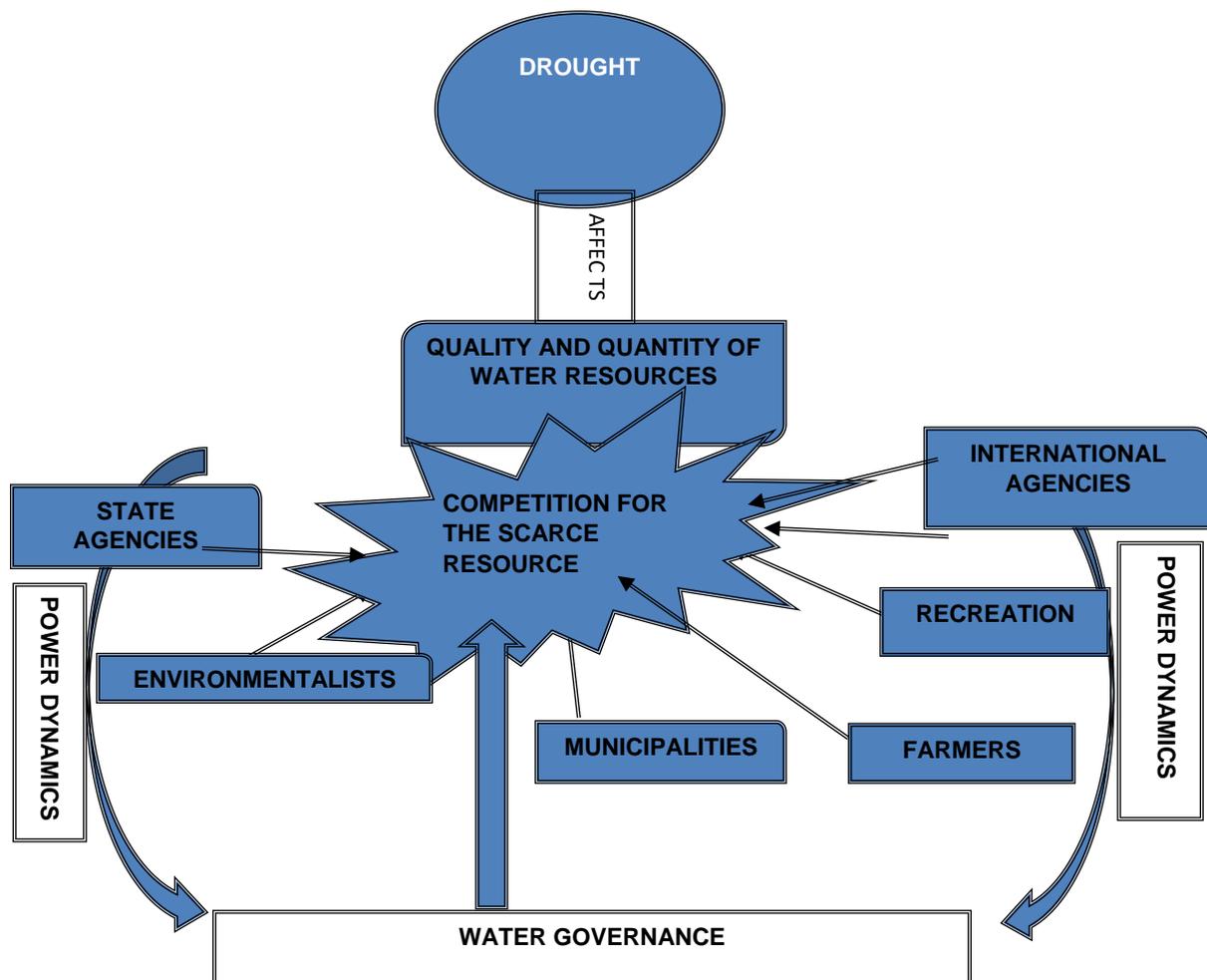


Diagram 2.1: The centrality of power dynamics in water governance in drought contexts (author’s own illustration)

2.2.1 The political ecology theory

The political ecology theory proposed by Frank Thorne (1935) and Erick Wolf (1970) “is all about the role of power along the social-ecological nexus” (Robbins 2011:11). Political ecology entails examining natural resources and the relations of power between different stakeholders. Its focus is on revealing “winners” and “losers”, and the differential power that exists in environment outcomes (Zimmer 2010;Robbins 2011).The theory posits that changes brought about by climate change do not affect the society in a homogenous way. Rather, social, political and economic differences account for unequal distribution of natural resources.

Two of the major strengths of this theory that were important to this study were its focus on power and power relations and analysis of human-environment relationships. Unlike other approaches to environmental problems, political ecology explicitly acknowledges the importance of political power and power in environmental issues. Drawing on the work of Foucault (1972), political ecology highlights the ways in which power issues behind political representations shape how people interact with the environment. Moreover, power in political ecology is explored at both the material level and the discursive level. For example, political entities can physically control natural resources (material level), while common narratives about the environment can be used by those in power to maintain that power and control (discursive level) (Quandt 2016).

However, while this theory enabled the researcher to ensure that both issues of power and ecological concerns were addressed in water management, it does not explain how certain groups have more power than others. The researcher therefore used this theory in combination with the power elite theory.

2.2.3 The power elite theory

The power elite theory was formulated by Vilfredo (1848-1923). It is a theory of the state that seeks to describe and explain power dynamics in contemporary society. The theory posits that:

- Power lies in positions of authority in key economic and political institutions.
- The psychological difference that sets elites apart is their perceived personal resources –such as intelligence and skills, and a vested interest in the government – while the rest of the population is viewed as incompetent and without the capability to govern itself. In contrast, the elite are seen as resourceful, striving to make the government function.
- There will always be an existence of inequality in distribution of resources in every society, owing to genetic predispositions.

The power elite theory is particularly concerned with the relationship between capital and the state. It proposes that the state is involved in negotiating for the elite rather than remaining (or becoming) an arbiter. In most environmental issues where this theory has been applied, the elite have been identified as corporate groups, such as the agricultural sector, businesses, hydrologists and engineers (Carter 2001). These groups are collectively known as the insider, or corporate, group in group relations. This insider/corporate group works in conjunction with the government manage the economy of a country, thus has a large influence on policies that affect the economy. Governments regard the views of the corporate group as legitimate and important (Carter 2001).

This view is reinforced by neo-pluralist theorists, in which a government's bias towards the corporate sector is recognised. Neo-pluralism no longer sees the state as an umpire, mediating and adjudicating between the demands of different interest groups, but as a relatively autonomous actor that looks after its own (sectional) interests (Lindblom 1977). This situation creates possibilities for some groups while limiting others' participation in decision making. Most governments in a liberal democracy will routinely take account of corporate interests in the decision making process because the overall performance of the economy is likely to influence its popularity (Lindblom 1977). Carter (2001), however, explains that some of the pressure applied by this group is counter-productive; she uses the example of French farmers (an insider group) who continuously mobilise against eco-taxes.

In this dissertation, the power elite theory was used to explain how stakeholders such as the agriculture and business sectors receive a majority allocation of water in the UMngeni. It was also used to explain why groups such as hydrologists and engineers, because of their technical and specialised knowledge, are influential in mapping out water governance issues in the UMngeni in the context of the 2015-2016 droughts.

It must be noted that this theory has received much criticism from classical pluralist theorists like Dahl (1961) and Weber (2009), who posit that:

- Power is diffuse and not concentrated in one group of people;

- Different groups compete with each other to influence policy outcomes;
- Competition amongst different groups ensures that no group dominates the other; and
- The state acts as a referee to ensure that the “rules of the game” are adhered to and that differences are resolved through negotiations.

Dahl (1961) argues that groups such as pressure groups provide a counterbalance to the power elite, thus reducing the power the elites have in society. For example, the Greenpeace pressure group has dramatically changed the way people govern natural resources, and in South Africa, the Anti-Privatisation Forum (a social movement) has led many protests regarding water service delivery. Thus, in this dissertation, the classical pluralist theory has also been used to study how stakeholders such as pressure groups influence water allocation policies and how the state regulates competition over water sources between different groups.

It is important to recognise at this point that in fact both the elite power theory and the classical pluralist models have shortcomings. Specifically, they have been criticised for having a one dimensional approach that concentrates only on visible power (Bachrach & Baratz 1970). Bachrach & Baratz (1970) argue that Dahl's classical pluralist theory does not capture what they dubbed the “second face of power”, “which refers to the covert use of power used outside the public for a to keep specific issues off public policy agendas” (Hudson& Lowe 2009:145). They argue that Dahl fails to fully analyse power dynamics, because he does not account for the crucial role that non-decision power plays –a means by which demands for change in the existing allocation of benefits and privileges in a community can be suffocated before they are even voiced (Bachran & Baratz 1970). Restricting the analyses of power to a one dimensional model has the risk of presenting skewed conclusions that are impaired by a pluralistic, biased view of power. In order to avoid the weaknesses associated with the one dimensional analysis of power, this dissertation also employed Lukes' three dimensions of power theory.

2.2.4 Lukes' three dimensions of power theory

Lukes' three dimensions of power theory is a social and political theory that posits that power has three faces/dimensions: decision making power, non-decision making power and ideological power. Lukes' theory is built upon criticism of the classical pluralist theory and the elite power theory.

The first dimension draws attention to who actually prevails in decision making through studying concrete and observable behaviour. When decisions are made, people clearly understand how the decisions have come about and why they have been opted for (Lukes 2004). This was examined in the examined in two JOC meetings attended.

The second facet is the agenda-setting power. This is a secretive face, usually exercised behind closed doors. Lukes argued that power is not just about decision making, but also encompasses preventing decisions from being made (non-decision power). A classic environmental illustration of non-decision making is seen in Crenson's (1971) study of air pollution in two neighbouring American steel towns: East Chicago and Gary. Whereas East Chicago introduced legislation controlling air pollution in 1949, the town of Gary (through the influence of one of the biggest steel companies) deliberately avoided addressing the pollution problem. In the context of this study, non-decision power was used to understand the covert decisions made in water governance issues in the UMngeni in the context of the 2015/2016 drought. One such example was the timing of the enactment of the drought levy, which is discussed in Chapter Four.

The third face of power is the ideological power, or the power to shape ideologies about issues. This dimension seeks to "identify the means through which power influences, shape or determine conceptions of necessities, possibilities and strategies of challenge in situation of conflict" (Gaventa 1982:15). It allows powerful groups such as the government to make people agree to something that may actually be harmful to their interests (Lukes 2005).

The above section has described the conceptual and theoretical framework guiding this study. Now, literature on drought and water governance will be examined in terms of practice at global, national and local levels. Specifically, the following

section will show that despite the fact that droughts have given rise to power dynamics being acted out amongst various water users who share a water source, very little or no academic work has been done on the relationship between recent or current drought and power dynamics (as an element of water governance). Indeed, discourse on drought often fails to address the relational and distribution aspects of water scarcity and their links to prevailing social and power relations. The next section attempts to address this lacuna.

2.3.1 A global overview of drought and water governance: the case of Ancient Egypt and present day Egypt

Droughts have occurred in the sites of human societies from time immemorial. One of the oldest historic narrations of drought and water governance is provided by Wittfogel (1959) in his thesis on the use of political power in “hydraulic empires” – a term that refers to a social or government structure that maintains power and control through exclusive control over water access (Eslamian 2016). Wittfogel (1959) narrates how arid ancient Egypt centralised water management during the 1708BC-1700BC drought, normally referred to famine Stela, which is quoted in the biblical story of Genesis 47 (verses 14-20). Wittfogel writes of the establishment of a centralised control over irrigation water resources and drought policies led by the Biblical character Joseph (Wittfogel 1959). Wittfogel’s (1959) work also notes that government representatives monopolised power and societal relationships, and dominated their country’s economy.

In his other work, titled *Oriental Despotism: A study in total power*, Wittfogel (1957) vividly illustrates the use of political elite power in controlling water. His work illustrates the power elite theory can be used to understand power dynamics. Moreover, Wittfogel’s work also highlights how power in water governance in the context of drought can be used as a repressive form of authority over marginalised, less powerful groups; for example, he narrates how most Israelites were forced to migrate to Goshen, a place in Egypt, in search for pastures to graze their flock and secure food. This example is built upon in this study to mirror the experiences of the less powerful groups in the UMngeni catchment area, such as the subsistence farmers.

Other authors refer to similar hydraulic empires in ancient civilisations of the Near East, India and China, where water management was governed through a “coercive, monolithic and hierarchical system, ruled by a power elite based on the ownership of capital and expertise” (Kalin 2006). However, Wittfogel (1959)’s work is one of the few pieces of literature that notices power dynamics in the arid regions of the Nile: authors of this time who wrote on water management in Egypt tended to concentrate more on techno-centric approaches of water management.

One such scholar who also took interest on water management under drought conditions in the Nile was Ludwig (1937:317). Ludwig’s accounts give narrations of Napoleon Bonaparte’s occupation of Egypt in (1798-1800), and how he used French engineers to construct dams and canals that were later used by Muhammad Ali Pasha to irrigate large scale farms under water scarce conditions (Ludwig 1937:317).

Ludwig’s accounts clearly concentrate on techno-scientific approaches to water management, ignoring the power relations between Napoleon Bonaparte and Muhammad Ali. However, it is evident that Napoleon Bonaparte was the first person to recognise that the Nile afforded the Egyptian government a source of unusual power that could be exploited for the benefit of France. Indeed, Ludwig noted how man could control nature for their own benefit(Ibid:318).

However, more research on the different influences that shaped water governance in the Nile would have given a more complete picture of the effects of social power dynamics in water management issues of the period.

The case of Egypt is particularly relevant to this study because, since the time of Pharaoh, the country has experienced a series of droughts. Evidence for these periods has been found in Egyptian mummy teeth, with different excavation sites recording variations in isotope levels on these artefacts. The variations indicate a change in precipitation patterns over different years (Touzeau et.al 2014).These droughts would have created water shortages in the Nile, which would have compelled the rulers of Egypt to exercise various forms of power including military and bargaining power to control the shared water source (Yimer 2015).

Several scholars who have analysed power dynamics in water management issues in the Nile (e.g Dinar; Albiac & Sanchez-Soriano 2008; Zeitoun 2008; Zeitoun & Warner 2006) have extensively written on the use of hegemonic power in the Nile basin. They posit that relative power disparities among riparian states have led to various forms of hydro-hegemonies, which can be understood as authoritative leadership practised at a river basin, imposed by one powerful actor over weaker ones, and achieved through water resource control strategies such as resource capture, knowledge construction, treaties and coercion (Zeitoun & Warner 2006). The hydro-hegemony framework has, however, only been applied to transboundary power dynamics, and little research has been done at sub-national river basin levels, even though issues of power and privilege also dictate communities' access to river basin resources (Selby 2007). This thesis thus investigates how hegemonic power develops at a sub-national river basin particularly in drought situations.

2.3.2 China and India

The issue of power dynamics in the governance of water in the context of drought has also been studied in China (Wittfogel 1959; Chen 2016) and India Mehta (2001). Wittfogel (1959) has analysed how China managed to control water sources the under episodes of drought that affected the country between 108BC and 1911AD. In this period, China had a total of 1828 natural disasters caused by drought and floods (Wittfogel 1959), with the most devastating being the Great Famine (1959-1961). During these drought episodes, China used power vested in different institutions such as the military, the emperor and technical staff (engineers and scientists) to manage droughts and ensure water security. Dong Wei, one of China's ancient authors quoted in Xiao-jun et al.(2012:12-13), writes:

“in the empirical hierarchy from the emperor, prime minister, provincial governance down to the country magistrate, different posts had different responsibility to manage natural disasters.”

This management included distribution of irrigation water and engaging in conservancy projects. Decisions were, however, made by the government, which then disseminated orders through the above-mentioned institutions, detailing how

water was meant to be managed (Xiao-jun et al.2012).This system was known as the command approach, and was influenced by communist ideologies.

The command approach to water management during the Great Famine in China ensured that only government sponsored projects were supported. The command approach therefore limited individuals' rights to pursue their own economic objectives (Xiao-jun et al.2012). In some instances, the command approach was abused by those in authority, who distributed more irrigation water to themselves. Indeed, the communist centralised water policies are criticised as one of the leading factors that worsened the effects of the Great Famine (Xiao-jun et al.2012).

Today, command approaches to resource distribution remain vulnerable to corruption and manipulation in governance systems. Recent examples of command approaches in resource (agriculture inputs) distribution in Zimbabwe have demonstrated such vulnerability (Magudhla 2017). In present day China, the idea of centralised water policies are maintained in the Mekong River, a transboundary watershed shared by China, Burma, Laos, Cambodia and Vietnam. Indeed, China has advocated for a centralised approach to water governance led by the Chinese government. It has taken advantage of being more technologically advanced and an upstream riparian in order harness more water at the expense of the above-mentioned riparian states (Osborne 2004).In terms of this study, the practice of command approaches in water governance in the UMngeni catchment area was not as destructive as it was in the Great Famine and in Zimbabwe. Rather, such approaches by the government demonstrated an effective way of maintaining constructive cooperation amongst different stakeholders.

These approaches described by Wittfogel (1959) and Xiao-jun (2016) reflect a state-centric water management approach. A state-centric approach in water governance relies on the power of the state to control water. However, the use of state power in water governance has, since the advent of "good water governance", been discouraged, with most countries trying as much as possible to decentralise power in water management issues. Many countries have thus appeared to embrace power decentralisation and narratives of neo-liberalisation in the water sector so as to receive International Monetary Fund (IMF) and World Bank (WB) loans, when in reality the state continues to exert control.

Moreover, although the literature by Wittfogel (1959) and Chen (2016) has been done that highlights the use of state power in water governance issues, limited research has been conducted on the power of the state in water governance issues in the context of droughts (Walker, Hrezo & Haley 1991). One such example of this type of research is, however, that of Mehta (2001), who highlights the power of politicians in determining who gets access to water in the Kutch region in India.

Kutch is an arid to semi-arid district in Gujarat, with often scant rainfall (Mehta 2001). In 1979, several politicians from Gujarat engaged the WB to help construct a dam in the Narmada River Gujarat, under the guise of promoting development through irrigation in Kutch. These politicians used media power as a persuasive tool to influence the WB, presenting a case that showed that the dam would irrigate 945,000 hectares of land in Kutch, thus mitigating water and food scarcity problems in the region. However, the politicians knew that these promises to the WB were not feasible, owing to the geographical location of Kutch. Thus in reality, only 95,000 hectares (2% of farming land in Kutch) were irrigated.

Rather, the intention was to use the water scarcity problems in Kutch to receive funding that would then be diverted to these politicians' own projects in Gujarat, in which a network of industrial business individuals were also lobbying the government to provide water to the area. Another other reason why the Kutch region was not prioritised was that Kutch is very insignificant in mainstream Gujarati politics (Mehta 2001). In light of this situation, Mehta (2001) suggests that water governance should be analysed in conjunction with historical and political realities. Indeed, this dissertation aims to add to the existing literature on how political power can be used as a tool in governing scarce water resources in both destructive and constructive ways.

2.3.3 America and Canada

Droughts have also been prevalent in Western societies (America and Canada), with the worst droughts being experienced during the “dust bowl” years of the 1930s – a period of severe dust storms that damaged the ecology and agriculture in Canada and America. The “dust bowl” was caused by years of severe drought (Woster 2004).

During this period there were several clashes amongst water users on how best the resource was to be managed. These clashes led to the seizure of management power from the public by the US core of Engineers and the United States Bureau of Reclamation (USBR) (a federal agency that oversees water resource management). The responsibility of decision making was then placed in the hands of the technological elite, bureaucrats and politicians, resulting in a highly integrated control system run by dominating actors who made decisions that only supported their interests. For example, agriculture and water subsidies were only implemented for large-scale farmers (Worster 1985).

In some parts of West America, water is still controlled through political power for the benefits of the few elites who contribute to the economy's GDP, as evidenced in the following extract:

“When powerful interest groups own land far away from water sources, the politicians simply see to it that the water is moved where the lobbyists tell them it should have been in the first place. Water is channelled from small scale farmers in Arizona through basin transfers across hundreds of miles to commercial farmers”(McMaken 2013).

Likewise, Worster (1985) highlights techno-scientific power in the management of water in the context of droughts. However, this dissertation will demonstrate that power is not one dimensional (concentrated in the hands of the elite), but rather, and as suggested by the pluralist theory, power is distributed among many groups.

2.3.4 Overview of drought and water governance in South Africa

This section focuses on water governance and drought in South Africa. The section aims at highlighting power dynamics in water governance in the context of droughts in this country. The overview begins in 18th century, during the *Madlathule* drought.

As indicated in Chapter One, the South African climate is characterised by periods of dry (El Nino) and wet spells (La Nina), which affect rainfall patterns (Water Research Commission [WRC], 2015). Accounts from historians date these dry spells as far back as the 18th century. Crais (2011), for example, documents oral traditions

pertaining to the *Madhlatule* famine, a Zulu word translated as “let one eat what he can and say nothing”. The famine was partially a result of the fact that in the 1700s, Portuguese traders introduced maize to Africa, which then replaced most staple grains. However, maize farming requires more water, which caused water scarcity problems, affecting maize crops, livestock and people. Different tribal groups began to compete for water sources, and fierce fighting eventually led to the *Mfecane* war that dispersed weaker groups away from water sources (Hansen & Curtis 2012). Shaka emerged as one of the powerful leaders; he consolidated his power through the *impi* and built his royal city south of the Mfolozi River, which is joined in the North by the Mhlathuze River. He chose this site because of its abundant water supply (Mofolo 1981). Power as a factor in water access and control is also evident in an account by an employee of the East India Company who was visiting Zululand in the 1920s, who wrote, “in many parts of the interior of the country, the springs and rivulets are drying up and the annual rains become more scanty and irregular, the more powerful societies control the water sources and the less powerful are forced to migrate” (Crais, 2011 p. 75).

Aside from the power dynamics amongst different African tribes, the English and the Dutch, who had occupied the Cape (in 1652 and 1815 respectively), also had much influence on the management of the water resources in periods of drought in South Africa. While English rule stipulated that only those who owned land could have riparian rights, i.e. a right to exclusive and unlimited use and enjoyment of all water rising on an individual's land (Swatuk 2010), the Roman Dutch law recognised three classes of water rights: private, common and public. The private right was given to individuals, the common water right pertained to the water that anyone had a right to use without restriction or limit and the public water right was owned by the state (Swatuk 2010). These water laws served the interests of the dominant actors in any given physical/legal space, such as the settlements in the Cape, Transvaal and Natal, which are generally prone to droughts.

The state's response to drought was seen during the drought episodes of 1895 to late 1896, in which the government made plans to build the Buchberg dam and irrigation canals along the Orange River. The project was initially abandoned owing to some administrative delays, but was re-started in 1929 when another devastating drought occurred (Swatuk 2010). At this point, the Director of Irrigation, A.D. Lewis,

received an instruction to “start the construction as soon as possible to provide employment and water for the white people who are suffering from the effects of the drought” (Swatuk 2010:27). Political power was clearly used to ensure that the white farmers and industrialists were allocated more water at the expense of the black communities. However, it still needs to be recognised that political power in water governance has the potential to marginalise less powerful groups – an issue that this study takes under consideration, by looking at the extent to which political power is used to influence water governance in the UMngeni.

In 1948, when the National Party (NP) in South Africa won the election, the Afrikaners consolidated political power and implemented policies of Grand Apartheid (Turton & Funke 2008). In terms of the hydro-political, this meant the construction of the Cahora Bassa project on the Zambezi River in Mozambique, the Cunene River project and later in the 1980s the construction of the Lesotho Highlands Water Project and various other dams countrywide. These projects were constructed to mobilise water resources on a grand scale for economic activities (Turton & Funke 2008). The projects were informed by technocrats like J.C. Brown, who advised the NP on how South Africa could plan in advance for droughts (Turton & Funke 2008). However, such knowledge power in water governance has only been studied in terms of its positive effects; little attention has been done on how knowledge can be used to alienate those without knowledge in water governance issues, as in the case of the black communities in the UMngeni.

Of relevance to this study is Turton’s (2016) account of the use of technological power as a decision making tool in water management. His writing touches on the Computing Centre for Water research (CCWR) and stream flow gauges that were constructed in 1948 but disbanded and disconnected during the presidency of Thabo Mbeki, who shunned Western science (Turton 2016). Turton highlights the use of technological power and how it has been neglected in the study of drought in South Africa. It is evident that Turton (2016) sees technological power as the most influential facet of power in managing scarce water resources. This dissertation, however, takes a multi-dimensional approach to the study of power, focusing on both “hard” and “soft” power dynamics that affect participatory approaches and equitable water sharing in the Umngeni in the context of drought. The study thus contributes to

the available knowledge on power discourse in water governance in the context of drought.

However, what is important about Turton (2016)'s article is that it highlights the rise of the new black elite and their interests in water tenders. The new black elite in the post-Apartheid era refers to the emergent bureaucratic aristocracy, drawn from the first and second generation freedom fighters (Turton 2016). This group of people is said to have consolidated political power, across all sectors, in a manner that has recently trended in the media as "state capture" (Muller 2016). State capture refers to a system of political corruption, where private interests significantly influence a state's decision making process. An article, published in *Business Tech* (July 2016), exposes how political power has been used to award tenders to political allies, namely LTE Consulting, a significant African National Congress funder, for the construction of the Polihali dam, which is part of the Lesotho Highlands Water Project used to mitigate water problems in South Africa. The UMngeni is one of the systems that benefit from the inter-basin transfer in times of drought.

Another example of the use of political power in water governance issues in South Africa is the widely contested case of the allocation of a water licence to the Vele coal mine, located in the farming communities in the Waterberg (Limpopo province) (Schneider 2016). The Limpopo province is generally a drought-prone region with frequent water shortages that have led to fierce competition between farming communities, Vele and Eskom. In 2015, Vele was granted a water licence, which permitted the extraction of 4,6 megaliters of water by the mine – despite the fact that farming communities had contested the issue of such a license, arguing that water should be equally shared (Schneider 2016). The issuing of the water licence is rumoured to have been acquired through political cronyism (Schneider 2016). However, the use of political power in water governance in post-Apartheid South Africa has received little attention.

This national overview on power dynamics has highlighted the use of different forms of power that manifest in water governance issues in South Africa in periods of drought. Some of these studies mirror the relationship of power and water governance in the UMngeni, but do not explain how power dynamics affect stakeholder participation in water governance issues. Nevertheless, addressing

aspects of how power dynamics affect participation in water governance remains an important issue for water practitioners.

2.3.5 Overview of drought and water governance in the UMngeni catchment area

UMngeni falls under one of South Africa's meteorological drought-prone areas (Hoffman et al. 2009). The area has experienced a series of droughts that dates back as far as the year of the *Madlathule* famine, discussed above. Episodes of drought have also been recorded in 1991/92, 1997/98, 2001/02, 2003/4 and recently in 2015/16. These recurrent dry spells have had an impact on the water quantity and have led to unequal distribution of water (Hoffman et al. 2009). For example, during the 2000 drought, the predominantly white suburbs received more water than the black residential townships. Water tariffs were also more costly in the townships than in the suburbs, as is evident in the following extract:

“The working class residents of the Ngwelezane Township pay much more for water than the white middle and upper class area, even though both are part of the same Empangeni Municipality” (Fort, Mercer & Gish 2004:121).

Water shortages in the townships then led to one of the worst-ever cholera cases in the whole of Africa, affecting 100 000 people and killing 260 (Fort, Mercer & Gish 2004). Before the outbreak of the epidemic, the Department of Health and members from the Anti-Privatisation Forum had made attempts to influence Water Affairs to allocate more water to the townships and less to the suburbs, arguing that residents from suburbs had alternative water sources such as boreholes, and they could also afford to buy water in bulk. The then-minister of water, Kader Asmal, did not take heed of their concerns, indicating that the decision had been made by a higher office and could not be contested. He also indicated that the government was under pressure from the WB and IMF to privatise the water sector (Fort, Mercer & Gish 2004), thus demonstrating that power in water governance can be shaped by global economic factors. Essentially, water management in the context of drought in UMngeni is also influenced by global market policies.

In the 2015-2016 drought (the period under review), UMngeni witnessed a number of protests from locals demanding to be included in deliberations that led to the installation of water meters as a way of restricting water usage (Galvin 2016). One of the many incidents occurred in Jozini, a small town in Kwa Zulu Natal that is supplied by UMngeni water. The community members complained about not being consulted before the installation of the water meters (Galvin 2016). Such social movements' mobilisations have recently generated a degree of power and influence over the state (Ballard et al. 2006), thus showing that power is not only possessed by a few – as suggested by the elite power theory – but rather that power is everywhere, as argued by Foucault in his studies on power (Foucault 1991).

In the ILembe district, an area also supplied by UMngeni water, a different situation occurred. Ward councillors were criticised for allocation of irrigation water through political party clientelism, where water was distributed to benefit those that were loyal to certain political groups (Swatuk 2005). These councillors were also criticised of practising cronyism (i.e. the election of close political friends who are given the authority to deliberate on water issues in their areas of responsibility) (Swatuk 2005). Similarly, power struggles manifested in urban municipalities in the 2015-2016 drought. *The Witness* reported that the Msunduzi Water Services manager, Brenden Sivparsad, was quoted as saying, “daily fights for water has reached boiling point between managers of the two municipalities trying to obtain enough water for their residents” (Kailene 2016). This article also claimed that municipalities were capitalising on water supplies to garner votes.

Essentially, the UMngeni water catchment area, like all other catchment areas in South Africa, has undergone a paradigm shift in water resource governance. Old notions of reliance on the state, engineering science and technical solutions have been discarded in favour of a “softer” governance regime that embraces stakeholder participation. This new regime is strongly influenced by neo-liberal policies that emphasise decentralisation, “rolling back of the state” and treating water as an “economic good” (Chikozho 2005). One such decentralised channel of participation in South Africa are the CMFs. The CMFs were set up to address the issue of citizen participation in water resource management so as to ensure consensus building on

issues affecting the people residing in a particular water management area (Pollard & Du Toit 2008; Lotz-Sisitka & Burt 2006; Karar 2003). However, studies of power dynamics in stakeholder participation in CMFs show some reluctance by the state to relinquish control in water management issues, as shown in the delays in establishing CMAs. So far, only two CMAs have been established out of the eleven proposed (Pollard & Du Toit 2008). Indeed, one of the critical questions often asked by the state is “why would a state voluntarily decentralize power over a crucial resource?” (Chikozho 2000:3). Additionally, water is a sensitive resource that can lead tensions and conflicts in if not well managed.

As is evident in the literature discussed in this chapter, power dynamics in water governance in the context of drought have always existed in different societies, but few studies have been conducted on this issue. As this study aims to fill the lacunae in current research, this chapter began by presenting the conceptual and theoretical frameworks employed in this literature review and the study in general. The chapter demonstrated that droughts affect water sources, which leads to intense competition from various water users who strive to support their own water interests. This competition leads to the manifestation of different forms of power from different users, who use this power to control water sources.

The theories that were employed to understand the nexus between drought and water governance include the political ecology theory, the power elite theory, the classical pluralist theory and Lukes’ three dimensions of power theory. These theories were used to explain how power is used by many players to pursue both their own interests, on one hand, and to promote the interests of the public, on the other. In other words, power does not always reside in the hands of the few. Rather, power is fluid and shared among many stakeholders. Moreover, the exercise of power has both productive and limiting outcomes for individuals, groups and communities involved water management and governance.

In the next chapter, attention is turned to the research methodology and design. The chapter outlines the research design, including the research tradition, the research methodology, data collecting methods and tools, sampling technique, data analysis

method, measures used to ensure rigor, ethical consideration and limitations of the research.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

The purpose of this chapter is to outline the research design that was used to explore the nexus of drought and power dynamics in water governance in the UMngeni located in KwaZulu-Natal, as well as to describe the rationale for the application of specific methodologies. The research design refers to the basic plan that was followed in conducting the research, and includes the research methodology, data collecting methods and tools, sampling technique, data analysis method, measures used to ensure rigor, as well as ethical considerations and recognising the limitations of the research. The research design links the research questions that were highlighted in Chapter One to the data, as depicted the diagram 3.1overleaf. Firstly, however, this chapter highlights the characteristics of the interpretivist research tradition that underpins this study.

The research tradition, at times referred to as research paradigm in the natural sciences, is a cluster of beliefs and agreements shared by scientists in a particular discipline (Kuhn 1962), which influence “what should be studied, how research should be done and how results should be interpreted” (Bryman 2012:630). This study is situated in the interpretivist research tradition, as is evident in its epistemological position(dealing with the nature of knowledge and the different ways of knowing),ontological position (concern in the nature of reality in research and how we know what is real), the methodological position (including the research methods most appropriate for collecting and analysing the data) and the axiological position (focussing on the study of values and value judgements) .

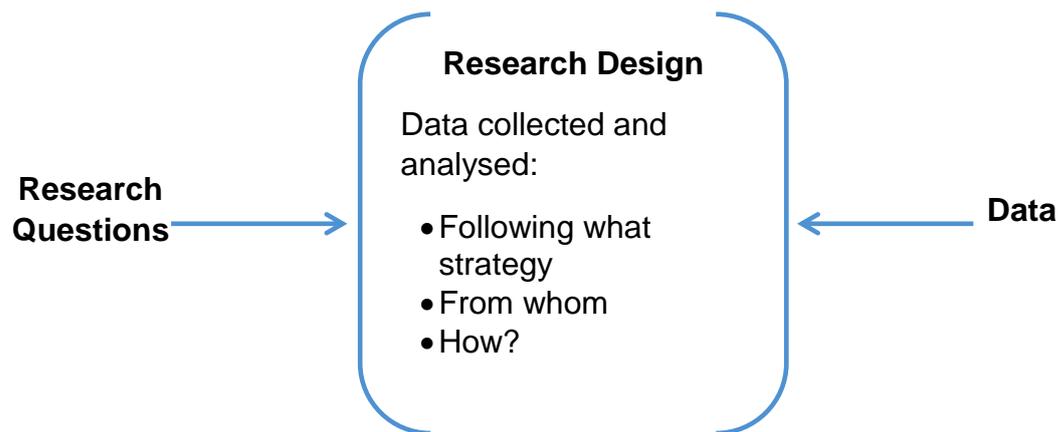


Diagram 3.1: Illustrating how the research design connects to research questions

3.2 Research Methodology

The research methodology or strategy, as depicted in the diagram above, is the process used to collect the data for a study. This study employed qualitative approaches, encompassing both primary and secondary data. A detailed description of these methods is provided in subsequent paragraphs. The selection of the qualitative design was influenced by the research objectives, research questions and research tradition (Crabtree & Miller 1999; Lincoln & Denzin 2000). Moreover, the philosophical tradition that underpins this research is motivated by Weber’s *Verstehen* approach of understanding phenomena in its context (Platt 1985). *Verstehen* is a German word that refers to deep understanding. In the context of qualitative research, it refers to the researcher’s approach of wanting to understand the participant’s experience by paying attention to what the participant says and feels – in other words, “putting one’s self in the other person’s shoes.” In the context of this research, water governance in the context of drought was understood in its naturalistic context.

Qualitative methods are rich in data and facilitate deeper insights into the phenomena being studied (Lincoln & Denzin 2001). These “thick” descriptions that may be produced by these methods were helpful in answering questions such as “what are the power dynamics that exist in the UMngeni in the context of the 2015-2016 drought?” Because quantitative research methodologies typically answer where, who and when questions (Crabtree & Miller 1999; Silverman 2000), these

questions would not have been adequately answered had a quantitative approach been used. Only a qualitative approach could provide the necessary in-depth and exploratory tools needed to draw a clear picture of the power dynamics that existed in the UMngeni in the 2015-2016 droughts.

Generally, a qualitative research approach analyses information that is conveyed through behaviour and language in natural settings (Gray 2013). In this study, this approach was used to capture expressive information about the beliefs, feelings values and motivations that underlie behaviour in water governance in the context of droughts. In-depth interviews that made use of qualitative approaches were used to give voice to those who are marginalised in water governance in the context of drought. Such data could not have been collected had quantitative measures been employed.

However, although the qualitative method proved useful in addressing the research problem, it had limitations, as listed on the left column of table 3.1overleaf. Nevertheless, the limitations were overcome by the counter measures described on the right column of the same table.

Limitations of Qualitative approaches	Counter measures
Quality of the research is highly dependent on the individual skills of the researcher and more easily influenced by the researcher's bias.	The researcher attended Qualitative workshops facilitated by the research coordinator before going to the field. These workshops helped to sharpen qualitative research skills. Researcher's bias was avoided through researching on how to avoid types of researcher's bias such as: confirmation bias, leading questions and wording bias, question order bias and the halo effect.
Quantitative approaches are capable of demonstrating rigour through an inclusion of a wide variety of numerical and statistical data, which is harder to demonstrate in qualitative approaches because it often involves a qualitative analysis of qualitative data.	The perceived lack of rigor was dealt with by generating sets of criteria against which rigor should be judged (Denzin & Lincoln 2000). This is discussed in depth in this chapter under the subheading

Table3.1 The limitations of qualitative approaches

3.3 Data collection techniques, processes and tools

Qualitative approaches use a variety of approaches and procedures to achieve the aim of the study. In line with the interpretivist paradigm in this study, the aim of the researcher was to study reality subjectively (Lincoln & Denzin 2001) and to gain an in-depth understanding of power dynamics in the UMngeni in the context of a drought. As a result, the methods employed had to be sensitive to the context.

Qualitative data was collected through primary and secondary data; the primary data included stakeholder analysis, face-to-face semi-structured interviews, observation method and focus groups, while secondary data was obtained through an extensive review of existing literature on the subject, newspaper articles and meeting minutes. A detailed description of these methods is provided below. This description also includes the rationale behind the use of these data collection technique, the data collection tool used, the step-by-step process of how data was obtained and the limitations of each method as well as the counter measures employed.

3.4 Primary data

Primary data was obtained through stakeholder analysis, face-to-face semi-structured interviews, observation method and focus groups.

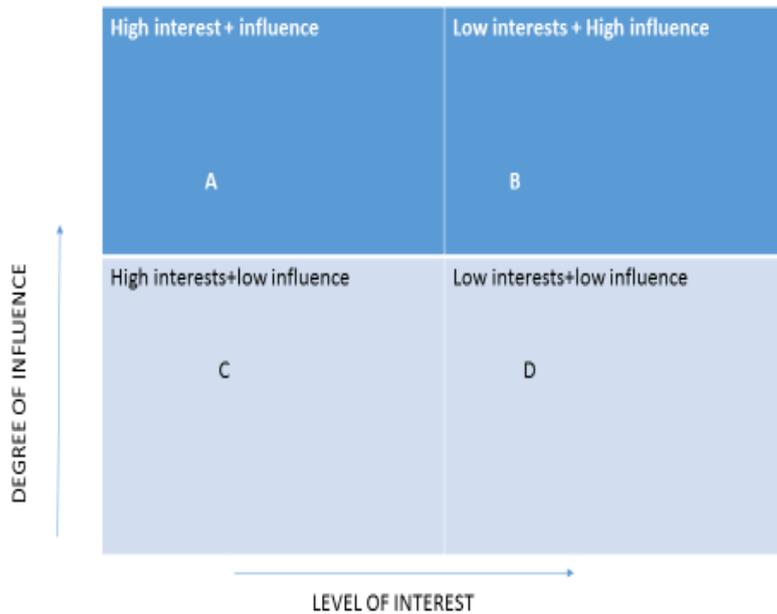
3.4.1 Stakeholder analysis

Stakeholder analysis is a systematic methodology that uses qualitative or quantitative data to determine interests and influence of stakeholders in relation to a phenomenon being studied (Reed et al.2009). Most research that has been conducted around issues of power dynamics in governance of scarce natural resources has made use of quantitative tools such as the social power inventory (Pearce & Robinson 1987), social network analysis (Prell et al.2009) and quantitative stakeholder analysis (Reed et al. 2009). This dissertation, however, uses the qualitative approach, as would a social scientist who seeks to understand a phenomenon that is difficult to understand through quantitative means (Reed et al.2009).

Specifically, stakeholder analysis was used to identify stakeholders involved in water governance issues in UMngeni and to understand their interests, motives and influence in water governance issues in the context of the 2015-2016 drought. Stakeholder analysis was done through direct interaction with different stakeholders, as explained in subsequent paragraphs. The stakeholder analysis also helped to illuminate power struggles among different stakeholders in water management issues in the UMngeni in the context of the 2015-2016 drought, and allowed for the formulation of recommendations to empower marginalised stakeholders in influencing decision making.

The qualitative stakeholder analysis was done through using the interest-influence matrix tool, as described in the table 3.2 overleaf. Stakeholders such as UMngeni Water, the DWA and farmers were graded in quadrant A of table. This information was later analysed and used to address objective 1 of this research.

Table 3.2: Interest influence matrix tool



Qualitative stakeholder analysis could not, however, address objectives 2 and 3 of the study; thus qualitative methods such as semi-structured interviews had to be employed. Qualitative stakeholder analysis was also limited in that it proved to be time consuming and subjective. However, the researcher had anticipated the problem of time constraints and factored it in during the field work planning phase.

Stakeholders were identified through a brain-storming process that was conducted with members from the Natural Resource Centre during the field scoping visit (a method normally referred to as “identification of key stakeholders through key agencies”) (International Institute for Environment and Development 2005). The method was combined with the identification of stakeholders through the literature review (International Institute for Environment and Development 2005). The followed questions were posed:

- Who are the people/groups/institutions that were affected by the 2015-2016 drought in the UMngeni?
- Who are the beneficiaries of the water in the UMngeni?
- Who is involved in water governance issues in the UMngeni?

An exhaustive list was generated from the brain-storming process. This list was then categorised into primary stakeholders (direct beneficiaries of the UMngeni water source), secondary stakeholders (intermediaries in water delivery and advisors on water governance issues) and the tertiary stakeholders (policy makers and influencers). The purpose of such categorisation was to obtain more detailed analysis on each group of stakeholder influence in water governance issues.

The list of stakeholders derived from stakeholder identification was used to compose a Venn diagram, as illustrated in the diagram below. The sizes of the circles in the Venn diagram depict the power each stakeholder possesses. This diagram is further analysed during the data analysis phase, and results are provided in Chapter Five.

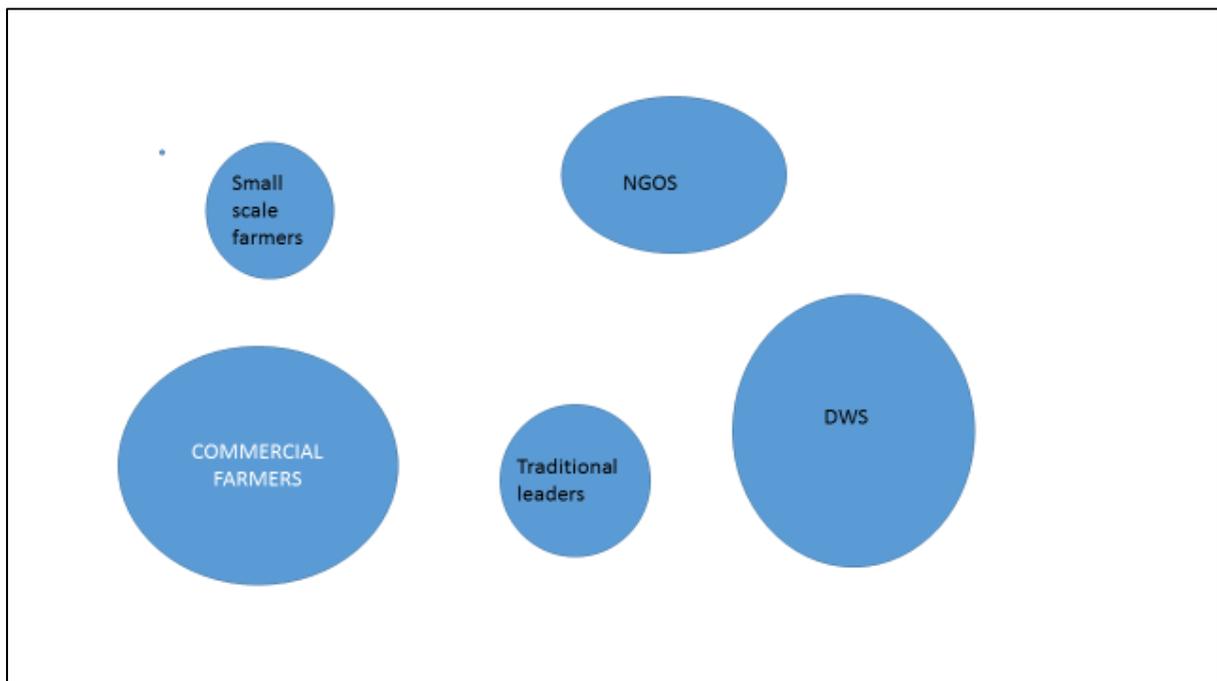


Diagram 3.2:A Venn diagram depicting power of stakeholders

A key finding was that stakeholders from different levels had various motives and expectations about water allocation in the context of drought, which were identified through semi-structured questions during a water board game that was played with the various stakeholders in focus group discussions. Some of the questions asked in this game were:

- What are the different water interests from each stakeholder?
- How are these interests protected?

The responses are recorded in table 2.3 below. The table also offers an example of the recordings of step 3 of the stakeholder analysis process. This data is later analysed in Chapter Four.

Table 2.3: Stakeholder water interests

Stakeholder	Interest	Negative impacts of water shortage	Power dynamics used to harness water
Commercial Farmers	To have enough water for farming	National food shortage. Personal Income shortages	Financing the construction of dams Using the water-food nexus as bargaining power
Provisional governor	It is a duty to provide water and sanitation services to the people.	Health problems Loss of votes	Political power (can easily gain government support)

As indicated above, the qualitative stakeholder data collecting method did not yield data that encompassed all the research objectives, only giving data on the stakeholders in the UMngeni, water interests and power possessed by each stakeholder. The researcher therefore also employed semi-structured individual interviews to address the identified lacunae.

3.5 Semi-structured, face-to-face, in-depth interviews

Semi-structured, face-to-face, individual interviews were conducted with the key informants identified in the stakeholder analysis process and through purposive sampling. A total of 19 interviews were conducted; the number was determined by data saturation. Data saturation refers to a moment during data collection where same themes recur, and no new insights are provided by participants (Fusch & Ness 2015).

In-depth interviews provided a means of collecting data in its natural context, which fits well with the interpretive research tradition (Blanche et al. 2006) discussed above. In line with interpretivism, the second reason for conducting semi-structured interviews was based on the assumption that reality is not “out there” as postulated by positivists, but is constructed through the study of participants.

The semi-structured interviews provided rich data on power dynamics and water governance in the context of the 2015-2016 drought. Information obtained from these interviews was used to complement data obtained from the stakeholder analysis, focus groups and observation method. In-depth interviews also generated data that reflected the experiences, perceptions and perspectives of the interviewees on water governance in the UMngeni in the context of drought. Such information would not have been generated had structured interviews, which are organised around a set of predetermined direct questions that require immediate mostly yes or no type of answers, been employed (Berg 2007). In addition, unlike structured interviews, semi-structured interviews allow for probing and expanding on the interviewees’ responses (Rubin & Rubin 2011), which again elicited responses that would not have been obtained had structured interviews been conducted.

However, the semi-structured, in-depth interviews did have limitations, as do all data collecting methods. The limitations encountered and the counter measures taken are described in table 3.3 overleaf.

Table 3.3: The limitations of semi-structured interviews

Limitation of Semi-structured interviews	Counter measure
Time consuming	Enough time was allocated for both the interviews and data transcription, as shown in the gantt chart attached as an annex. The researcher also took classes in NVIVO and had an option of relying on it for data analysis in case of being overwhelmed.
Conducting semi-structured interviews required high levels of training in conducting interviews.	The researcher conducted pilot interviews and attended various workshops on qualitative data techniques that equipped the researcher with interviewing skills.
Social desirability bias-on some occasions respondents tended to give socially desirable answers in order to avoid embarrassment about issues of power and unequal water sharing.	Using neutral questions: This method is employed to reduce social desirability bias. It is done through posing questions that are neutral with regards to social desirability.

Respondents for the qualitative, semi-structured, face-to-face interviews were contacted via an email that was sent to the relevant organisation gatekeepers. The email addresses of the personnel in these organisations were obtained through the public domain. Stakeholders without formal structures, such as the subsistence farmers, were contacted through traditional leaders. Interviewees then directly contacted the researcher, and an interview schedule was drawn up. The interviewees determined the times and venues for the interviews.

A week before each interview, the interviewees were sent an explanatory statement (a sample of this statement is attached in annex B of the document), and were also asked to complete a pre-interview questionnaire dealing with demographic issues (for example, age, occupation and gender). This approach was taken so as to allow the interviewer to concentrate on more substantive matters (Gray 2004). Two days before each interview was conducted, the researcher made a final confirmation at date, time and venue.

Interviews were conducted using an interview guide (attached in annex A). The interview guide was prepared during the research proposal phase and further refined during the literature review phase. Several pilot interviews were done with colleagues to test the research instrument. Pilot studies do not guarantee success in the main study, but rather increase the likelihood thereof (Van Teijlingen & Hundley 2004). The other instrument that was prepared and tested before conducting the interviews was the audio recorder.

Before the commencement of each interview, interviewees were asked to read and sign the consent form (a copy of this form is attached in annex C). The interviews lasted between 45 and 90 minutes. Each interview was audio recorded and “memoed” (a term that refers to the act of recording reflexive notes about what the researcher heard, saw, experienced and thought during the course of data collection) (Birks, Chapman & Francis 2008). All interview notes were anonymous, with all contact information held separately. These interviews were referenced through dates, venue of interview, job title, gender and race (for example 20/06/2016, Msunduzi municipality office, water distribution manager, male, Indian).

3.6 Sampling technique

Interviewees were identified during the stakeholder identification process discussed above and further refinement was done through expert sampling. Expert sampling is a type of sampling technique that is used when the research requires obtaining knowledge from individuals with a particular attribute or experience. Expert purposive sampling relies on the researcher’s judgement in choosing participants or groups of people who are especially knowledgeable about or have experiences in the phenomenon being studied (Creswell, Plano & Smith 2011). Such judgement was guided by inclusion and exclusion criteria. These criteria are sets of pre-defined characteristics used to identify participants who are considered to be ideal for the research. The inclusion and exclusion criteria therefore formed the eligibility criteria, and also supported the objectives of the study and the type of information required (Sloan & Quan-Haase 2017).

The type of information required for this project was power dynamics in water governance issues in the UMngeni. Participants were required to be above the age of 18, have witnessed at least two episodes of drought in UMngeni, be able to converse in either English or *IsiZulu*, have at least attended at least one Joint Operations Committee (JOC) meeting or CMF, and be knowledgeable in water governance issues. Participants could be of any race and gender. The exclusion of participants younger than 18 years was based on the incapability of participants below this age to provide informed consent, while the inclusion of participants who had witnessed at least two episodes of droughts and were knowledgeable in water governance issues pertained to the experiences that these participants could share. Excluding participants who could not converse in English and *Isizulu* was based on the language proficiency of the researcher; there was no budget that had been set aside for a language translation of Afrikaans or other South African ethnic languages.

Moreover, although the expert sampling technique proved to be economic and convenient as compared to other sampling techniques, it had two disadvantages:

- It did not contribute to generalisation. This limitation was however expected as the study was carried out in KZN, and the findings might not be the same in other provinces or in other countries.
- It was highly prone to bias. The idea that the expert sample was created based on the researcher's judgement is not good enough defence with regards to alleviating possible researcher biases (Sloan & Quan-Haase 2017).

The details of the participants that were selected through expert sampling are provided in table 3.4 overleaf. The table shows the name of organisation, the number of people interviewed in each organisation and demographics (job title, gender and race).

Table 3.4:Details of the participants

Name of organisation	Number of people	Gender	Department
Department of Water and Sanitation (Durban)	03	1 x female 2 x male	<ul style="list-style-type: none"> • Department of Water Licensing • Regulation and Planning Department • Interim Drought Joint Operations Committee
Umgenti Water	02	2 x male	<ul style="list-style-type: none"> • Engineering and Scientific Services • Corporate Services
Umgungundlovu District Municipality	02	2 x male	<ul style="list-style-type: none"> • Department of Water and Sanitation
Msunduzi Municipality	02	2 x male	<ul style="list-style-type: none"> • Department of Water and Sanitation
Pietermaritzburg Chamber of Commerce	02	1 x male 1 x female	<ul style="list-style-type: none"> • Economic and Enterprise Development
Mbofana Irrigation Board	02	2 x male	<ul style="list-style-type: none"> • Department of Water Management
Duzi-Umngeni Conservation Trust (DUCT)	02	1 x female 1 x male	<ul style="list-style-type: none"> • Executive • Enviro-Champs Education Department
South African National Biodiversity institute (SANBI)	01	1 x female	<ul style="list-style-type: none"> • The uMngeni Ecological Infrastructure Partnership (UEIP)
World Wildlife Fund (WWF)	01	1 x male	<ul style="list-style-type: none"> • Water Stewardship Project Manager

Independent water activists	01	1 x male	• Independent water activists.
Subsistence farmers	02	2 x male	• No organisation

3.7 Focus groups

Primary data was also collected through a focus group. Participants for the focus group were drawn namely from the Duzi-Umngeni Conservation Trust (DUCT), South African National Biodiversity institute (SANBI), Wildlife and Environment Society of South Africa (WESSA), World Wildlife Fund (WWF), University of KwaZulu-Natal (UKZN) and various subsistence farmers. A total number of eight participants agreed to take part in one focus group.

Data collected from the focus groups was used to enhance data richness and depth of inquiry, as well as for triangulation purposes. Group interaction between different stakeholders encouraged participants to freely discuss the power dynamics that affected stakeholder participation and suggest solutions on how problematic power relations could be resolved. Focus groups were also found by the researcher to be socially oriented, real life data in a social environment and more fruitful, as discussions during the focus groups identified issues that had not emerged during the individual interviews.

The challenges faced with employing this method were that it was difficult to facilitate conversations in such a way that the participants fully understood the objectives of the study (Krueger & Casey 2014). These issues resulted in engineers and water technicians dominating the discussions.

At the end of the focus group discussion, participants were asked to play a river basin game. This game was designed to help participants understand the complexity of sharing scarce water resources between different stakeholders and making collaborative decisions about water governance. Data gathered in engaging players in this game was used to address objective 3, which required identifying how power relations among different stakeholders in water management could be improved. To

obtain this data, the observation method was used to note and record the water interests and power dynamics demonstrated by the gamers. River basin games have previously been used in qualitative research to explore group dynamics in natural resource management (Barreteau; Bousquet & Attonaty 2001).

3.8 Observation method

Observation as a data collecting method involves observing behaviour and systematically recording what has been observed. This method was carried out in JOC meetings and in CMFs attended by the researcher and the focus group discussed above. A total of two JOC meetings and three CMFs were attended. The observation method was done overtly (participants were aware of the researcher's intention). Observation was employed to gather data about the behaviour of stakeholders in participatory JOC meetings and issues that related to equitable water sharing.

The observation method provided insights into how different stakeholders behaved and interacted with regards to power dynamics in water governance issues. The method also enabled the researcher to observe phenomena taken for granted by participants. For instance, some individuals assumed that they were not important; an issue that could not have been identified by the methods discussed above that explored the participants' perceptions on power dynamics in the context of drought. However, the observation method could not be used without these other methods, because the beliefs that underpinned each participant's observable actions would not have been observed.

One of the challenges that this method presented was that it required some knowledge of the academic discipline of ethnography and its culture. The researcher therefore used self-taught methods, which were thoroughly researched before field research commenced. Observations were recorded in an observation check list and in form of field notes. These notes were later analysed through the data analysis method.

3.9 Secondary data

Secondary data was obtained through a comprehensive review of existing published and unpublished literature. The literature included journals, books and newspapers. The materials reviewed included the following:

1. Literature on the history of drought and politics in South Africa (books, journals, theses).
2. Literature on scarce natural resources and power dynamics (various books, online articles, journals).
3. Literature on participatory approaches in water governance (books, journals, government publications)
4. Literature on competition over water resources in South Africa and UMngeni (books, journals, newspaper articles, magazines).
5. Literature on drought joint management forums and CMFs (i.e. the minutes of the various meetings attended).

The use of secondary data contributed significantly to the overall quality of the research. Firstly, it offered insight into the historic roots of power dynamics in the water sector. Some of the relevant documents reviewed were an account of three and a half centuries (Tewani 2000), the politics of the Great South African Drought (Maveric 2016), drought and floods in post-Apartheid South Africa (Bond, 2001) and stakeholder participation in water management (Boakye 2012).

Secondly, newspaper articles that focused on power dynamics in water management in South Africa, especially in the UMngeni, were also reviewed. Some of these newspaper articles were: “South Africa’s water sector: a case study in state capture” (*Mail & Guardian* 2016), “Water war hits boiling point” (*The Witness* 2016), “The new “world war” – the water war” (*Northern KwaZulu-Natal Courier*), “‘Pray for rain’ – Durban residents urged or water restrictions loom” (*Times Live* 2016), “Farmers steal water from Hazelmere” (*Online News Sources (ILO)* 2016), and “Councils oppose drought levy” (*News 24*).

Thirdly, data collected from journals and books enabled the researcher to view theoretical and methodological approaches that have been used by other social scientists, the problems they encountered and the insights their approaches yielded. In addition, data obtained from all the above-mentioned sources was used to

compare and complement primary data (data triangulation). Lastly, multiple sources of information often provided additional insight into the topic, and facilitated validation of data through cross verification from other sources.

The secondary data search for journals and books was conducted through a qualitative systematic review protocol. Systematic qualitative reviews are useful in reviewing large volumes of material, synthesising major findings and identifying knowledge gaps (Gough, Oliver & Thomas 2012). The systematic literature review was chosen over the traditional literature review, because unlike traditional literature reviews that exclusively focus on results of other studies without taking into consideration study design, data and analytical methods used; systematic reviews focus more on validity and evidence. This approach improves transparency, objectivity and the breath of a study (Mallet et al. 2012). A detailed account of how the systematic literature review was done is provided below:

Stage 1

- Defining the question that the review is setting out to answer.

The review sought to determine the nexus of drought and water governance.

Stage 2

- Defining the inclusion and exclusion criteria.

This study focused on four main selection criteria summarised in Box 1 below.

Stage 3

- Identifying the search terms.

The search terms used in this thesis are indicated in Box 1 below.

Box 1: Search terms

Key words : Drought* and water management; Water governance OR/AND Water scarcity OR water shortage OR water stress; Water* AND power relations OR power dynamics AND catchment management OR basin management.

The search terms in Box 1 were entered into the following databases: International Water Security Network, International Bibliography of the Social Sciences (IBSS), South African Publications, Google Scholar and in a search for South African newspaper articles.

These databases were used because they provide very broad coverage of literature published on water management, drought, water scarcity and power dynamics in water management. Of the articles that were identified in this search, only materials that addressed water management, drought, water scarcity and power dynamics in water management were selected. The list of articles that were systematically reviewed amounted to 40. The articles are included the reference list. All the articles that met the requirements of the systematic review were analysed using the conceptual framework, as outlined in Chapter One. The elements of the framework were used as proxies for power dynamics, because power takes various dimensions.

Newspaper articles were searched for on-line using the search terms drought and water management, water competition and power. In addition, the minutes of meetings were obtained through official requests from the chairperson of the JOC meetings and CMFs.

3.10 Data analysis

Data was analysed through the framework data analysis method. This method is a type of thematic analysis or qualitative content analysis method that involves a systematic process of sifting, charting and sorting material according to key issues and themes (Ritchie & Spencer 2002). The framework analysis method was chosen

because it can be easily used with a conceptual framework or deductive approaches. In addition, it provides systematic and visible stages that demonstrate how the analysis is conducted. This requirement was vital for funders of this research, to whom I am obliged to be clear about the stages that led to the results and recommendations of the study. The method is also simple to follow and leaves a paper trail, as will be demonstrated in the key stages of the method discussed below.

3.10.1 Transcription

Data from audio recordings gathered from in-depth interviews and focus groups was transcribed word-for-word (verbatim) on a word document. Transcripts ranged between four and six pages and a total of 19 interviews were transcribed. All transcripts used codes to identify participant (i.e. numbers and demographics were used). The transcription process formed an opportunity for early data familiarisation. Although the transcription phase did not include non-verbal cues, this information was recovered from memos that were made during data collection.

3.10.2 Familiarisation

Familiarisation is a common characteristic in all qualitative research, often defined as the process of “immersion” (Ritchie & Spencer 2002:310). The transcribed data was read repeatedly, while the researcher listened to the audio recordings and listed key ideas and recurring themes. Familiarisation also included reviewing the memos that had been compiled during the data collection phase.

3.10.3 Identifying the thematic framework

This stage involved setting up a thematic framework within which data was sifted and sorted. This process included drawing upon both the themes informed by the literature review and issues identified during the interviews. Key issues, concepts and themes that were drawn from the interviews were then used to form the basis of the thematic framework, which was then used to filter and classify the data. Although the researcher had a set of themes that had been identified early in the research, an open mind was maintained to avoid forcing the data to fit the themes.

The development of the thematic framework is illustrated in figure 3.1 below, which an example is illustrating the development of a thematic framework (extracted from the raw data) .In this example, one set of the issues explored concerned power dynamics that exist in water governance in a drought context. This area of questioning and the emergent issues noted at the familiarisation stage resulted in the index categories included in the diagram.

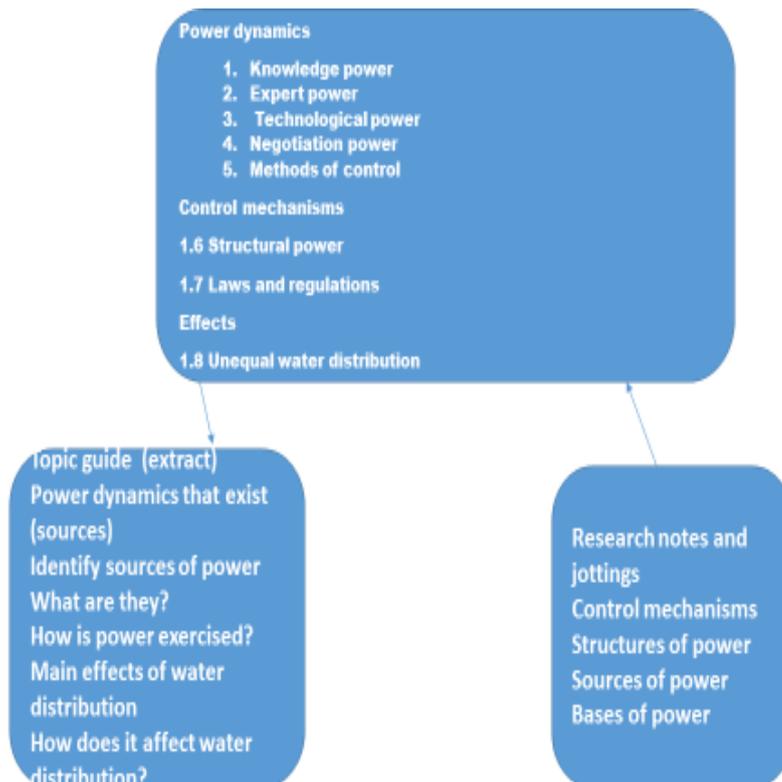


Figure 3.1:An example showing development of a thematic framework (extracted from the raw data).

3.10.4 Indexing

Indexing refers to the process of applying the thematic framework to all the data in its textual form (Ritchie & Spencer 2002). Indexing references were recorded on the margins of each transcript through a numerical system. Because single passages contained a variety of themes that are all referenced through indexing, these multiple indexes highlighted patterns of association within data. The process of annotating

the textual data provides clarity on how the data was sifted and organised, and is important for paper trails.

Figure 3.2 below provides extracts from interviews on power dynamics that emerged in water governance in the context of the 2015-2016 drought in UMngeni. The boxes on the right hand side replicate the index numbers drawn from the framework discussed above, and the notes that were made. Thus the figure shows that it is possible for several different index prefixes to appear within one speech passage (for example, 1.3; 1.8; 1, 9). These themes were later interwoven and connected.

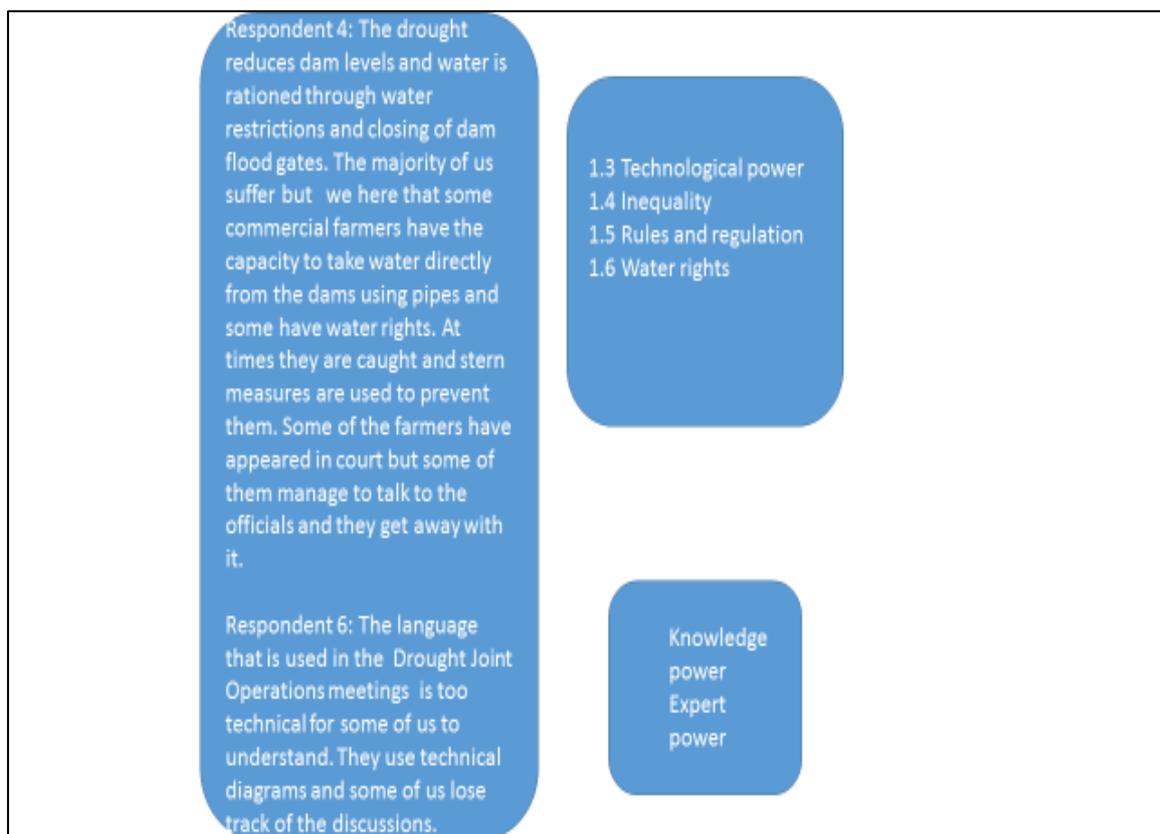


Figure 3.2: An illustration of how indexing was done

3.10.5 Charting

Having applied the thematic framework to individual transcripts, the researcher then constructed an overview of the data as a whole by lifting data from the original transcripts and rearranging it according to the appropriate thematic references through a charting process. These charts were devised with headings and

subheadings drawn from the thematic framework; and the approach used for laying out the charts was a thematic approach. A total of six major subject charts were constructed. These covered:

- Sources of power;
- Water control mechanisms; and
- Effects of power dynamics.

3.10.6 Mapping and interpretation

After the data was sifted and charted according to main themes, then the key characteristics of the data were collated, and the data was mapped and interpreted as a whole. Although emergent categories, associations and patterns were noted and recorded during the memoing, indexing and charting phases, the systematic process of analysis began at this stage. The process was guided by both the research questions stated in Chapter One and the key objectives of qualitative analysis (i.e. creating typologies, finding associations and providing explanations). The process was done through reviewing the created charts and research notes and comparing and contrasting the perceptions, accounts and experiences of the participants, and by searching for patterns and connections in the data.

3.10.7 Ensuring credibility

Qualitative research is frequently “criticised for lacking scientific rigour with poor justification of the methods adopted, lack of transparency in the analytical procedures and the findings being merely a collection of personal opinions subject to researcher bias” (Rolfe 2006:11). Rolfe (2006) does note, however, that most scholars who criticise the qualitative approach as lacking rigor use the wrong measuring techniques (validity and reliability). He explains that rigour in quantitative research is judged by how narrow, concise and objective the design and analysis techniques are and how scrupulously the rules have been adhered to and applied to all decisions. In qualitative research, however, it is defined by quite the opposite set of criteria, and is associated with being open to the data, scrupulously adhering to a

specific philosophical perspective and thoroughness in collecting data. He explains that validity and reliability can only be looked at in qualitative research when they are defined in their broadest context, with validity referring to the integrity and application of the methods undertaken and the precision in which the findings accurately reflect the data, while reliability describes consistency within the employed analytical procedures.

Lincoln & Guba (1985) offer alternative criteria for demonstrating rigour within qualitative research, namely truth value, consistency and neutrality and applicability. This study adapted Lincoln and Guba's criteria to ensure rigor, as discussed in the subsequent paragraphs.

3.10.8 Truth value

Truth value was achieved through reflexivity and reflection of the researcher's own perspectives. These reflections were recorded in a reflexive journal. Peer briefings were also conducted, with the hope of uncovering taken-for-granted biases. Peer briefings refer to a process where the researcher works with several colleagues who have impartial views of the study. These impartial peers examine research transcripts, the final report and methodology, and provide feedback regarding the biases of and assumptions made by the researcher, underemphasised points, general errors in the data and vague descriptions (Onwuegbuzie & Leech 2007). Semi-structured audio recorded interviews and audit trails of how the research was conducted were also kept to allow for repeated revisiting of the data to check emerging themes and remain true to participants' accounts.

3.10.9 Consistency/neutrality

A transparent and clear description of the research process is provided, from initial outline through the development of the methods and reporting of findings. In addition, the researcher maintained a research diary, and documenting relevant challenges and issues assisted in maintaining cohesion among the study's aim, design and methods.

3.11 Ethical considerations

Prior to the research, ethical clearance forms were submitted to the Monash University Human Research Ethics Committee (MUHREC) through the supervisor. Once approval was granted, permission to conduct research from relevant organisations' gatekeepers was sought via email.

Individuals who voluntarily participated were asked to review an explanatory statement before the interview, and were asked to sign this statement. The explanatory statement and consent form highlighted the following issues: the purpose of the research; the possible benefits, discomforts and risks associated with the research; the potential use and storage of the data; and modalities of ensuring confidentiality and anonymity of the participants. A copy of each of these documents is found in annex A and annex B of this dissertation.

A lifecycle approach to research ethics was also adopted. The lifecycle approach refers to planning for the entire "lifecycle" of a product, starting from the initial phase through to the end (Farrimond 2012:59). Ethical considerations were taken into account, from the choice of topic through to the dissemination of the project. Some of the key ethical considerations that were observed were:

- Respect for research participants (autonomy and protection of the vulnerable). Participants were able to make independent decisions about their involvement in the research. To this end, a consent form was provided. Participants also had the capacity to consent (i.e. they understood the process and the decision to participate).
- Beneficence refers to the "need to do good" in research (Farrimond 2012:27). The benefits of participation in the study were explained in the consent form.
- Non-maleficence. Participants were not exposed to any physical or emotional harm.
- Fidelity (honest, integrity and trust). Measures were put in place for confidentiality and anonymity.

3.12 Limitations of the study

This section outlines the characteristics of the methodology that impacted or influenced the interpretation of the research findings. The limitations are given under two major headings: methodological limitations and limitations of the researcher.

3.12.1 Methodological limitations

Lack of prior research studies on the topic

This study is situated in the discipline of hydro-politics (politics affected by the availability of water) “which is a relatively new academic pursuit” (Turton & Henwood, 2000:13). A systematic literature review on power dynamics and the governance of water in the context of drought yielded more results in transboundary contexts than at catchment levels. It is contended that transboundary politics are emerging as an area of research due to transboundary water wars theses. The Biennial on Fresh Water Resources, however, shows that unchecked power relations at local catchment levels can lead to tensions when there is water scarcity, for example as demonstrated in the 2012 Kenya clashes between herders and farmers (Gleick & Ajami 2014). This analysis suggests that power dynamics in water governance should be examined from both macro and micro levels.

The research also took a multidisciplinary approach to examining power dynamics and the governance of water in the context of drought. Multidisciplinary approaches to issues are rarely fostered in academia, thus creating a dearth in literature that combines issues from political science, water management, history, sociology and management (Turton & Henwood 2002). This lacuna meant that the researcher needed to use methodologies and epistemologies borrowed from other disciplines.

3.12.2 Measures used to collect data

Water governance and decision making in the UMngeni are characterised by interactions between different stakeholders. Initially, a qualitative stakeholder analysis was performed to identify stakeholders. However, this method did not help address the aim of the research, i.e. “exploring the power dynamics in the

governance of water as a scarce resource in the Umngeni during the 2015-2016 drought". A method could have been employed, but was overlooked, was the combining of stakeholder analysis with social network analysis (SNA). SNA can explain how power can be diffused through relational ties and social structures to restrict certain policy outcomes (Barnett 2011). However, SNA requires more time and expertise in quantitative research methods, which the researcher did not have.

3.12.3 Limitations of the researcher

Access

Some of the research participants were drawn from government officials in the water sector; much bureaucracy was required before an interview could be scheduled. This issue led to cancellation of one interview with a municipality official, who needed authority from a senior who was not available until after field work had been completed. Access to farmers who make up part of the stakeholders in the UMngeni was also complicated, as they indicated that the month that field work was conducted clashed with the land tilling season, which they prioritised. However, two participants from the municipality and two from the commercial farmers' associations were available for interview.

This chapter presented the research design and methodology used in the study. The study was underpinned by an interpretive research tradition, and the methodology employed was qualitative in nature, employing primary and secondary data. The primary data was collected through face-to-face, in-depth interviews, qualitative stakeholder analysis, focus groups and observation methods, and the secondary data was collected through a comprehensive review of existing published and unpublished literature. This literature included journals, books, magazines and newspapers.

The employment of various methods achieved data triangulation. Data was analysed through the framework data analysis method, and rigor was ensured through reflexivity, peer briefings and maintaining an audit trail. Ethical considerations were considered from the choice of topic through to the dissemination of the project, as

prescribed in the MUHREC. The next chapter (Chapter Four) presents the research findings and discussions.

CHAPTER FOUR: FINDINGS AND DISCUSSIONS

4.0 Introduction

This chapter presents and discusses the findings of the data collected regarding the nexus of drought and power dynamics in water governance in the UMngeni. The chapter addressed the three objectives of the study by establishing the power dynamics that existed in the UMngeni in the context of the 2015-2016 drought, addressing how these power dynamics affected stakeholder participation in water governance and examining how power relations can be improved. Central to this chapter is a discussion of power as being diverse, fluid, productive and limiting – all at the same time. The clearest message that may be taken from this chapter is that collaborative water governance of scarce water resources is susceptible to inequalities of power, which are influenced by various social, political and economic factors (Ansell & Gash 2008).

The study established that power dynamics manifested under the following themes:

- Race and privilege;
- Economic elite domination: “water flows where money comes from”;
- Knowledge as power in decision making on water management : *ipsa scientia potestas*;
- Technocracy;
- Non-decision making: the hidden face of power;
- *Toi-toing*: the weapon of the masses;
- Political cronyism;
- Market forces; and
- State arbitration.

In discussing the above power dynamics, participants noted that knowledge power and the socio-economic status alienates stakeholders that are PDIs, such as subsistence farmers, traditional leaders and people from lower socio-economic class groups. In responding to how power relations could be improved,

participants revealed that there was need for capacity building, and perhaps the application of market mechanisms in water governance in the context of drought.

The chapter discusses the findings by drawing examples from literature regarding the nexus of drought and power dynamics in water governance. Before delving into the findings and discussions, however, the chapter presents description of the respondents in table 4.1 below. The descriptions characterise the respondents through a numerical system taking into account age, race, gender, and occupation/organisation. The numerical system is used to maintain confidentiality and anonymity of study participants, as discussed in Chapter Three.

Table 4.1: Description of study participants

Respondent number	Age	Race	Gender	Occupation
01	37	African	Male	Water manager (DWS)
02	35	Indian	Female	Water licensing manager (DWS)
03	42	African	Male	Manager (Umgungundlovu Municipality)
04	39	African	Male	Manager (Umngeni Water)
05	45	African	Male	Gardener
06	60	White	Male	Farmer (Kwanalu)

07	55	African	Male	Subsistence farmer
08	47	African	Male	Subsistence farmer
09	50	Indian	Male	Umgeni Water
10	62	White	Female	Manager (DUCT)
11	70	White	Male	Business man (Pietermaritzburg Chamber of Commerce)
12	39	White	Male	Project co-ordinator (WWF)
13	62	White	Male	Manager (Msunduzi Municipality)
14	39	African	Male	Engineer/UMngeni
15	37	White	Male	Independent (Water activist)
16	55	African	Male	UMgungundlovu Municipality
17	53	White	Male	Manager (Ethekwini Municipality)
18	45	White	Female	Manager (Pietermaritzburg Chamber of Mines)

19	65	White	Male	Water Bailiff (Mbofana Irrigation Board)
----	----	-------	------	--

4.1 Alienation of the PDIs through race and privilege: “continued legacies of Apartheid”

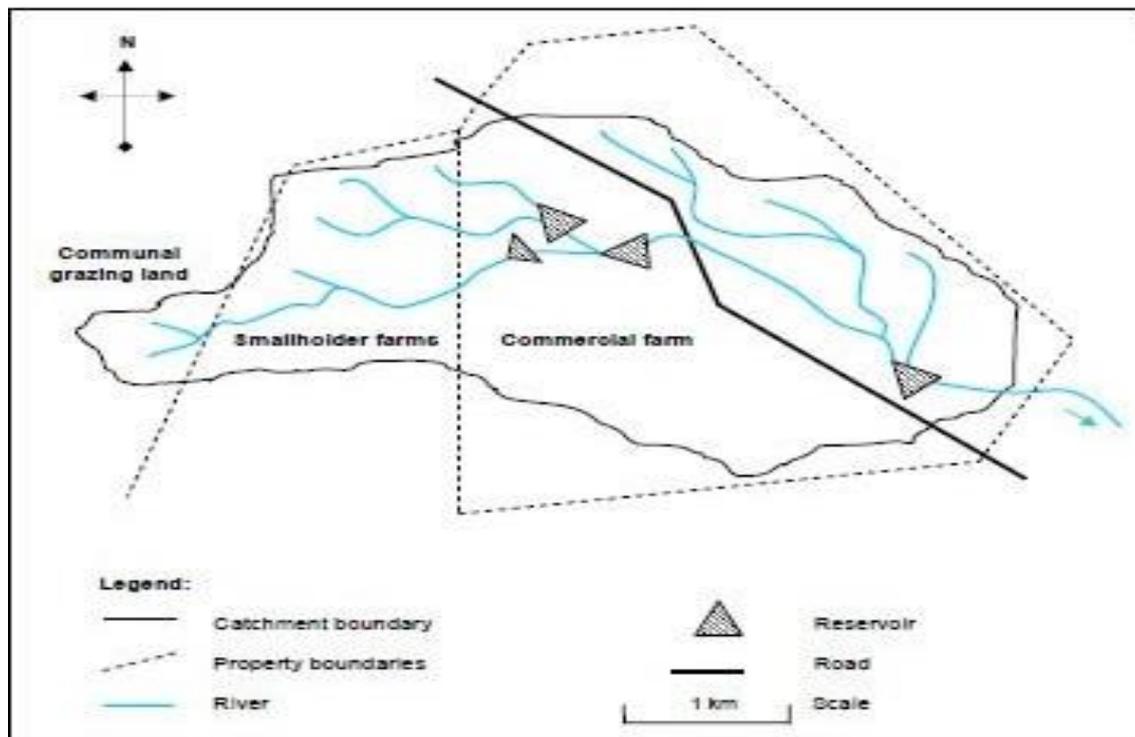
The study found that poor black people were alienated through the exercise of racial power. Racial power refers to a political or socio-economic system where white people benefit from a structural advantage (privilege) over other ethnic groups (Mendez-Barrientos et al. 2016). This power was built on both historical and institutional realities, where Apartheid legislation was divided people into four racial groups: black, white, coloured and Indian. For example, in the context of the 2015-2016 drought, five respondents spoke of how the skewed historical patterns of water access favoured white commercial farmers at the expense of small-scale black farmers. Participant 7 (55, male, black, subsistence farmer) and 8 (47, male, black, subsistence farmer) gave illustrations of a former Bantustan (an area that was set aside for black people during Apartheid) that shares the same water source with one white commercial farmer in the southern side of the Umgeni.

It was observed that the subsistence farmers are located upstream, and most of their household water supply is drawn from four boreholes and natural springs. Of these four boreholes, only two service a population of approximately 500 villagers. Their crops rely on rainwater, and a few farmers have received help from non-governmental organisations to install rainwater harvesting tanks.

The commercial farm is located downstream on a 1 560 hector farm that has been passed from one generation to another. The property is serviced by four dams that support irrigated crops during the summer and winter farming seasons. These dams are replenished by perennial streams that are on this property. The farmer has riparian rights over the river, and has recently registered his historic water use through water licensing. A sketch map of the description of the situation is illustrated in a sketch map in diagram 4.1 below. The sketch map diagram shows the

distribution of four dams on the farmer's property. During the 2015-2016 drought, the boreholes in the communal areas ran dry, creating household water shortages. Most of the rivers also dried, leading cattle to stray and trespass into the commercial farm in search for water and grazing pastures along the four dams.

Diagram 4.1: A sketch map showing water distribution



The situation described above can also be observed in most former Bantustan communities that share boundaries with white commercial farms and in the towns where water supplies in predominantly white areas are superior to water supplies in the black townships. For instance, water in predominantly white areas such as Athlone is typically provided through in-house connections, while townships dwellers in Imbali rely on communal tapes or daily purchased water, and informal settlements like Jika Joe rely on tankers and river water. Figure 4.1 illustrates one of the water sources on which residents from Jika Joe relied during the drought. This water comes from a waste water plant.

Figure 4.1A polluted water source used by residents from Jika Joe informal settlement



Participant 5 raised observed the following regarding unequal water allocation between races:

“During this period of drought we often get more water shedding in the locations [townships] than the people that reside in the affluent towns. I work as a gardener for a white family and I water the garden nearly twice a week but when I get home I get surprised to note that my family has not had water for the whole day. Maybe it’s because we pay a flat amount for the water we use yet the people in the suburbs pay as they use. Whatever the reason is, we feel unfairly treated.”(Participant 5, 45, male, black, gardener).

The above extracts show that the whites have greater privilege in terms of water allocation in a drought situation. Similar examples were noted in an online article on race dynamics and privileges during the 2015-2016 drought, where the leader of the National African Farmers Union (NAFU) in KZN stated that during the 2015-2016 drought, he lost 300 of his 800 cows, while a neighbouring commercial farmer lost three of his 300 cows (Danovich 2016). This observation on race power dynamics is in line with one of the tenets of the elite theory discussed in Chapter Two, which

positsthat there will always be an existence of inequality in distribution of resources in every society due to genetic predispositions (Vilfredo 1848).

Similar water allocation inequalities based on racial grounds were evident in Soweto during the 2005 drought. During this drought period, the government implemented operation *Gcin'Amanzi* (meaning "conserve water" in *isiZulu*). Operation *Gcin'Amanzi* was a project targeted at limiting water consumption in Soweto by means of installing pre-paid water meters (PPMs). These meters were, however, different from conventional meters installed in the affluent suburbs in Johannesburg. The difference was that the Johannesburg meters provided water on credit with numerous procedural protections against disconnections, while the PPMs automatically disconnected once the (largely inadequate) free basic water was exhausted (Dugard 2010).

Indeed, the water allocation system in general in the whole of South Africa largely owes its present configuration to the legacies of the colonial and Apartheid systems, as alluded to in the literature review (Turton & Ohlsson 1999). During the Apartheid and the colonial eras, white commercial farmers were cushioned against droughts through government regulatory apparatus (du Toit 2004). A vivid narration of this scenario appeared in the *New York Times* during the 1984 drought, where a journalist was quoted saying,

"...the drought is different for whites and blacks. Damaging as it is in the white rural areas, where the government has pushed through an emergency finance programme to enable farmers to stretch out their debts and save their farms, it is a different order of phenomenon altogether in black rural areas....in the white farming area of Tzaneen overhead sprayers whir all day long shooting jets of water over fruit orchards and over the rugby fields.. in Gazankulu (black community) there is no longer any grass to water and scarcely any livestock left" (Leyveld, 1983)

Despite the redressing of Apartheid policies in the water sector, such practises as described above have continued, resulting in black farmers suffering from disproportionate loses, as indicated by the leader of the NAFU.

Another example is provided in research by Forster, Downsborough & Chomba (2017) on water governance issues in the Crocodile sub-catchment. These authors noted that the canal system of Marico-Bosveld Dam that was built in the 1950s only distributes water to white commercial irrigation farms, and does not extend to traditional communities. If there is an occurrence of a drought in the Crocodile sub-catchment, it is obvious that the black communities would feel the lack more than the commercial farmers. In other research conducted on water allocation between racial classes in South Africa, MacDonald (2004) also noted that in the northern parts of South Africa, wealthier white people were better able to capture water resources than with black communities.

Several other scholars (Turton & Ohlsson 1999; Turton & Meissner 2002; Turton 2008 and Funke et al. 2007) have also attempted to analyse race dynamics and water scarcity in water governance issues in South Africa. However, most of these attempts studies concerned with how institutional mechanisms such as the 1998 South African Water Act can redress past inequalities (Reid & Lane 2004). Yet formal structures of policy and law cannot solve the problem of skewed water allocation when riparian rights have been re-registered under water licenses and when some “sunset clauses”, which are still based on riparian rights, are included in sections 32 and 35 of the new Water Act. Indeed, the prevailing allocation mechanisms through water licences still privileges existing lawful users. The solution to equal water distribution in general thus probably lies in a legal and practical separation of land ownership and water entitlements (Forster, Downsborough & Chomba 2017), or the intervention of the state to ensure distributive justice of water allocation under drought situations.

In analysing power and race dynamics in the UMngeni, it was also noted that in as much as respondents spoke of race dynamics in distribution, there is a rising new black elite in the form of black *petite bourgeoisie* who live in affluent towns and share the same water distribution benefits enjoyed by the whites. Water distribution can therefore no longer be said to be purely along racial lines, but is now more along economic social status. This assertion is supported by evidence of a white family in Ladysmith who lived for five months without water due water control restriction valves that were installed by the municipality in the area, whereas the white family's

neighbour, a black family, received water from a borehole that the white family could not afford to drill (*Water News* 2015).

4.2 Economic elite domination: “water flows where money comes from”

In relation to race privilege and power dynamics, a sub-theme that featured in most interviews on discussions on power, race and water governance was the economic dimension of power in a period of drought. When participants were asked to characterise the participation of different stakeholders in the decision making process on water management issues in the context of the drought in UMngeni, most participants revealed that the agriculture sector was always prioritised in water management issues owing to its contribution to the country’s GDP and to food security. For example, participant 6 observed that,

“...in the eyes of government, the agriculture sector does not appear merely as representatives of a special interest. They are functionaries performing a nation’s economic interests. This therefore gives them leverage to control certain decisions in water management issues, especially when water is scarce.” (Participant 6, male, white, farmer).

Similar sentiments were echoed by (participant 18, 45, female, white, manager), who indicated that the aim of any government is to manage a viable economy, thus decisions on water management regularly consulted and sought co-operation of the business sector.

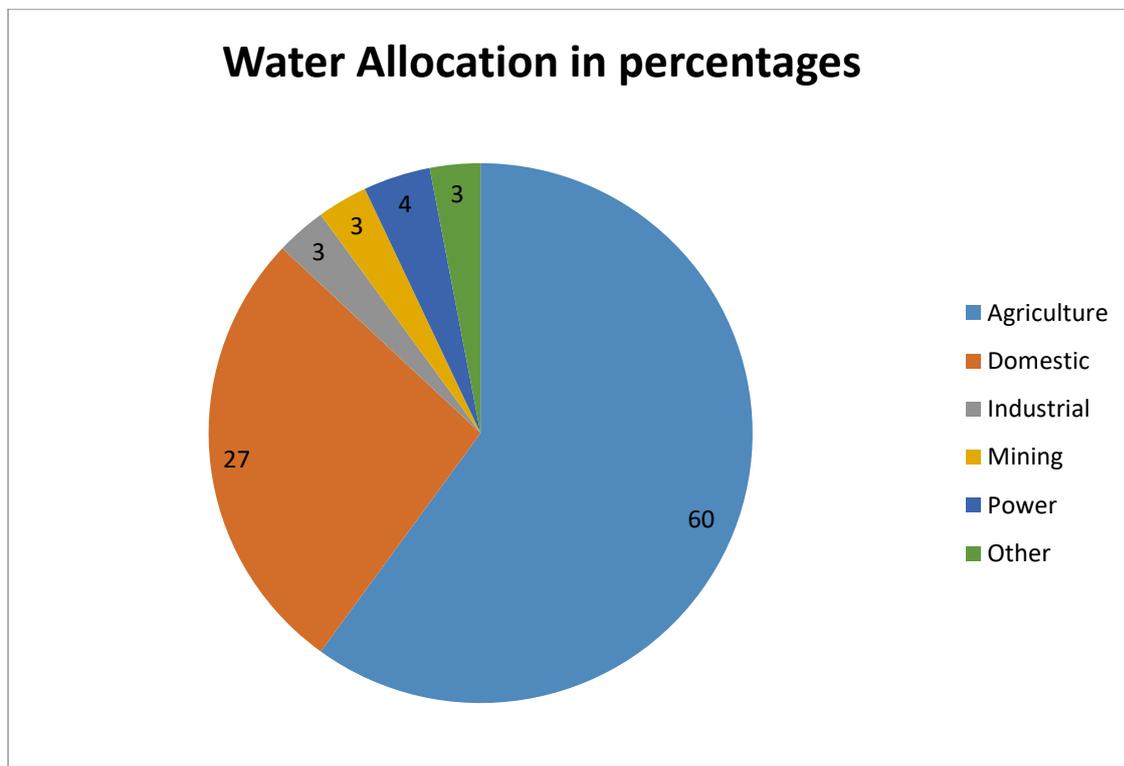
In line with these sentiments, newspaper articles and magazines revealed that in 2015 the KZN Department of Agriculture and Rural Development allocated 60million Rand towards drought relief for farmers for the purchase of water harvesting equipment, dam scooping equipment and borehole drilling equipment (*Farmer’s Weekly* 2015).Ironically, the following year municipalities such as Msunduzi and Ethekwini were issued with a drought levy (*City Press* 2016).The bulk of the drought relief funds was used by commercial white farmers, as the government considered their importance in the food industry.

In it therefore clear that the South African government understands that it is in the economic and food security interests of the country to provide farmers with more

access to water (Devereux & Maxwell 2001). Agriculture in South Africa receives a 52% share of water allocation in comparison to other sectors, as shown in figure 4.2 below (which shows water allocation according to sectors). Indeed, although during the 2015-2016 drought a 50% water restriction was imposed on agriculture, the sector still received the largest volume of water.

Movik (2014:189), in a study on water allocation between the mining sector and other sectors, also noted that the “allocation discourse serves the privileged existing lawful particularly miners, who are regarded as economically beneficial water users”, while downplaying the often huge environmental impacts they have on water resources and consequently on other water users (mining uses more water than other water users such as subsistence farmers). Similar observations have also been noted in other parts of the world, where millions of marginalised people face water shortages at the hands of the water interests of capitalist agribusiness, forest logging, hydropower companies and mining activities (Ansell & Gash 2004; Brisbois 2015; Bakker 2010; Swyngedouw 2000).

Figure: 4.2 Water allocation according to sectors



These power dynamics associated with the agribusiness sector is in line with the Lindblom thesis (Lindblom 1977), alluded to in the discussion on the elite power theory. This thesis argues that agro-based economies hold a privileged interest within a state, owing to their structural importance in the capitalist economy (Carter 2001). In terms of power, this is defined as structural power. In the UMngeni, the business sector exercises power over other stakeholders because of its position in the economic structure. Groups like the sugar cane farmers and dairy farmers occupy decision making positions in water. These stakeholders are more influential in decision making because of their contribution to the economy. When it comes to decision making on water management issues in the context of drought, they use their status to bargain for their own interests. Moreover, their positions in the economic sector facilitate direct access to decision making at the expense of those who have little to nothing to offer in terms of economic contributions. Indeed, most governments will thus routinely take account of producer interests in decision making because the performance of the economy influences the popularity of those in political power (Carter 2001). In power dynamics discourse, structural power can both enable or constrain what stakeholders can do (Hayward & Lukes 2008).

Similar observations have been noted in other parts of the world. For example, in California when a drought occurs, farmers' interests are prioritised over other water users, and the farmers themselves convince the government to allocate them more water. The idea that farmers should get more water has also been indoctrinated into the general populace through the media, which raises alarms of food shortages if farmers are not allocated with enough water (*The San Diego Union Tribune* 2015). In a survey carried out in California, in which participants were "asked to rate the importance of competing needs when water is scarce, 74 percent said agriculture should be a top or high priority", and one of the poll participants noted that, "to put food on the table, we rely on agriculture" (*The San Diego Union Tribune* 2015).

An economic study done by the Water Research Commission, however, argues that in a period of water scarcity, water use should be allocated based on marginal benefits and not average benefit (Nieuwoudt, Backeberg & Du Plessis 2004). In this study's research findings, the authors established that agriculture in South Africa is

an inefficient water user in terms of the gross income generated per unit of water and in terms of job creation. One cubic meter of water adds R1.5 as compared to R44.4 in ecotourism, and one million metre's cubic of water supports only 250 jobs in agriculture, as compared to 1,785,000 jobs in the glass industry (Nieuwoudt, Backeberg & Du Plessis 2004).

4.3 Knowledge as power in decision making on water management: *ipsa scientia potestas est* (knowledge itself is power)

The phrase *ipsa scientia potestas est* is a Latin phrase popularized by philosophers such as Francis Bacon and Thomas Hobbes, and later on is used by Michael Foucault to acknowledge that he who has knowledge has power. Participants in this study identified knowledge as a power dynamic in water governance issues in the context of the 2015-2016 drought.

Knowledge is a supporting pillar to participation in water governance issues. The researcher observed that during in the three JOC meetings attended, engineers, water consultants, the Department of Water and Sanitation and white commercial farmers steered most of the discussions on how water should be managed. In one of the JOC meetings in Howick, some of the items on the agenda included discussions of launching the drop a block campaign, removal of invasive alien plants, installation of pressure-reducing valves (that were abbreviated as PRVs in the discussions) and implementation of level B3 water restrictions. The language used in the meeting was too technical for people from the local community to understand, resulting in many interjections during the meetings, where the locals constantly asked for clarity on some of the measures, because that they had convey the information to the communities that they represented. Participant 7 also raised the concern about inhibited participation in water governance issues in the context of the drought:

“ ...at times they put figures and calculations on a power point presentation which are complicated to understand because we are not water experts ...at times I have to report back things from the last meeting but I shy away because I can't speak the technical language. I don't feel comfortable to raise up and say anything because there are all

sorts of things that are being said like volumes of water and environment and I don't understand some of these things" (Participant 7, male, black, subsistence farmer).

In the JOC meetings it was observed that much technical language that could only be understood by white commercial farmers, engineers and water technicians was used in the discussions on the drought in UMngeni. Technical language alienates those who do not understand, and in the case of UMngeni these were mostly stakeholders from the black communities. This observation was also cited by Goldin (2010), who conducted research in Breede-Overberg on how knowledge affects power relations in stakeholder participation.

The knowledge gap that exists between socio-economic classes in the UMngeni in water management is a result of the legacies of Apartheid. These legacies still exist, despite the reversal of the regime and the introduction of stakeholder participation in water management. There is still a significant number of people who are lack in situational capacity to manage water, owing to lack of knowledge. For example, most councillors in the UMngeni are not proficient in scientific water language. Although councillors should understand what is being discussed in water management, and their "communities" assume that they have the power to network and influence water policy networks, once they are knowledge deficient, the power invested in them becomes meaningless, and in reality they have little influence in building these water policy networks (Goldin 2010).

Knowledge is also a pillar for participation in decision making in the context of drought in the UMngeni, and the marginalised communities are unable to participate in decisions owing to absence of knowledge regarding water management issues. This issues points to further questions of what the country has done or can do to try and address the knowledge gap in water management issues. For instance, it is increasingly recognised that the government has a duty to ensure knowledge equity amongst different stakeholders (Schreiner & Hassan 2010). According to the writings of Foucault, who writes extensively on power and knowledge, "power and knowledge are not to be seen as independent entities but inextricably related," the more knowledge one has the more power they have over those who do not have such

knowledge; “knowledge will always be an exercise of power and power will always be a function of knowledge” (Foucault 1991:45).

4.4 Technocracy

A sub-theme that emerged under knowledge power in water management issues in the context of the drought in the UMngeni was technocracy, a term that refers to a system of governance where decisions are made based on technological knowledge (Lahsen 2005). When participants were asked about power dynamics in water governance in the context of the 2015-2016 drought, they felt that engineers and consultants were the most influential groups in water management issues in the drought period. Two of the participants indicated that the solution of water problems lay with water experts such as engineers. Water engineers were seen to have relatively more influence in water management decisions than other groups (Participant 1, 37, male, black, water manager) and (Participant 3, 42, male, white, manager).

Water management in a time of crisis does indeed rely on technical expertise, which is essential in supporting decision making. For example; the capacity of water needs to be calculated to enable fair distribution (van Ast & Gerrits 2017). Thus although participants in this project indicated that experts overshadowed other stakeholders with regards to decision making, experts are still viewed by the researcher as being an important group in power dynamics of the UMngeni water management system because of the fact that they possess knowledge that is essential for decision making.

4.5 Non-decision power: the invisible face of power in water governance

Power can produce a scenario in which there is little or no behaviourally admissible evidence of power being exercised (Bachrach & Baratz 2001). This kind of power is used by stake holders to divert discussions away from an issue raised so that decisions are not reached (McCalla-Chen 2000). Non-decision power also means that important decisions are not made, or are not even included in relevant agendas.

In discussing power dynamics in this study, participants revealed that some power dynamics in the water governance in the UMngeni are exercised through non-

decision making, or through covert means. For example, two participants spoke about how various stakeholders ensured that the construction of Smithfield and Impendle dams were brushed aside, when constructing these dams could have gone a long way in alleviating water problems during the drought:

“... In July this year the Department of Water and Sanitation unveiled a grand plan of constructing the Smithfield and Impendle dams that we were told would double the current capacity of UMngeni. We all looked forward to this project but our hopes were dampened by the vehement disapproval of the project from the eThekweni councillors and environmental groups. The councillors complained that the construction of the dams would create a hefty burden on ratepayers and that it would also dislocate a lot of families. The environmentalists spoke of environmental risks. The issue ended up dying a natural death, “without the support of the politicians projects cannot take off” (Participant 9, 50, male, Indian, Engineer).

In another interview, participant 6 similarly remarked that,

“construction of the Smithfield dam became a non-event as it gradually received no audience” (Participant 14, 37, male, white, water activist).

Similar findings were also observed in the Greytown JOC meeting and in the analysis of newspaper articles that were written on the construction of the dams. At the Greytown JOC meeting, when one of the attendees brought up the issue, the chairperson brushed it aside. Furthermore, an analysis of newspaper articles revealed that the eThekweni councillors deliberately avoided making deliberations about the project (*IOL* 2015)

The drought levy was also brought up as one of the issues that had been removed from the agenda by the Minister of Water and Sanitation until council elections were over. Another group of people that ensured that the decision of passing the drought levy was postponed were the Pietermaritzburg Chamber of Mines. Indeed, participant 4 highlighted that the Pietermaritzburg Chamber of Mines was one of the key players that opposed the implementation of the drought levy, which was also noted in a newspaper article:

“...the Pietermaritzburg Chamber of Business said it would ‘fiercely’ oppose implementation of the levy, deeming it ‘completely outrageous’” (News 24 2016).

Non-decision making has, however, received limited attention in research literature. Some scholars such as Jarzabkowski & Wittington (2008) struggle with the concept of studying things that do not happen (Clegg et al. 2011). Nevertheless, in social sciences and politics of environment, the study of non-decision power is a well-established concept that emerged through attempts to theorise power relations in the society, as depicted in the literature by various authors (e.g. Van Iteroson & Clegg 2008; Bachrach & Baratz 1962; Crenson 1971). The findings on non-decision in UMngeni demonstrated that power relations in the catchment area do not follow the traditional conceptualisation of power, as suggested by Dahl (1957), where A gets B to do what B would not have otherwise done but can manifest through inaction or the destruction of demands. That is, the powerful may not attend to, may not listen to, or may not hear demands as articulated by the less powerful. This phenomenon may occur through, for example, bureaucratic and procedural delays, or through the passing of laws but not implementing them (Kamuzora 2013). This dimension of power corresponds with Lukes’ theoretical framework.

4.6 Political party cronyism in water allocation

Most participants mentioned that politics played a large role in water management issues in the UMngeni. Participants 10 (62, Female, white, project manager) and 16 (55, male, black, Umgungundlovu Municipality) said that the drought was being politicised to the extent that any decisions on water management had to take into consideration what politicians thought about water management issues. Participant 16 (55, African male, municipality) said that he knew of a village around UMngeni that did not benefit from the borehole drilling scheme aimed at meeting water demands in the villages because it was affiliated to a certain political party. This participant also noted that water allocation between Pietermaritzburg, Greytown and Durban was highly dependent on politicians; Durban was viewed by national politicians and policy decision makers “as too big to fail”, and its water needs were hence given priority over Pietermaritzburg and Greytown. During the drought,

Greytown had no tap running water for two months (*The Witness* 2016), yet Durban was being supplied through the Mearns Emergency Transfer scheme.

The needs of big cities and city-based political actors thus clearly influence water distribution either proactively (as when municipality officials take the lead in water distribution to pursue specific objectives) or reactively (as when the national government representatives take the lead in responding to the needs of the city) (Earle 2013). One Durban town municipality member commented that starving Durban of water would expose it to the 2008 cholera scourges and affect the tourist industry. He also indicated that the government was not prepared for the 2008 shame and politicians had been warned to liaise with various stakeholders to ensure that there was no cholera outbreak. The most important stakeholders were the DWS and Department of Health (Participant 17, 53, male, white, manager). Participants raised concerns over the use of political power in managing water issues, stating that there was a lot of abuse of political power that affected water management. A sub-theme that came out of this data set was, therefore, corruption.

Participants noted that the political power dimension in water governance issues in the UMngeni in the context of the 2015-2016 drought was plagued by corruption, as most politicians capitalised on the drought situation to benefit themselves. An example was given by participant 16, who said;

...we did not receive all the drought levy that had been budgeted for. We know that the government had put in a lot of money, but some of the money did not reach the intended beneficiaries. There is a lot of corruption that goes on top there; as we speak, Greytown has an abandoned water project because tenders were given to some incompetent people through political ties..." (55, male, black, municipality worker).

Similar stories were noted in various newspaper articles. For example, *ILO* (2016) and *News 24* mentioned queries raised by farmers on the allocation of the drought levy that was intended for borehole drilling and dam scooping, among other activities.

The political dimension of power in any water governance issues in South Africa is unavoidable, owing to the ideological shifts in legislation that took place after 1994,

where the new ANC government followed redistributive policies in water management (Emmett & Hagg 2001). In a drought situation, the most appropriate political dimension of power in governing scarce water would be one that “attempts to mobilize support in order to consolidate a power base which can secure the equitable and sustainable supply, management and distribution of water resources”(Jankielsohn 2012). Unfortunately, political power in most water governance issues in South Africa is used in corrupt ways; for example, billions of Rands have been stolen by politicians in the Lesotho Highlands Water Project(Muller 2016).

4.7 The state: arbitral powers in water governance in times of scarcity

Throughout the discussions on power dynamics in water governance in the context of the 2015-2016 drought, participants noted that inasmuch as different stakeholders exercised power in various forms, the government was the main arbitrator and decision-maker in water governance issues. Two participants from government Water Department agencies referred to the statutes that quote the government as the custodian of all water resources in South Africa (Participant 4, 39, male, black, manager) and (Participant 2, 35, female, Indian, manager). Participant 4 (39,male, black, manager) noted that they were aware of the competition around the dwindling water resources and they used the authority vested in them by the state to ensure that water was distributed in accordance to the amount of water in the dams. Participant 4 also said that,

“As a department we have authority to initiate water restrictions, monitor its implementation and recommend punitive measures in cases where water users violate water restrictions. For example, we have reported water theft by some white farmers and ensured that they faced the wrath of the law.”

However, other participants said that although they appreciated the role of the government in ensuring that water was distributed equally during a time of crisis, they felt that at times their intervention was destructive, as some government officials used their powers to pursue corrupt activities. Some participants also felt that the

government used its power to impose decisions that they felt should first be discussed with them. For example participant 11 said,

“Most decisions are imposed on us by DWS; for instance, when decisions on water restrictions were done none of us was consulted. We are not even sure of how the percentages were reached; we just woke up to see advertisements of water restrictions” (Participant 11, male, white, businessman, Pietermaritzburg Chamber of Commerce).

In line with this observation, another participant said,

“The communication of the drought level came as a directive via a fax, implying that there was no room for discussion. We heard that the decision had been taken by the Water and Sanitation Minister in July” (Participant 3, 55, male, white, manager).

Nevertheless, the state, with the help of bureaucracy (which refers to those parts of the state that are principally charged with the administration of government decisions and programmes), is at the centre of most water management decisions in times of water crisis in most countries (Doyle & McEachern 2015). Indeed, the use of state power in managing depleting water resources is seen by Ostrom (cited in Antony & Campbell 2011) as a one of the fundamental ways of managing a water resources. For instance, the government intervenes when stakeholder A wants one thing, yet stakeholder B wants another (Doyle & McEachern 2015). However, power becomes the element that shows why one party takes precedence over the other (Coleman 2013). In the context of the drought in UMngeni, instrumental power is used to enforce decisions made by the Department of Water and Sanitation. Where there is an existence of instrumental power, the super ordinate element is naturally expected to control and lead decisions (Coleman 2013).

The concept of the use of state power in controlling depleting natural resources is rooted in Hobbes' theory of social order (Hechter & Horne 2003). From this perspective, if different stakeholders in the UMngeni are left to pursue their interests, the results could be chaotic. There is thus a necessity of a single central power used to impose order. In water management discourse, Hobbes' idea has been developed into the idea of a hydro-social contract. This idea was first proposed at the Ninth

Stockholm Water Symposium. It refers to an unwritten contract that exists between citizens and the government that comes to existence when citizens are no longer able to capable of mobilising sufficient water for their survival. The hydro-social contract then acts as a mandate by which the government ultimately takes responsibility that all users get an equal share of water (van Wyk, Meissner & Jacobs 2009).

Another justification of the use of state power in water management is the relation of water to state security. This concept was introduced by the Copenhagen School, which was instrumental in developing a broader understanding of state intervention in environmental issues that threaten national security (Trombetta 2008). Water has been identified as a threat to human security in South Africa and, as such, the involvement of the state cannot be side-lined (Brown et al. 2007).

To fulfil its function, the state can use coercion to limit resource use, monitor behaviour, enforce compliance and facilitate cooperation within various sectors (Ostrom cited in Antony & Campbell 2011). Gardner, Ostrom & Walker (1990) demonstrate the pivotal role played by the state in ensuring water cooperation in times of scarcity in California. In a separate case in Sri Lanka, Ostrom & Walker (1990) demonstrated how collective water resource management failed, owing to the state's unwillingness to enforce rules regarding depleting water resources in dams.

In South Africa, the involvement of state power in the sharing of scarce water resources is crucial for the inclusion of the PDIs who lack governance and institutional capacities to manage water resources (Goldin 2010). However, some authors have argued that the government's control over scarce water resources makes water resources vulnerable to politicisation. Indeed, Wittfogel argues that state control on water governance in a time of crisis can lead to "despotic regimes" (Wittfogel 1953). Modern thinkers on state power in environment governance also argue against the use of top-down command and control system of power in natural resource management. They urge states to instead use infrastructural power, which entails a more cooperative relationship between citizens and the government (Mann 2008). In this approach, instead of the state using power to make unilateral decisions in water governance, it can use its power to enhance collaboration among

stakeholders. However, Doyle & McEachern (2001), who are instrumental writers on politics of the environmental and state intervention, emphasise that coercion and regulation are not the only means to ensure compliance (Doyle & Meacher 2001).

In other water management academia, it is noticeable that the proposed use of state power to manage water resources is not in line with either the 1992 Dublin Principles or the South African 1988 NWA. The Dublin Principles and the NWA encourage polycentric systems that involve multiple power bases that influence centres of decision making (Anderson & Ostrom 2008). However, Movick (2004) argues against the use of state power in the governing of water resources, arguing that when the state acts as a trustee of water resources, it uses its “judgement on who should have water and on what basis.” This judgement can be biased towards certain groups of people.

Moreover, there has also been a general paradigm shift in natural resource management, from state-controlled decision making to approaches in which multiple stakeholders share power in decision making. These reforms purportedly aim to increase stakeholder participation in decisions by restructuring power relations between the state and stakeholders (Shackleton 2002). In the context of water governance in the 2015-2016 drought in UMngeni, however, there still remains the issue of whether the principles of stakeholder involvement in decision making on water scarce resources could be relegated to the public.

4.8 *Toi-toing*:the weapon of the masses

Participants noted that aside from the state, there is a growth of new centres of authority, mainly from global and local civil society, and supra-national and international institutions, which play influential roles on how water should be governed in a drought. In the context of the 2015-2016 drought in the UMngeni, local civil societies largely ensured that the PDIs received a share of the scarce resource. Moreover, global civil societies and global societies ensure that the governments are held accountable for decisions and actions in water governance issues; indeed, some of them have developed skills that they can use to challenge water

governance in the UMngeni. Some of these organisations include the WWF, DUCT, WESSA and independent water activists. One participant said,

“...we keep the government on check and make sure that we advocate for the equal sharing of water and equal participation of stakeholders. We have pushed the government to provide water tankers for the people in the informal settlements and we capacitate the previously disadvantaged with necessary skills that can help them participate meaningfully” (Participant 10, 62, female, white, programme manager).

The involvement of global and local civil societies in water governance issues is in line with the classic pluralist theory, which posits that pressure groups provide a counterbalance to the power elite and that “power is everywhere” (Foucault 1998:63). Civil societies in the UMngeni and in South Africa at large have challenged unfair water distribution. An example is the case of the Phiri campaigns in Soweto, where the Anti-Privatisation Forum (APF) helped Soweto residents to protest over the installation of the PPMs. The APF drew litigation against the government, and the Soweto residents won the case (Dugard 2010). Other instances also include protests by the Lesotho Highlands Church and Solidarity Action Group, which protested against the construction of the Katse and Mohale dams, citing environmental concerns and the impacts of displacing local residents (Meissner 2015). These two examples show how civil societies counter-balance state power in water management issues. Indeed, most left-wing activists in South Africa like the APF regard the state as an agent of capitalists and thus believe that they enable disputation, accountability, representation and participation.

International institutions, in contrast, have a conviction that most countries in the Global South are unable to manage water crisis owing to lack of infrastructure as well as corruption (Narsiah 2010). Therefore in a drought period, international institutions shift their focus to encourage governments to manage water resources through privatisation, because there is a general belief that privatisation produces some forms of disciplinary conduct, or, to use Foucault’s term, “governmentality” (Narsiah 2008). The influence exerted by global international institutions in environmental issues is a new dimension of power that challenges Westphalian

principles of the state, but are very influential in ensuring that principles of equity are adhered to and good water governance is pursued (Narsiah 2010).

4.2 How power dynamics affect stakeholder participation in water governance

Having discussed the various forms of power dynamics, this section discusses how power dynamics affect participation in water governance issues in the context of drought. Dominant themes that came out of this data set were knowledge power and stakeholder participation, and socio-economic status.

4.2.1 Knowledge power and stakeholder participation

The recurring themes in water governance under the context of drought – tradeoffs, water user rights and marginal cost pricing – were both dominant in the JOC meetings, as well as alienating to most locals who have not mastered the jargon of water management . Indeed, one of the traditional leaders felt that he had no voice in decision making, because he could not converse in the scientific language. Lack of knowledge was also identified by participant 12 (65, male, white, program coordinator) as a barrier to participation in water governance issues. He highlighted that allocation procedures were too technical to be understood by people who did not have basic knowledge of water management. He also highlighted that at times decisions were made by the government without consulting stakeholders.

These sentiments were also echoed by one of the participants, who said,

“In the JOC meetings we are at times given statistics that three months ago the dam levels were like this and now there are like this, or they say we tested water at such and such a time and we found out that it was this dirty, they then ask us to contribute the way forward. I have never been able to say anything because I don’t understand what the graphs mean...we also at times just here that the government has passed such and such dam laws and we are not show of how they have been reached, or the government has issued drought relief funds but we are not told about the procedures we must follow to get the funds” (Participant 8, 47, male, black, subsistence farmer).

This response indicates that the information presented by DWSA is too technical for certain stakeholders, and that certain knowledge about drought developments are is not imparted to the farmers.

However, the researcher noticed some contradictions in the statement about how procedures on application of drought relief funds were not publicized. Specifically, the researcher identified the procedures that farmers were required to follow to access the funds in a *Farmers'Weekly* magazine (2015). However, the medium of communication has affected knowledge sharing, as most subsistence farmers do not use print media and nor understand power point presentations. Moreover, unequal access to knowledge limits participation and shapes the ways in which stakeholders are able to cooperate with each other (Vroom 2002).

Participant 12 (65, male, white, program coordinator) indicated that there are clear links between knowledge and an individual's self-esteem. He provided examples from his own personal experiences with the locals in several Catchment Forum meetings, noting that stakeholders who lack understanding of water management issues remain silent when such issues are deliberated upon to avoid embarrassment. White commercial farmers, in contrast, were able to use the knowledge they possessed to strengthen arguments, which then could not easily be counteracted by those who did not have such knowledge. Lack of knowledge also included low literacy and numeracy capabilities, which also inhibited these water users to actively participate in water governance issues.

Thus although the South African Disaster Management Framework and the 1998 Water Act create opportunities for stakeholders to participate in the water governance issues, where the objectives of these policies are to attain equity, efficiency and equality (Golding 2002), in order for stakeholder engagement to be effective, stakeholders should have the ability to make choices and to voice their concerns. Knowledge is therefore a necessity for participation, and those lacking in knowledge are unable to engage in water governance. In contrast, if they have the knowledge, they are able to challenge authority. Ultimately, the absence of knowledge and presence of asymmetrical power relations frustrates the participation process (Golding 2010).

4.2.2 Socio-economic status and participation

The socio-economic status of subsistence farmers and locals in UMngeni was identified as a barrier to participation. The social aspect includes authority and education, and the economic aspect includes financial aspects and occupation. Subsistence farmers and members from the lower socio-economic classes reported that their socio-economic standing made them feel inferior; they felt that the affluent white commercial farmers and professionals such as engineers and technicians dismissed their contributions. One of the participants said,

“We are generally seen as people who cannot make sound decisions because of our low class backgrounds. Most of the commercial farmers and professionals have good managerial backgrounds that they acquired from good educational backgrounds and work experience; they can manage projects better than us and the money they have affords them a social status that we do not have. Some white commercial farmers are big sponsors of water management projects and by virtue of their financial contributions they are elected to become board of directors in some water boards” (Participant 8 , 47, male, black, subsistence farmer).

Yet although socio-economic status is often valued in stakeholder participation, most discourse on participation in environment issues note that most communities possess a wealth indigenous knowledge that is generally not explored (Mahlangu & Garutsa 2014; Iloka 2016; Cheserek 2005). Indigenous knowledge is a systematic body of knowledge attained by indigenous people through the accumulation of informal experiences and thorough an understanding of their environment (Cheserek 2005). The inclusion of indigenous knowledge into decision making processes in water governance could contribute to local empowerment and improve self-esteem among the indigenous people (Cheserek 2005). In this study, local farmers in the UMngeni have experiences and local knowledge in water management that can be fed into the decision making processes. Some of the methods that were noted by these participants included traditional ways of water resource management and traditional ways of water conservation strategies. However, integrating indigenous knowledge into decision making can be challenging, owing to differing and

contradictory views, and at times can be incompatible with ways of acquiring knowledge between indigenous and scientific systems (Cheserek 2005).

The researcher also noted that formal education, which was discussed as a hindrance to water governance issues, was not of much concern. Local communities required more citizen science, which refers to the engagement of non-scientists in decision making about policies that have technical or scientific components (Silvertown 2009). Citizen science is extensively discussed below.

4.2.3 How power relations among different stakeholders in water management can be improved

Having identified the following power dynamics in water governance in the context of drought and how they affect stakeholder participation, this section looks at how these power relations can be improved.

Improving power relations through capacity building

Participants who identified knowledge power as a power dynamic that affected participation were asked to explain how this power dynamic could be improved. Most of the participants responded that there was need to capacitate those without relevant knowledge and skills in water governance. Participant 2 (35, female, Indian, DWS) noted that the DWS knew of the knowledge gap between white commercial farmers, water consultants, subsistence farmers and traditional leaders and how it affected both water distribution and stakeholder participation. This participant highlighted how the DWS and local non-governmental organizations such as DUCT, WESSA and WWF work together to develop capacities in the local communities. Participant 10 (62, female, white, DUCT) said that DUCT recognized this issue, introducing the researcher to members of a project called “Enviro-champs”, which was currently working on equipping locals with water governance frameworks and negotiation skills in water management. Another member from Natural Resource Management (NRM) also introduced the researcher to NRM-sponsored Masters and PhD students, PDIs who were admitted to a programme aimed at capacity building.

Capacity building helps to empower PDIs by developing competencies that were identified as lacking. Importantly, capacity building can be used as a tool to address inequality in society (Buytaert et al.2014). However, the researcher noted that

capacity building projects in the context of the drought would be more productive if the element of citizen science was introduced. Citizen science can help in bridging the knowledge gap between the ordinary citizens and professionals like engineers and technicians. It can also help integrate civil societies into the routine of monitoring water resources, thus providing citizens with a greater comprehension of their resources and empowering them to interact with authorities and co-manage resources (Water Research Commission 2017). Citizen science can also improve availability of and access to data, which was raised as a concern by some subsistence farmers. Ultimately, citizen science empowers citizens to become part of the decision making process (Ostrom 2010).

4.2.4 Transfer of knowledge and skills

A sub-theme that came out of how knowledge power could be improved was the transfer of knowledge. Participants noted that there was a knowledge gap in water management practices between the white commercial farmers and subsistence farmers. One commercial farmer said,

“During this period of drought I have tried to educate neighboring black farmers on simple water harvesting techniques, and the importance of ploughing water resistant crops and shorter season crops, I feel obliged to transfer knowledge to them because they are part of the farming community” (Participant 6, 60, male, white, farmer).

Knowledge on water governance in South Africa is still largely divided along racial lines. After Apartheid, most of the white people who were part of the Department of Water Affairs and Forestry exited the department to create managerial vacancies for PDIs. However, the white community left a knowledge deficit in the water management sector. Moreover, they formed water consultancy companies, further ensuring that knowledge and skills were along passed along to those who could afford it. However, transfer of knowledge and skills can still bridge the power dynamics between racial classes.

4.2.5 Improving power relations through dialogue and policy frameworks

When participants were asked about how power asymmetries could be improved in water governance issues in the context of the 2015-2016 drought in UMngeni, most of them identified dialogue as a tool that could be used to improve power relations. This observation came out of the focus group, after participants had become aware of how different dimensions of power affected water distribution and stakeholder participation. A member from the DWS and a member from DUCT also suggested that power relations could be improved through strengthening policy frameworks.

The dialogue approach to improving power relations rests on ideas of the liberal “reform” view of change, which suggests that the recognition of inequitable power sharing among stakeholders leads to its rectification (Zeitoun & Jagerskog 2011). Identifying the power dynamics and speaking about them with stakeholders can alter its egregious impacts (Zeitoun & Jagerskog 2011). This approach to improving power dynamics in stakeholder participation is achieved through tactics such as matching of interests and encouragement of transformation. The matching of interests technique rests on the assumption that those efforts that are in line with interests of powerful stakeholders will receive support from them. This technique relies on identifying decisions that are beneficial to the stronger and weaker groups, such as sharing of the benefits related to water resources (Sadoff & Grey 2005; Dombrowsky 2010). In contrast, the tactic of encouraging transformation to influence power relies on the idea that the more powerful stakeholders may be convinced to allow change in existing power relations through “naming and shaming” the destructive components of power in water management (Zeitoun & Jagerskog 2011).

Strengthening policy frameworks can help in levelling the playing field, or leveling the players. These approaches rely on “increasing the legitimacy or authority of the less powerful side” (Zeitoun & Jagerskog 2011). In the case of UMngeni, such methods would be applicable through the creation of WUAs, the devolution of powers, the acceptance of polycentric governance and the stern application of the compulsory reallocation of water. The intention of compulsory reallocation is to free up water to redress race inequalities (Speed 2013). Leveling the playing field is done through strengthening of legislative and regulatory frameworks, so that all stakeholders are subject to the same regulations (Zeitoun & Jagerskog 2011).

4.2.6 Improving power relations through market forces

During the focus group discussion, some participants suggested that power relations in water governance issues in UMngeni could be improved through the application of market forces in water governance issues. A participant from WWF said,

“...one approach that can be used to adequately regulate water is the use of market mechanisms” (38, male, white, WWF).

This sentiment was also echoed by participant 4 from UMngeni water (39, African, male who felt that deregulation would ensure water governance issues would become immune to the government's corrupt activities, giving way for market forces to facilitate the reallocation of water in a more efficient and sustainable way. He argued that market mechanisms had a tendency of defusing political power, largely because market forces do much of the regulation as compared to government administrative allocation, which normally generates inequality through granting water rights to one sector and precluding the other.

Market forces have been successfully applied in the management of water under scarce conditions in countries like Australia and in western California (through drought water bank markets) (Walmsley 1995). The application of purely market forces in South Africa's water sector is more complex, owing to the fact that historically, water development projects in South Africa were initiated and conducted with alternative political agendas in mind, and with the government at the forefront in water management issues (Walmsley 1995). In present-day South Africa, the government still controls through provisions given in the 1998 Water Act (Walmsley 1995). The same act does however show some inclinations to neo-liberal policies (e.g. water is seen as an economic good which should be managed efficiently) (van Koppen & Schreiner 2014).

Moreover, as water has become increasingly scarce in some parts of South Africa, it has become obvious that traditional government-controlled approaches to water management are no longer viable. Several economists have suggested a move towards a freemarket system (Walmsley 1995). However, the freemarket model has been applied in the water-scarce Upper-Berg River region, and showed that it was

impossible for any water resources in South Africa to be governed through a purely free-market model (Louw & Van Schalkwyk 2002).

The diagram below shows the mixed model system that was used in the Upper-Berg River area. The model shows a continuum between government-controlled market and freemarket. The diagram is a reflection of what happens in almost all water management arrangements in South Africa. For example, the UMngeni municipalities and industries has some freemarket characteristics (such as water is priced), yet the government policy dictates that domestic water should be freely provided to the citizens.

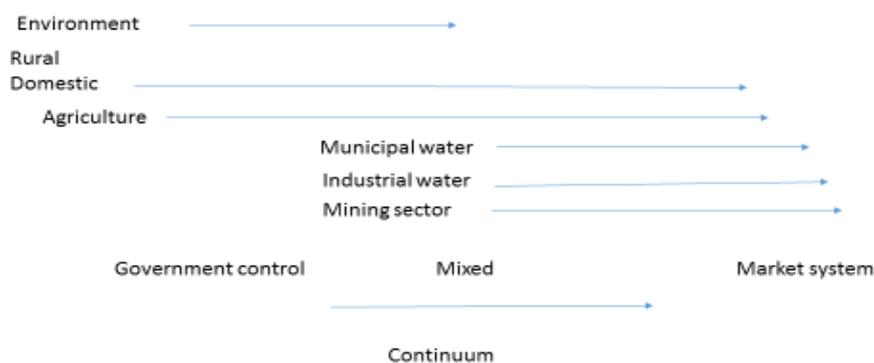


Diagram 5.1: Showing a continuum from government-controlled model to freemarket systems

In this chapter, power dynamics were discussed under the following themes drawn from the analysed data: race and privilege, economic elite domination, knowledge as power, non-decision making, toi-toing, political cronyism, market forces and state arbitration. These various power dynamics discussed under these themes illustrate that power in water governance can either have positive effect (when used to ensure that everyone gets an equal share of water) or negative effect (when used to alienate certain groups of people). The data also revealed that water scarcity in a drought situation results in everyone wanting to participate in water governance issues.

Moreover, various stakeholders use whatever power base to try and influence water distribution in their favour. These power bases can either be social, political or economic. The chapter also noted that power is not concentrated in the hands of a few, but is everywhere. However, there is need for capacity building, and perhaps the application of market mechanisms in water governance in the context of drought. Conclusions that were drawn from findings in this study are presented in the next chapter (Chapter Five), which also offers recommendations based on these findings.

CHAPTER FIVE: CONCLUSION AND RECOMMENDATIONS

5.0 Introduction

This chapter presents the conclusions and recommendations based on the findings of this study. The chapter begins by once again outlining the aim and the research objectives of the study, together with the relevant findings. Thereafter, conclusions are presented, followed by recommendations.

The study set out to examine the nexus of drought and power dynamics in water governance in the UMngeni in the context of the 2015-2016 drought. The study therefore examined power dynamics among stakeholders in the UMngeni. The UMngeni is located in KZN, South Africa. It lies in the Mvoti-Mzimkhulu WMA and it covers an area of 7,963 square kilometres. This catchment area was selected because of its exposure to recurrent droughts and power dynamics at play in water governance issues in the context of droughts. Moreover, it is an area of interest to the International Water Security Network (the sponsors of this programme).

Power dynamics were examined among the following stakeholders: the DWA; Umngeni Water (a government parastatal responsible for bulk water distribution); the uMngeni, eThekweni, uMgungundlovu, Howick, Richmond and Mbofana municipalities; the DUCT; the SANBO; the Mbofana Irrigation Board, the WWF; Pietermaritzburg Chamber of Business and UKZN, National Department of Agriculture, and the National Disaster Management Centre.

The chapter conceptualised that droughts affect water sources, leading to intense competition among various water users who strive to support their own water interests. This competition leads to the manifestation of different forms of power from different users, who use this power to control water sources to support their social, economic and political interests. The theories that were employed to understand the nexus of drought and water governance were the political ecology theory, the power elite theory, the classical pluralist theory and Lukes' three dimensions of power theory.

In order to ensure that the study remained focused, the main objectives were broken down to these specific questions:

1. What were the power dynamics that existed in the UMngeni catchment area (UMngeni) in the context of the 2015-2016 drought?
2. How have power dynamics affected stakeholder participation in water governance?
3. How can power relations among different stakeholders in water management be improved?

Based on these questions, results were obtained through analysing qualitative data obtained from semi-structured interviews, qualitative stakeholder analysis, focus groups and secondary data analysis. A total of 19 semi-structured interviews were conducted, as well as one focus group. In addition, 12 books and seven newspaper articles were reviewed.

The results obtained were analysed through the framework data analysis method discussed in Chapter Three. The results were then presented and discussed in Chapter Four under the following themes:

- Race and privilege: “continued legacies of apartheid in water governance”;
- Economic elite domination: “water flows where money comes from”;
- Technocracy;
- Non-decision making: the hidden face of power;
- *Toi-toing*; the weapon of the masses;
- Political cronyism;
- Market forces; and
- State arbitration

Discussions from these themes led to the following summary of findings:

- There are various forms of power that manifest in water governance issues of scarce water resources. Some of the forms of power are destructive (“power over”) and some are constructive (“power with”).

“Power over” in water governance issues in a drought situation has many negative outcomes such as discrimination, corruption and abuse. This form of power is seen as a win-lose kind of relationship in water management, as those with more power use it to gain more water and to influence decisions that are in support of their interests. An example in the context of this dissertation is the controlling power of the white commercial farmers in the agribusiness industry. “Power with”, in contrast, finds common grounds among different interests and builds hydro-solidarity.

- Power imbalances that are associated with race and privilege result in unbalanced water allocations during a drought situation

Patterns of water access in the UMngeni are still markedly skewed along racial lines as a result of South Africa’s political history. In the farming communities, white commercial farms are strategically located near perennial streams and dams while subsistence farmers have few or no water sources. In affluent towns where mostly white people live, water is provided through in-house connections, while water in most of the nearby townships is provided through shared standpipes and Jojo tanks. Water shedding is also more prevalent in the townships than the affluent towns, and lack of adequate water among black communities exposes them to water borne diseases such as cholera, as well as loss of livestock and crops.

- The agribusiness sector has more influence on water management decisions in drought situations than other groups

The agribusiness sector is prioritised in water allocation issues during a drought situation, owing to the structural position of the agribusiness in the economy of South Africa and its importance in food security. Farmers’ concerns about water distribution are therefore largely taken into consideration at the expense of other water users.

- Knowledge is used as a power tool to alienate PDIs

Knowledge is a pillar for participation in water governance, and the lack of scientific and technical water management knowledge among PDIs bars them from meaningful participation in water governance issues. This situation gives engineers, technicians and white commercial farmers an upper hand in decision making at the expense of the previously disadvantaged. As shown in Lukes’ second dimensional

view of power, empowerment through knowledge in water governance issues in the context of the drought in UMngeni does not only mean challenging expertise with expertise, but also means expanding who participates in the knowledge production. The government should put more effort in building capacities among PDIs so as to ensure that they are equipped with adequate knowledge that facilitates participation in water governance. Knowledge can be imparted through citizen science.

The government should also ensure that communication about drought policies is disseminated through various communication platforms such as the use of agriculture extension officers. Full participation occurs only when all participants have equal knowledge. As it stands, the knowledge gap affects group dynamics; those who do not possess the knowledge feel ashamed to contribute to any decisions interestingly, although the PDIs expressed that they lacked the technical and scientific language to facilitate participation in water governance issues, they possessed indigenous water management knowledge that could be used in decision making.

- The power of the state as an arbitrator in water allocation issues and water management decisions

Drought and its implications on water sources is viewed as a state security issue. To reduce conflict among different water users, the government acts as an arbitrator in ensuring that all users get a share of water. Fairness in the sharing of the water resources is, however, difficult, since the government has some bias towards stakeholders such as the agriculture sector that greatly contribute to the economy.

The concept of the use of state power in controlling depleting natural resources is rooted in Hobbes' theory of social order (Hechter & Horne 2003). From this perspective, if different stakeholders in the UMngeni are left to pursue their interests, the results could be chaotic. There is thus a necessity of a single central power used to impose order. However, the use of state in water governance issues is not in line with the principles good governance, which advocate for decentralisation of power.

- Power of the masses rests in social movements.

Although the state manages its water affairs locally, there are external sources of authority in water governance issues. These are mainly global and local civil

societies and international organisations. Local civil societies in South Africa counter balance state power in water management.

- The effect of a drought results in all affected parties wanting participate in water management discussions. Power thus becomes distributed to everyone, ceasing to be one dimensional (concentrated in the hands of the elite), and, as suggested by pluralist theorist, becoming distributed among many groups (Barry 2013).

There were several major findings regarding power relations. Firstly, stakeholders should open up dialogue about the different power dynamics that surfaced in the context of drought, and be able to communicate openly with each other on how these dynamics affected water distribution and participation. This dialogue approach to improving power relations rests on ideas of the liberal “reform” view of change that suggest that the recognition of inequitable power sharing among stakeholders leads to its rectifications (Zeitoun & Jagerskog 2011). Identifying the power dynamics and speaking about them with stakeholders can alter its egregious impacts (Zeitoun & Jagerskog 2011). This approach is done mainly through two subcategories: the matching of interests through the creation of positive-sum solutions and through the encouragement of transformation. Dialogue can also be used to challenge power; this approach is also applied through two tactics: levelling the playing field or levelling the players. These tactics are illustrated in table 5.1 below.

Table 5.1: Examples of interventions (adapted from Zeitoun&Jagerskog 2011).

Approach	Influencing Power		Challenging Power	
Tactic	Matching interests	Encouraging Transformation	Levelling the Players	Levelling the Playing Field
Examples of interventions	Generation of positive-sum outcomes:	Dialogue platforms (Ward, et al., 2007)	Building capacity (technical, negotiations, administration); establishment of WUAs	Objective water sharing standards (IWL); Harmonisation of national environmental regulation

Secondly, power dynamics can also be improved through capacity building. Capacity building plays an important role in imparting technical and competency skills that can help PDIs to fully participate in water governance issues. Capacity building can thus be used as a tool in addressing inequality in society. In addition, it must be augmented by a transfer of skills and expertise from mostly the white commercial farmers.

5.1 Recommendations

Integrated water approaches are widely used in the governance of scarce water resources around the globe (Martinez-Santos et al. 2014; Hileman, Hicks & Jones 2013). These approaches allow competing water users to govern water sources in a given area. Within the context studied in this dissertation, a number of power dynamics affected water management, including water governance and: race, economy, knowledge, decision making, politics, corruption, the state, and global and local civil societies. These dynamics characterise most of the WMAs in South Africa.

The study therefore generated a number of recommendations for those designing, facilitating and participating in integrated water approaches under drought conditions. The recommendations are directly derived from empirical findings from the research and are as follows:

1. It is recommended that water policy implementers (DWS), agriculture extension officers and water bailiffs be aware of both the visible and invisible ways that power can manifest in water governance in the context of a drought. To unearth visible and invisible power frameworks, the Gaventa cube can be applied.
2. It is recommended that during JOC meetings and CMFs, the DWS pays careful attention to how agendas are set and how problems are defined in the context of a drought. Agenda-setting and problem definition are contestable social processes shaped by the preferences of those who have power. In order to account for power exercised during the agenda-setting phase, participants must collaboratively set the agenda. If during phase particular attention is paid to power, there is a greater likelihood that the eventual agenda will better reflect the diverse perspectives of all stakeholders .
3. A knowledge gap still exists between different racial groups. It is therefore recommended that the government builds capacities amongst the previously disadvantaged so as to enable them to participate fully in water management decisions.
4. It is also recommended that DWS facilitates open dialogue among stakeholders about power relations and tensions that develop in water governance issues in the context of droughts. Dialogues on inequitable power sharing can lead to its rectifications (Zeitoun & Jagerskog 2011).
5. Integrated water approaches may not be appropriate under drought conditions, especially where economic interests of sectors like the agribusiness sector in water management issues take priority over other sectors (Innes and Bochner 2010; Loe 2013). The government is likely to favour some interests over others. Under such conditions, the use of well enforced government regulations such as the Compulsory Water licencing can be enforced.

5.2 Ideas for future research

This study was grounded in an interpretation of power theories based on the political ecology theory, the power elite theory, the classical pluralist theory and Lukes' three dimensions of power. Application of these theories restricted the research to discussing power within instrumental, structural and discursive dimensions. Many other forms and frameworks of viewing power, such as Gaventa's power cube, Clegg's circuits of power, Foucault's view of power and Giddens' structuration theory could have generated insights not seen in this dissertation. There is also still significant work to be done in examining Lukes' (2005) ideas in the context of stakeholder participation in drought context, as all dimensions were not addressed in this study.

This study looked at the negative sides of power in water governance issues. The most recognised form of power, "power over", discussed in this study has negative impacts such as discrimination, corruption and abuse. Effective collaboration requires the sharing of power between stakeholders. However, Giddens and Foucault see power at times as being purposeful. Using Giddens and Foucault's ideas, future studies can therefore be conducted to examine the positive impacts of state power in water governance in the context of drought.

REFERENCES

- Ansell, C. and Gash, A., 2008. Collaborative governance in theory and practice. *Journal of Public Administration Research and Theory*, 18(4), pp.543-571.
- Arendt, H., 1970. *On Violence*. Houghton Mifflin Harcourt.
- Bachrach, P. and Baratz, M.S., 1970. *Power and Poverty: Theory and practice*. Oxford University Press.
- Bakker, K., 2010. *Privatizing Water: Governance failure and the world's urban water crisis*. Cornell University Press.
- Barnaby, W., 2009. Do nations go to war over water?. *Nature*, 458(7236), pp.282-283.
- Barnett, G.A., 2011. *Encyclopedia of social networks* (Vol. 1). Sage.
- Barreteau, O., Bousquet, F. and Attonaty, J.M., 2001. Role-playing games for opening the black box of multi-agent systems: method and lessons of its application to Senegal River Valley irrigated systems. *Journal of Artificial Societies and Social Simulation*, 4(2), p.5.
- Benjaminsen, T.A., Maganga, F.P. and Abdallah, J.M., 2009. The Kilosa killings: Political ecology of a farmer–herder conflict in Tanzania. *Development and Change*, 40(3), pp.423-445.
- Benson, D., Gain, A. and Rouillard, J., 2015. Water governance in a comparative perspective: from IWRM to a 'nexus' approach?. *Water Alternatives*, 8(1).
- Berg, B.L., 2007. A dramaturgical look at interviewing. *Qualitative Research Methods for the Social Sciences*, 6.
- Birks, M., Chapman, Y. and Francis, K., 2008. Memoing in qualitative research: probing data and processes. *Journal of Research in Nursing*, 13(1), pp.68-75.
- Biswas, A.K., 2004. Integrated water resources management: a reassessment: a water forum contribution. *Water International*, 29(2), pp.248-256.
- Blanche, M.T., Blanche, M.J.T., Durrheim, K. and Painter, D., eds., 2006. *Research in Practice: Applied methods for the social sciences*. Juta and Company Ltd.

Bond, P., 2004. The political roots of South Africa's cholera epidemic. In M. Fort, M. Mercer and O. Gish, eds, *Sickness and Wealth: The corporate assault on global health*. South End Press.

Brisbois, M.C., 2015. *Natural resource industries and the state in collaborative approaches to water governance: a power-based analysis* (Doctoral dissertation, University of Waterloo).

Brown, J., 2011. Assuming too much? Participatory water resource governance in South Africa. *The Geographical Journal*, 177(2), pp.171-185.

Brown, O., Hammill, A. and McLeman, R., 2007. Climate change as the 'new' security threat: implications for Africa. *International Affairs*, 83(6), pp.1141-1154.

Brugnach, M. and Ingram, H., 2011. Rethinking the role of humans in water management: toward a new model of decision-making. In B.R. Johnson, L. Hiwasaki, I.J. Klaver, A. Ramos Castillo and V. Strang, eds, *Water, Cultural Diversity, and Global Environmental Change*. Springer Netherlands.

Bryman, A., 2012. *Social Research Methods*. OUP Oxford.

Business Tech 2016. Corruption seeps into South Africa's R26 billion water project. 10 July

Butterworth, J., Warner, J., Moriarty, P. and Batchelor, C., 2010. Local approaches to integrated water resources management. *Water Alternatives*, 3(1), p.68.

Buytaert, W., Dewulf, A., De Bièvre, B., Clark, J. and Hannah, D.M., 2016. Citizen science for water resources management: toward polycentric monitoring and governance?

Carter, N., 2001. *The Politics of the Environment: Ideas, activism, policy*. Cambridge University Press.

Chen, Y., Zhang, D., Sun, Y., Liu, X., Wang, N. and Savenije, H.H., 2005. Water demand management: a case study of the Heihe River Basin in China. *Physics and Chemistry of the Earth, Parts A/B/C*, 30(6), pp.408-419.

Cheserek, G., 2005. Indigenous knowledge in water and watershed management: 'Marakwet' conservation strategies and techniques. *FWU Water Resources Publications*, 3, pp.25-33.

Chikozho, C., 2005. Policy and institutional dimensions of small-holder farmer innovations in the Thukela River Basin of South Africa and the Pangani River Basin of Tanzania: a comparative perspective. *Physics and Chemistry of the Earth, Parts A/B/C*, 30(11), pp.913-924.

Clegg, S.R. and Haugaard, M., eds., 2009. *The Sage Handbook of Power*. Sage.

Collier, P., Conway, G. and Venables, T., 2008. Climate change and Africa. *Oxford Review of Economic Policy*, 24(2), pp.337-353.

Collier, P., Conway, G. and Venables, T., 2008. Climate change and Africa. *Oxford Review of Economic Policy*, 24(2), pp.337-353.

Conde, C., Ferrer, R. and Orozco, S., 2006. Climate change and climate variability impacts on rainfed agricultural activities and possible adaptation measures. A Mexican case study. *Atmósfera*, 19(3), pp.181-194.

Conde, C., Ferrer, R. and Orozco, S., 2006. Climate change and climate variability impacts on rainfed agricultural activities and possible adaptation measures. A Mexican case study. *Atmósfera*, 19(3), pp.181-194.

Crabtree, B.F. and Miller, W.L., eds., 1999. *Doing Qualitative Research*. Sage Publications.

Crais, C., 2011. *Poverty, War, and Violence in South Africa*. Cambridge University Press.

Crenson, M.A., 1971. *The Un-Politics of Air Pollution: A study of non-decision-making in the cities*. Johns Hopkins Press.

Creswell, J.W., Klassen, A.C., Plano Clark, V.L. and Smith, K.C., 2011. Best practices for mixed methods research in the health sciences. *Bethesda (Maryland): National Institutes of Health*, pp.2094-2103.

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

Danovich, T. 2016. The South African Drought Goes From Bad to Worse If you are a Black Farmer. Take Part. 1 November.

De Boer, C., Vinke-de Kruijf, J., Özerol, G. and Bressers, H.T.A., eds., 2013. *Water Governance, Policy and Knowledge Transfer: international studies on contextual water management*. Routledge.

- Devereux, S. and Maxwell, S., 2001. *Food Security in Sub-Saharan Africa*. ITDG Publishing.
- Dinar, A., Albiac, J. and Sánchez-Soriano, J. eds., 2008. *Game Theory and Policy Making in Natural Resources and the Environment* (Vol. 10). Routledge.
- Dombrowsky, I., 2010. The role of intra-water sector issue linkage in the resolution of transboundary water conflicts. *Water International*, 35(2), pp.132-149.
- Doyle, T., McEachern, D. and MacGregor, S., 2015. *Environment and Politics*. Routledge.
- Dugard, J., 2010. Civic action and legal mobilisation: the Phiri water meters case. In J. Handmaker and R. Berkhout, eds, *Mobilising Social Justice in South Africa: Perspectives from researchers and practitioners*. Pretoria University Law Press.
- Ekers, M. and Loftus, A., 2008. The power of water: developing dialogues between Foucault and Gramsci. *Environment and Planning D: Society and Space*, 26(4), pp.698-718.
- Emmett, T. and Hagg, G., 2001. Politics of water management: The case of the Orange River development project. In M.M. Khosa, ed., *Empowerment through economic transformation*. Africa Millennium Press, Durban.
- Eppel, E., 2014. Governance of a Complex System: Water. *Institute for Governance and Policy Studies Working Paper*, 14(01).
- Falkenmark, M., Berntell, A., Jägerskog, A., Lundqvist, J., Matz, M. and Tropp, H., 2007. *On the Verge of a New Water Scarcity: A call for good governance and human ingenuity*. Stockholm International Water Institute (SIWI).
- Farmers Weekly 2015, Managing for drought Conditions. July.
- Farmers Weekly, 2015
- Farrimond, H., 2012. *Doing Ethical Research*. Palgrave Macmillan.
- Fauchereau, N., Trzaska, S., Rouault, M. and Richard, Y., 2003. Rainfall variability and changes in southern Africa during the 20th century in the global warming context. *Natural Hazards*, 29(2), pp.139-154.

Förster, J.J., Downsborough, L. and Chomba, M.J., 2017. When policy hits practice: structure, agency, and power in South African water governance. *Society and Natural Resources*, 30(4), pp.521-536.

Forsyth, T., 2004. *Critical political ecology: the politics of environmental science*. Routledge.

Fort, M.P., Mercer, M.A. and Gish, O., 2004. *Sickness and Wealth: The corporate assault on global health*. South End Press.

Foucault, M., 1980. In C. Gordon, ed., *Power/Knowledge: Selected interviews and other writings 1972-1977*. Pantheon Books.

Foucault, M., 1991. *The Foucault Effect: Studies in governmentality*. University of Chicago Press.

Funke, N., Nortje, K., Findlater, K., Burns, M., Turton, A., Weaver, A. and Hattingh, H., 2007. Redressing inequality: South Africa's new water policy. *Environment: Science and Policy for Sustainable Development*, 49(3), pp.10-23.

Fusch, P.I. and Ness, L.R., 2015. Are we there yet? Data saturation in qualitative research. *The Qualitative Report*, 20(9), p.1408.

Galvin, M., 2016. Leaving boxes behind: civil society and water and sanitation struggles in Durban, South Africa. *Transformation: Critical Perspectives on Southern Africa*, 92(1), pp.111-134

Gardner, R., Ostrom, E. and Walker, J.M., 1990. The nature of common-pool resource problems. *Rationality and Society*, 2(3), pp.335-358.

Gaventa, J., 1980. Power and powerlessness. *Urbana: University of Illinois Press*, 36, pp.1-27.

Gaventa, J., 2006. Finding the spaces for change: a power analysis. *IDS Bulletin*, 37(6), pp.23-33.

Giglioli, I. and Swyngedouw, E., 2008. Let's drink to the great thirst! Water and the politics of fractured techno-natures in Sicily. *International Journal of Urban and Regional Research*, 32(2), pp.392-414.

Gleick, P.H., 2014. Institute. P., Ajami, N., Christian-Smith, J., Cooley, H., Donnelly, K., Fulton, J., Ha, M.-H., Heberger, M., Moore, E., et al.

- Gough, D., Thomas, J. and Oliver, S., 2012. Clarifying differences between review designs and methods. *Systematic Reviews*, 1(1), p.28.
- Gray, D.E., 2013. *Doing Research in the Real World*. Sage Publications.
- Hansen, V. and Curtis, K.R., 2012. *Voyages in World History, Volume II, Brief*. Cengage Learning.
- Hay D, Breen,C & Nkhata B, 2014. Securing the Water Resources of the UMngeni River
- Hayward, C. and Lukes, S., 2008. Nobody to shoot? Power, structure, and agency: a dialogue. *Journal of Power*, 1(1), pp.5-20.
- Hechter, M. and Horne, C., 2003. *Theories of Social Order: A reader*. Stanford University Press.
- Hemson, D. and Dube, B., 2004. Water services and public health: the 2000-01 cholera outbreak in KwaZulu-Natal, South Africa.
- Holling, C.S., 2001. Understanding the complexity of economic, ecological, and social systems. *Ecosystems*, 4(5), pp.390-405.
- Howitt, R.E. and Vaux, H., 1995. Competing demands for California's scarce water. In A. DinarandE.T. Loehman,eds., *Water Quantity/Quality Management and Conflict Resolution*. PraegerPublishers.
- Hudson, J. and Lowe, S., 2009. *Understanding the Policy Process: Analysing welfare policy and practice*. Policy Press.
- Iloka, N.G., 2016. Indigenous knowledge for disaster risk reduction: an African perspective: original research. *Jàmbá: Journal of Disaster Risk Studies*, 8(1), pp.1-7.
- Innes, J.E. and Booher, D.E., 2003. Collaborative policymaking: governance through dialogue. *Deliberative policy analysis: Understanding governance in the network society*, pp.33-59.
- Jankielsohn, R., 2012. Defining hydropolitics: the politics of water in South Africa. *Journal for Contemporary History*, 37(1), pp.123-141.
- Jarzabkowski, P. and Whittington, R., 2008. A strategy-as-practice approach to strategy research and education. *Journal of Management Inquiry*, 17(4), pp.282-286.

- Kaika, M., 2006. The political ecology of water scarcity: the 1989–1991 Athenian drought. In N.C. Heynen, M. Kaika and E. Swyngedouw, eds, *In the Nature of Cities: Urban political ecology and the politics of urban metabolism*. Taylor and Francis.
- Kailene, P. 2016. Water wars hit boiling point. *The Witness*. 23 June
- Kalin, M., 2006. *Hidden Pharaohs: Egypt, engineers and the modern hydraulic* (Doctoral dissertation, University of Oxford).
- Kane, R.P., 2009. Periodicities, ENSO effects and trends of some South African rainfall series: an update. *South African Journal of Science*, 105(5-6), pp.199-207.
- Karar, E., 2003. Governance in water resources management: progress in South Africa. In F.R. Marseille, *3rd World Water Forum, at Kyoto, Shiga and Osaka, Japan*. Secretariat of the 3rd Water Forum.
- Krueger, R.A., 2014. *Focus Groups: A practical guide for applied research*. Sage Publications.
- Lahsen, M., 2005. Technocracy, democracy, and US climate politics: the need for demarcations. *Science, Technology, & Human Values*, 30(1), pp.137-169.
- Landie, C., 2016. South Africa's water supply status: water boards. *Water and Sanitation Africa*, 11(3), pp.58-60.
- Lautze, J., De Silva, S., Giordano, M. and Sanford, L., 2011. Putting the cart before the horse: water governance and IWRM. In *Natural Resources Forum* 35(1), pp.1-8.
- Leyveld, J. 1983. In South African Drought, blacks are hardest hit. *New York Times*, 18 May.
- Lincoln, Y.S. and Denzin, N.K., 2000. The seventh moment: out of the past. In N. K. Denzin and Y.S. Lincoln, eds, *Handbook of Qualitative Research*, 2nd edn. Sage Publications.
- Lincoln, Y.S. and Guba, E.G., 1985. *Naturalistic Inquiry*, Vol. 75. Sage Publications.
- Lindblom, C.E., 1982. Politics and markets.
- Loftus, A., 2009. Rethinking political ecologies of water. *Third World Quarterly*, 30(5), pp.953-968.

- Lorimer, B., 2012. Some, for all, forever: a case study of participation in water management in South Africa's Umgeni river catchment.
- Lotz-Sisitka, H. and Burt, J., 2006. *A Critical Review of Participatory Practice in Integrated Water Resource Management*. Water Research Commission, Pretoria.
- Louw, D.B. and van Schalkwyk, H.D., 2000. Water markets an alternative for central water allocation?. *Agrekon*, 39(4), pp.484-494.
- Ludwig, E., 1947, 1881. *The Nile; The Life-Story of a River*. Trans. M.H. Lindsay. Garden City Publishing.
- Lukes, S., 1986. *Power*. NYU Press.
- Lukes, S., 2005. Power and the battle for hearts and minds. *Millennium*, 33(3), pp.477-493.
- Magudhla, T 2017 Command economy model unsuitable, Zimbabwe Independent, 21 March.
- Mahlangu, M. and Garutsa, T.C., 2014. Application of indigenous knowledge systems in water conservation and management: the case of Khambashe, Eastern Cape South Africa. *Academic Journal of Interdisciplinary Studies*, 3(4), p.151.
- Mallett, R., Hagen-Zanker, J., Slater, R. and Duvendack, M., 2012. The benefits and challenges of using systematic reviews in international development research. *Journal of Development Effectiveness*, 4(3), pp.445-455.
- Mann, M., 2012. *The Sources of Social Power: Volume 3, global empires and revolution, 1890-1945, Vol. 3*. Cambridge University Press.
- McCalla-Chen, D., 2000. Towards an understanding of the concept of non-decision making and its manifestation in the school sector. *Educational Management & Administration*, 28(1), pp.33-46.
- McDonald, D.A., 2004. *Environmental Justice in South Africa*. Juta and Company Ltd.
- McMaken, R. 2013 Water Subsidies and Shortages in the American West, MISES Daily articles
- Mehta, L., 2001. Water, difference and power: unpacking notions of water "users" in Kutch, India. *International Journal of Water*, 1(3-4), pp.324-342.

- Meijerink, S., 2009. *Water Policy Entrepreneurs: A research companion to water transitions around the globe*. Edward Elgar Publishing.
- Meissner, R., 2015. *Interest groups, water politics and governance: The case of the Lesotho highlands water project*. Springer.
- Méndez-Barrientos, L.E., Kemerink, J.S., Wester, P. and Molle, F., 2016. Commercial farmers' strategies to control water resources in South Africa: an empirical view of reform. *International Journal of Water Resources Development*, pp.1-14.
- Merquior, J.G., 1980. *Rousseau and Weber: Two studies in the theory of legitimacy*. Routledge/Thoemms Press.
- Mills, C.W., 2000. *The Power Elite, Vol. 20*. Oxford University Press.
- Minch, M., 2011. Political Ecology. In D.K. Chatterjee, ed., *Encyclopedia of Global Justice*. Springer Netherlands.
- Mirumachi, N. and Allan, J.A., 2007, November. Revisiting transboundary water governance: power, conflict cooperation and the political economy. In *International Conference on Adaptive and Integrated Water Management*.
- Mofolo, T., 1981. Chaka, trans. Daniel P. Kunene. *Oxford: Heinemann, 1931*, p.48.
- Mofolo, T., 1981. *Chaka: a new translation of the famous novel*. Trans. Daniel P. Kunene. Heinemann.
- Molle, F., 2008. Why enough is never enough: the societal determinants of river basin closure. *International Journal of Water Resources Development*, 24(2), pp.217-226.
- Mollinga, P.P., 2008. Water policy-water politics. In W. Scheumann, S Neubert and M Kipping, eds, *Water Politics and Development Cooperation*. Springer Berlin Heidelberg.
- Molobela, I.P. and Sinha, P., 2011. Management of water resources in South Africa: a review. *African Journal of Environmental Science and Technology*, 5(12), pp.993-1002.
- Movik, S., 2009. The dynamics and discourses of water allocation reform in South Africa. STEPS working paper 21, STEPS.

- Movik, S., 2014. A fair share? Perceptions of justice in South Africa's water allocation reform policy. *Geoforum*, 54, pp.187-195.
- Muller, M 2016. South Africa's water sector:a case study in state capture.The conversation,01 December.
- N.a Why water war has broken out in India's Silicon's Valley [online]. London BBC <http://www.bbc.com/news/world-asia-india-37346570>
- Nare, L., Love, D. and Hoko, Z., 2006. Involvement of stakeholders in the water quality monitoring and surveillance system: the case of Mzingwane Catchment, Zimbabwe. *Physics and Chemistry of the Earth, Parts A/B/C*, 31(15), pp.707-712.
- Narsiah, S., 2008. Discourses of privatisation: the case of South Africa's water sector. *Development Southern Africa*, 25(1), pp.21-35.
- Nel, W., 2009. Rainfall trends in the KwaZulu- Natal Drakensberg region of South Africa during the twentieth century. *International Journal of Climatology*, 29(11), pp.1634-1641.
- Nicholson, S.E., 2001. Climatic and environmental change in Africa during the last two centuries. *Climate Research*, 17(2), pp.123-144.
- Nieuwoudt, W.L., Backeberg, G.R. and Du Plessis, H.M., 2004. The value of water in the South African economy: some implications. *Agrekon*, 43(2), pp.162-183.
- Nordås, R. and Gleditsch, N.P., 2007. Climate change and conflict. *Political Geography*, 26(6), pp.627-638.
- Onwuegbuzie, A.J. and Leech, N.L., 2007. Validity and qualitative research: an oxymoron? *Quality & Quantity*, 41(2), pp.233-249.
- Osborne, M., 2004. *River at Risk: The Mekong and water politics of China and Southeast Asia*. Longueville Media.
- Ostrom, E., 2010. Beyond markets and states: polycentric governance of complex economic systems. *Transnational Corporations Review*, 2(2), pp.1-12.
- Pareto, V., 1971. *Manual of Political Economy*. Macmillan.
- Parsons, T., 1963. On the concept of political power. *Proceedings of the American Philosophical Society*, 107(3), pp.232-262.

Pearce, J.A. and Robinson, R.B., 1987. A measure of CEO social power in strategic decision- making. *Strategic Management Journal*, 8(3), pp.297-304.

Pittock, J., 2009. Lessons for climate change adaptation from better management of rivers. *Climate and Development*, 1(3), pp.194-211.

Platt, J., 1985. Weber's verstehen and the history of qualitative research: the missing link. *British Journal of Sociology*, pp.448-466.

Pollard, S. and 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), pp.671-679.

Postel, S.L., 2000. Entering an era of water scarcity: the challenges ahead. *Ecological Applications*, 10(4), pp.941-948.

Prell, C., Hubacek, K. and Reed, M., 2009. Stakeholder analysis and social network analysis in natural resource management. *Society and Natural Resources*, 22(6), pp.501-518.

Pretty, J., 2003. Social capital and the collective management of resources. *Science*, 302(5652), pp.1912-1914.

Pulwarty, R.S. and Sivakumar, M.V., 2014. Information systems in a changing climate: early warnings and drought risk management. *Weather and Climate Extremes*, 3, pp.14-21.

Quandt, A., 2016. Towards integrating political ecology into resilience-based management. *Resources*, 5(4), p.31.

Reed, M.S., Graves, A., Dandy, N., Posthumus, H., Hubacek, K., Morris, J., Prell, C., Quinn, C.H. and Stringer, L.C., 2009. Who's in and why? A typology of stakeholder analysis methods for natural resource management. *Journal of Environmental Management*, 90(5), pp.1933-1949.

Rifai, F., 2008. Impact of collaboration in the Euphrates Tigris region. PDF available at <http://www.inbo-news.org/IMG/pdf/rifai.pdf>.

Ritchie, J. and Spencer, L., 2002. Qualitative data analysis for applied policy research. *The Qualitative Researcher's Companion*, 573, pp.305-329.

- Robbins, P., 2011. *Political Ecology: A critical introduction*, Vol. 16. John Wiley & Sons.
- Rogers, P. and Hall, A.W., 2003. *Effective Water Governance*, Vol. 7. Global Water Partnership.
- Rolfe, G., 2006. Validity, trustworthiness and rigour: quality and the idea of qualitative research. *Journal of Advanced Nursing*, 53(3), pp.304-310.
- Rossi, G., 2015. Achieving ethical responsibilities in water management: A challenge. *Agricultural Water Management*, 147, pp.96-102.
- Rubin, H.J. and Rubin, I.S., 2011. *Qualitative Interviewing: The art of hearing data*. Sage Publications.
- Sadoff, C.W. and Grey, D., 2005. Cooperation on international rivers: a continuum for securing and sharing benefits. *Water International*, 30(4), pp.420-427.
- Sadoff, C.W. and Grey, D., 2005. Cooperation on international rivers: A continuum for securing and sharing benefits. *Water International*, 30(4), pp.420-427.
- Schneider, K. South Africa Coal Projects Collide With Water Scarcity, Financial Turmoil. Yale Environment 360.21 March
- Schreiner, B. and Hassan, R., eds., 2010. *Transforming Water Management in South Africa: Designing and implementing a new policy framework*, Vol. 2. Springer Science & Business Media.
- Selby, J., 2007. Joint mismanagement: reappraising the Oslo water regime. In H. Shuval and H. Dweik, eds., *Water Resources in the Middle East*. Springer Berlin Heidelberg.
- Silverman, D., 2000. *Doing qualitative research: a practical guide*. Sage Publications.
- Silvertown, J., 2009. A new dawn for citizen science. *Trends in Ecology & Evolution*, 24(9), pp.467-471.
- Simon, H., 1991. Bounded rationality and organizational learning. *Organization Science*, 2(1), pp.125-34.
- Sloan, L. and Quan-Haase, A., eds., 2017. *The SAGE Handbook of Social Media Research Methods*. Sage Publications.

- Stott, P.A. and Sullivan, S., 2000. Political ecology: science, myth and power.
- Sultana, F. and Loftus, A., eds., 2013. *The Right to Water: Politics, governance and social struggles*. Routledge.
- Swatuk, L., 2010. The state and water resources development: a tale of two South Africas. *Water Alternatives*, 3(3), p.521.
- Swatuk, L.A., 2005. Political challenges to sustainably managing intra-basin water resources in Southern Africa: drawing lessons from cases. In L. Wirkis, ed., *Water, Development and Cooperation—Comparative Perspective: Euphrates-Tigris and Southern Africa*. Bonn International Centre for Conservation.
- Swyngedouw, E., 2000. Authoritarian governance, power, and the politics of rescaling. *Environment and Planning D: Society and space*, 18(1), pp.63-76.
- Swyngedouw, E., 2009. The political economy and political ecology of the hydro- social cycle. *Journal of Contemporary Water Research & Education*, 142(1), pp.56-60.
- Tewari, D.D., 2009. A detailed analysis of evolution of water rights in South Africa: an account of three and a half centuries from 1652 AD to present. *Water SA*, 35(5), pp.693-710.
- Trombetta, M.J., 2008. Environmental security and climate change: analysing the discourse. *Cambridge Review of International Affairs*, 21(4), pp.585-602.
- Truelove, Y., 2011. (Re-)Conceptualizing water inequality in Delhi, India through a feminist political ecology framework. *Geoforum*, 42(2), pp.143-152.
- Turton, A. and Funke, N., 2008. Hydro-hegemony in the context of the Orange River Basin. *Water Policy*, 10(S2), pp.51-69.
- Turton, A. and Henwood R., eds., 2002. *Hydropolitics in the Developing World: A Southern African perspective*. IWMI.
- Turton, A. and Meissner, R., 2002. The hydrosocial contract and its manifestation in society: a South African case study. In A. Turton and R. Henwood, eds, *Hydropolitics in the Developing World: A Southern African perspective*. IWMI.

Turton, A. and Ohlsson, L., 1999. *Water Scarcity and Social Stability: Towards a deeper understanding of the key concepts needed to manage water scarcity in developing countries*. Publisher not identified.

Turton, A.R., 2000. Precipitation, people, pipelines and power in southern Africa: towards a "virtual water"-based political ecology discourse. In...

U.N., 2006. *Water, A Shared Responsibility*. The United Nations World Water Development Report 2.

van Ast, J.A. and Gerrits, L., 2017. Public participation, experts and expert knowledge in water management in the Netherlands. *Water Policy*, 19(1), pp.115-127.

van der Zaag, P., 2005. Integrated water resources management: relevant concept or irrelevant buzzword? A capacity building and research agenda for Southern Africa. *Physics and Chemistry of the Earth, Parts A/B/C*, 30(11), pp.867-871.

van Iterson, A. and Clegg, S.R., 2008. The politics of gossip and denial in interorganizational relations. *Human Relations*, 61(8), pp.1117-1137.

van Koppen, B. and Schreiner, B., 2014. Moving beyond integrated water resource management: developmental water management in South Africa. *International Journal of Water Resources Development*, 30(3), pp.543-558.

Van Teijlingen, E.R. and Hundley, V., 2004. Pilot study. In M. Lewis-Beck, A. Bryman, & T. Liao, eds, *The SAGE Encyclopedia of Social Science Research Methods*, pp.824-825. Sage Publications.

Walker, W.R., Hrezo, M.S. and Haley, C.J., 1991. Management of water resources for drought conditions. *US Geological Survey Water-Supply Paper*, 2375, pp.1988-89.

Wallace, J.S., Acreman, M.C. and Sullivan, C.A., 2003. The sharing of water between society and ecosystems: from conflict to catchment-based co-management. *Philosophical Transactions of the Royal Society of London B: Biological Sciences*, 358(1440), pp.2011-2026.

Walmsley, J.J., 1995. Market forces and the management of water for the environment. *WATER SA-PRETORIA*-, 21, pp.43-43.

Warner, J., 2007. The beauty of the beast: multi-stakeholder participation for integrated catchment management. *Multi-Stakeholder Platforms for Integrated Water Management*, pp.1-19.

Water News 2015, No water for days.

Weber, M., 1978. The distribution of power within the political community: class, status, party. *Economy and Society*, 2, pp.926-940.

Wegerich, K., Warnerb, J. and Tortajadac, C., 2014. The dark side of governance an introduction to the Special Issue. *International Journal of Water*, 2, pp.1-6.

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

Wilhite, D.A., Sivakumar, M.V. and Pulwarty, R., 2014. Managing drought risk in a changing climate: the role of national drought policy. *Weather and Climate Extremes*, 3, pp.4-13.

Wittfogel, K.A., 1957. *Oriental Despotism: A study of total power*. Yale UP.

Wittfogel, K.A., 1959. *Food and society in China and India: Human nutrition, historic and scientific*.

Worster, D., 1982. Hydraulic society in California: an ecological interpretation. *Agricultural History*, 56(3), pp.503-515.

Worster, D., 2004. *Dust Bowl: The southern plains in the 1930s*. Oxford University Press.

Xiao-jun, W., Jian-yun, Z., Shahid, S., ElMahdi, A., Rui-min, H., Zhen-xin, B. and Ali, M., 2012. Water resources management strategy for adaptation to droughts in China. *Mitigation and Adaptation Strategies for Global Change*, 17(8), pp.923-937.

Yimer, M., 2015. The Nile Hydro Politics; A Historic Power Shift. *Inter J Polit Sci Develop*, 3, pp.101-107.

Zeitoun, M. and Jagerskog, A., 2011. Addressing power asymmetry: how transboundary water management may serve to reduce poverty.

Zeitoun, M. and Warner, J., 2006. Hydro-hegemony – a framework for analysis of trans-boundary water conflicts. *Water Policy*, 8(5), pp.435-460.

Zeitoun, M., Mirumachi, N. and Warner, J., 2011. Transboundary water interaction II: the influence of 'soft' power. *International Environmental Agreements: Politics, Law and Economics*, 11(2), pp.159-178.

Zimmer, A., 2010. Urban political ecology: Theoretical concepts, challenges, and suggested future directions. *Erdkunde*, pp.343-354.

Zimmerer, K.S. and Bassett, T.J., eds., 2003. *Political Ecology: An integrative approach to geography and environment-development studies*. Guilford Press.

ANNEX A: CONSENT FORM



MONASH University

CONSENT FORM

Project Title: The nexus of drought and power dynamics in water governance:
The case of the Umgeni catchment area

Chief Investigator: Dr Fay Hodza

I have been asked to take part in the Monash University research project specified above. I have read and understood the explanatory statement and I hereby consent to participate in this project.

I consent to the following:	Yes	No
I have received sufficient information about the study for me to decide whether to take part or not.	<input type="checkbox"/>	<input type="checkbox"/>
Audio recording during the interview.	<input type="checkbox"/>	<input type="checkbox"/>
All information arising from the study will be treated as confidential.	<input type="checkbox"/>	<input type="checkbox"/>
Quotations from the interview can be used in the final research report and other publications. I understand that these will be used anonymously and that no individual respondent will be identified in such a report.	<input type="checkbox"/>	<input type="checkbox"/>
The data that I provide during this research may be used in future research projects	<input type="checkbox"/>	<input type="checkbox"/>
There will be no payment or reward offered for participation in the research.	<input type="checkbox"/>	<input type="checkbox"/>

Name of Participant _____

Participant Signature _____ Date _____

ANNEX B: EXPLANATORY STATEMENT



MONASH University

EXPLANATORY STATEMENT

Project Title: The nexus of drought and power dynamics in water governance: The case of Umgeni catchment area

Group 1-

Chief Investigator's name: Dr. Fay Hodza

Department of Social Sciences

Phone: [REDACTED]

email: [REDACTED]

Student's name: Hlengiwe Dube

Phone: [REDACTED]

[REDACTED]

[REDACTED]

Project Number: 01

You are invited to take part in this study. Please read this explanatory statement in full before deciding whether or not to participate in this research. If you would like further information regarding any aspect of this project, you are encouraged to contact the researchers via the phone numbers or email addresses listed above.

What does the research involve?

The aim of the research to discuss nexus of drought and power dynamics in water governance in Umgeni.

What will the participants be asked to do, and how much time it will take?

Participants are requested to first of all read and understand the explanatory statement and then sign a consent form in accordance with Monash Ethical Clearance regulations. Participants will then be interviewed for approximately one hour. The interviews will be semi-structured.

Why were you chosen for this research?

Participants were chosen because of their stakeholder positions in organisations that participate in decision making in water management policies.

What does consenting to participate in the project and withdrawing from the research mean?

Participation in this study is voluntary. Participants may withdraw at any stage without disclosing the reason of their decision to withdraw, and participants may avoid answering questions that they are not comfortable with. A decision to withdraw will not disadvantage participants in any way. Participants willing to participate in this study will be requested to sign a consent form and hand it back to the interviewer.

What are the possible benefits and risks to the participants?

Participation in this research may provide the following benefits: contribution to a sense of purpose in management issues on transboundary hydro-politics and water security.

Risk is the potential for a negative outcome or effect of the research. Risks to which participants may be exposed to can be classified as physical, psychological, social economic and reputation risks. There is, however, no anticipation of all the above-mentioned risks as the research is a “low risk” project.

Will I receive payment?

Participation in this research will be entirely voluntary.

Will confidentiality be ensured?

All aspects of the study, including results, will be completely confidential. All reference to the respondents in the transcribed interview notes will be anonymous. No findings will identify any individual.

How will data be stored?

All data will be stored in secure places. For example, all hard documents will be stored in a locked filing cabinet while soft documents will be stored in a password-controlled computer. Data will only be disposed of after at least five years.

Will the data be used for other purposes?

The data will be used only for the purpose of the research.

Can I find out about the results?

If you would like to be informed of the aggregate research finding, please contact Hlengiwe Dube on: +[redacted] or email [redacted]

What if I have any complaints?

Should you have any concerns or complaints about the conduct of the project, you are welcome to contact the Research Coordinator at MSA Office:

Ms Hester Stols,

Monash South Africa

[redacted]

[redacted]

Phone: [redacted]

Email: [redacted]

Thank you

Chief Investigator's name: Dr. Fay Hodza

ANNEX C: INTERVIEW QUESTIONS

Guiding questions for semi-structured interviews with water management stakeholders in the Umgeni Water Management System.

Preliminaries (introduction)

Thank you very much for taking time off your busy schedule to be available for interview. My name is Hlengiwe Dube; I am Master of Philosophy student in Integrated Water Management at Monash University, South Africa. Today, as scheduled, I am going to ask you to share the knowledge that you have on politics and power dynamics in the management of water resources under drought conditions. Your responses will make a significant contribution to my research by helping to explain how power dynamics and politics affect drought mitigation plans. We will discuss how different stakeholders use various forms of power and politics that affect drought management strategies and policies.

Before we commence with the interview, I will kindly ask you to go through the consent form fill it in, sign and hand it back to me.

1. Please tell me about yourself and the role you play in your organisation.
2. What role does your organisation play in mapping out drought policies?
3. How do you channel drought mitigation suggestions?
4. Which other stakeholders in Umgeni Water Management participate in drought formulation plans?
5. Can you share with me the relationship between different drought management stakeholders in the Umgeni?
6. Can you share with me some of the drought mitigation plans that you have suggested in 2015?
7. Have your suggestions ever been contested by any of the other stakeholders?
8. If so, what has been the basis of their arguments?
9. How do you ensure that decisions you suggest are taken on board?

Ending remarks

(Summary)

You are very involved and well informed in this subject. You say that Your organisation plays role in mapping up drought policies. You also say that other stakeholders who participate in these decisions are.....You also mention thatstakeholder is more influential because of.....

I appreciate the time you took for this interview, given your busy schedule. Is there anything else you think I should know about power dynamics in the water management system in the Umgeni?

ANNEX D: ETHICS CERTIFICATE
