The South African regulatory framework for urban drought risk management

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ABSTRACT

Droughts are complicated natural occurrences that can severely impact communities and ecosystems worldwide. Several urban and rural communities across South Africa have suffered prolonged periods of drought, the most often referred to example being the 2015-2018 Cape Town drought. While Cape Town managed to lower the city's water consumption-levels to avoid the threat of "Day Zero", other urban areas such as Nelson Mandela Bay continue to struggle with severe drought conditions that cause harm to the people of the area, the surrounding environment and state infrastructure.

A chapter in this study focuses on Nelson Mandela Bay. As its drought exacerbates the pressure placed on potable water supply, the community's constitutional right of access to water becomes threatened. The Nelson Mandela Bay Municipality must cooperate with the other spheres of government to mitigate the impact of drought on the city. To ensure that the relevant spheres of government deal with the drought accordingly, the laws and policies applicable to drought risk management, as extensively explored in this study, should incorporate the three internationally recognised pillars of drought risk management. These pillars serve as a meaningful lens for government to analyse how its laws and policies can properly provide for urban drought risk management. Urban drought risk management in a nutshell refers to the tools and strategies used by key role-players to mitigate the effect of drought in urban areas.

This study shows that existing South African law and policy provides for urban drought risk management to an extent. This follows an exploration of four areas of law that were identified to apply to urban drought risk management, namely: local government, disaster risk, environmental, and water law. As alluded to above, the study utilised the Nelson Mandela Bay Municipality as a case study to determine if and how this drought-stricken municipality provides for urban drought risk management.

Key words: Urban drought risk management; urban areas; local government law; water law; environmental law; Nelson Mandela Bay Municipality; South Africa.

OPSOMMING

Droogtes is ingewikkelde natuurlike gebeurtenisse wat gemeenskappe en ekosisteme wêreldwyd ernstig kan beïnvloed. Verskeie stedelike en landelike gemeenskappe regoor Suid-Afrika het lang tydperke van droogtes gely, met die droogte in Kaapstad van 2015-2018 waarna die meeste na verwys. Terwyl Kaapstad daarin geslaag het om die stad se waterverbruikvlakke te verlaag om die bedreiging van "Dag Zero" te vermy, sukkel ander stedelike gebiede soos Nelson Mandelabaai steeds met erge droogtetoestande wat skade aan die mense van die gebied, die omliggende omgewing en staatsinfrastruktuur veroorsaak.

'n Hoofstuk in hierdie studie fokus op Nelson Mandelabaai. Aangesien die droogte die druk wat op drinkbare water voorsiening geplaas word, vererger, word die gemeenskap se grondwetlike reg op toegang tot water bedreig. Die Nelson Mandelabaai-munisipaliteit moet saam met die ander regeringsfere werk om die impak van droogte op die munisipaliteit te versag. Om te verseker dat die betrokke sfere van die regering die droogte dienooreenkomstig hanteer, moet die wette en beleide van toepassing op droogterisikobestuur, soos omvattend in hierdie studie ondersoek is, die drie internasionaal erkende pilare van droogterisikobestuur insluit. Hierdie pilare dien as 'n sinvolle lens vir die regering om te ontleed hoe sy wette en beleide behoorlik vir stedelike droogterisikobestuur voorsiening kan maak. Stedelike droogterisikobestuur in 'n neutedop verwys na die gereedskap en strategieë wat deur sleutelrolspelers gebruik word om die uitwerking van droogte in stedelike gebiede te versag.

Hierdie studie toon dat bestaande Suid-Afrikaanse wetgewing en beleide tot 'n mate voorsiening maak vir stedelike droogterisikobestuur. Dit volg op 'n verkenning van vier gebiede van die reg wat geïdentifiseer is om op stedelike droogterisikobestuur van toepassing te wees, spesifiek: plaaslike regering, ramprisiko, omgewings- en waterwetgewing. Soos bo aangedui, het hierdie studie die Nelson Mandelabaai-munisipaliteit as 'n gevallestudie gebruik om te bepaal of en hoe hierdie droogtegeteisterde munisipaliteit vir stedelike droogterisikobestuur voorsiening maak.

Sleutelwoorde: Stedelike droogterisikobestuur; stedelike gebiede; plaaslike regeringswetgewing; waterreg; omgewingsreg; Nelson Mandelabaai-munisipaliteit; Suid Afrika.

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All views, findings, errors, and omissions remain that of the researcher. KAS and the NRF do not accept any liability with regard to this study.

The research for this dissertation was completed on the 14th of November 2023. The study reflects the legal position in South Africa as up to this date.

TOEWYDING

Ter nagedagtenis aan my Oupa, Gert Steyn. (1930 – 2008)

Streekhofpresident van die Oos-Kaap (1981 – 1990)

Lid van Goldstone-kommissie (1991 – 1994)

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LIST OF ABBREVIATIONS

AARES	The Australian Journal of Agricultural and Resource Economics
Change Biol	Global Change Biology
CINT	*Contexto Internacional*
Clim Res	Climate Research
CTMM	City of Tshwane Metropolitan Municipality
DMA	Disaster Management Act 57 of 2002
DMP	Drought Management Plan (2005)
DRAMP	Drought Resilience, Adaptation and Management Policy
EIA	Environmental impact assessment
ERM	Enterprise Risk Management Policy
ESP	Environmental Sustainability Policy
ENSO	El Niño-southern oscillation
GAR	Global Assessment Report
IDP	Integrated Development Plan
IPCC	Intergovernmental Panel on Climate Change
JGR Atmospheres	Journal of Geophysical Research: Atmospheres
MDMC	Municipal Disaster Management Centre
MSA	Local Government: Municipal Systems Act 32 of 2000

MFMA	Local Government: Municipal Finance Management Act 56 of 2003
NAP DLDD	The Second National Action Programme for South Africa to Combat Desertification, Land Degradation and the Effects of Drought (2018-2030)
NASA	National Aeronautics and Space Administration
NCCAS	National Climate Change Adaptation Strategy
NDMC	National Disaster Management Centre
NDMF	National Disaster Management Framework
NEMA	National Environmental Management Act 107 of 1998
NIWIS	National Integrated Water Information System
NJDCC	National Joint Drought Coordinating Committee
NMBM	Nelson Mandela Bay Municipality
NMBM IDP	Nelson Mandela Bay Municipality Integrated Development Plan
NWRS-3	National Water Resource Strategy 3
NWA	National Water Act 36 of 1998
NWSMP	National Water and Sanitation Master Plan (2018)
Pure Appl. Geophys	Pure and Applied Geophysics
SADC DRIMMS	Southern African Development Community's document on Drought Risk Management and Mitigation Strategy (2022)
SAJIM	South African Journal of Information Management

SAPL	Southern African Public Law
SAWS	South African Weather Service
Sci. Total Environ	Science of the Total Environment
SDG	Sustainable Development Goals
UN	United Nations
UNCCD	United Nations Convention to Combat Desertification (1994)
UNDRR	United Nations Office for Disaster Risk Reduction
UNICEF	United Nations Children's Fund
UNISDR	United Nations International Strategy for Disaster Reduction (1999)
UN-Water	United Nations Water
UNW-DPC	UN-Water Decade Programme on Capacity Development
WCL	World Comparative Law
Weather Clim. Extreme	Weather and Climate Extremes
Windhoek Declaration	Windhoek Declaration for Enhancing Resilience to Drought in Africa (2016)
WHO	World Health Organization
WMO	World Meteorological Organization
WSA	Water Services Act 108 of 1997
WSSP	White Paper on Water Supply and Sanitation (1994)

LIST OF FIGURES

Chapter 1 Introduction

1.1 Background

Droughts are disasters that adversely affect people and the environment.[1] Community unrest, degradation of the environment, and damage to private and public-sector infrastructure are some examples of the impact of droughts, globally.[2] Drought occurs naturally as a result of less-than-average precipitation within the hydrological cycle.[3] The frequency of droughts is exacerbated by climate change and the anthropogenic presence of humans in expanding urban areas.[4] Severe weather-induced droughts are influenced by climate change and may lead to the depletion of natural resources.[5] Additionally, drought can exacerbate vector-borne diseases, population displacement, and can weaken food security.[6] Individuals' physical and mental health are also under pressure as drought and water insecurity impact the livelihoods of those residing in urban areas.[7] In municipal areas, water scarcity is further aggravated by poor water supply management by municipalities, lack of infrastructure maintenance, and excessive water consumption.[8]

Drought and water scarcity are similar in some respects – both are known for superseding borders and traversing vast areas of land.[9] Climate change and

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1 Abera and Gebeyehu "Review of Hydrological Drought Analysis Status in Ethiopia" 19**.**

2 Centre for Disease Control and Prevention 2020 https://tinyurl.com/2fwb5pc4.

3 The hydrological cycle may be defined as "(t)he transport of water in all its forms within and between the atmosphere, cryosphere, hydrosphere, and the Earth's surface". See Dunlop *A Dictionary of Weather* 45; Orimoloye, Belle and Orimoloye *et al* 2022 *Atmosphere* 1.

4 National Aeronautics and Space Administration (NASA) *Date unknown* https://gpm.nasa.gov/resources/faq/what-drought-and-what-causes-it; Pereira and Freitas 2017 *CINT* 522.

5 Centre for Climate and Energy Solutions 2022 https://www.c2es.org/content/drought-and-climate-change/; Pereira and Freitas 2017 *CINT* 523.

6 World Health Organization (WHO) 2021 https://www.who.int/news-room/fact-sheets/detail/climate-change-and-health.

7 WHO 2021 https://www.who.int/news-room/fact-sheets/detail/climate-change-and-health.

8 United Nations Children's Fund (UNICEF) *Urban Water Scarcity Guidance Note Preventing Day Zero* 11.

9 International Water Association *Water Scarcity & Drought Summit* 3. It is worth noting that the general difference between drought and water scarcity is that droughts are caused by climate variability while water scarcity refers to the nexus between hard to come by water resources and inadequate water-related infrastructure that leads to unstainable water supply. See C40 Knowledge *Date unknown* https://tinyurl.com/bdttyu8v.

inadequate water supply management have aggravated both phenomena to such an extent that they are substantively interlinked and for the purposes of this research, the two terms will be used interchangeably.[10]

Water is necessary to sustain life, and as temperatures rise, the water-cycle becomes more unbalanced.[11] Although drought forms part of the natural hydrological cycle, the severity of drought occurrences is intensifying due to climate change.[12] In the past, climate change was observed as a potential, future threat. However, temperatures have risen by more than one degree Celsius since the 1800s, and natural disasters have become more prevalent and severe. Consequently, climate change is now deemed an imminent threat that cannot be ignored.[13] Climate change induced droughts affect everyone, but vulnerable and disadvantaged groups are affected disproportionately.[14] This is especially true for many areas in Africa and other developing countries.[15] Climate change has catastrophic effects on the environment and can impact the well-being of communities.

Drought can also be seen as a form of water scarcity experienced by residents of cities and towns.[16] Approximately 57% of the global population reside in urban areas.[17] While this number increases, rapid urbanisation has led to a rise in global

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10 The terms "drought" and "water scarcity" will be used interchangeably. The author recognises the subtle differences in meaning but for the purposes of the research at hand, both phenomena are seen to affect quality of life, water security, and the well-being of those residing in urban areas. See World Meteorological Organization (WMO) *Drought and Water Scarcity* 3 and International Water Association *Water Scarcity & Drought Summit* 3.

11 Intergovernmental Panel on Climate Change (IPCC) *Climate Change 2023 Synthesis Report* 69, 78.

12 Makunde, Chikumba, Svinurai and Mhike "Climate Change: A Real Danger to Human and Animal Survival" 12.

13 NASA Earth Observatory *Date unknown* tinyurl.com/v3a56pch; WMO 2021 tinyurl.com/3u8ed7ck; Rumble "Climate change legislative development on the African continent" 33.

14 United Nations Framework Convention on Climate Change *Considerations regarding vulnerable groups, communities and ecosystems in the context of the national adaptation plans* 4.

15 Grasham, Korzenevica and Charles 2019 *WIREs Waters* 2; WHO 2021 https://www.who.int/news-room/fact-sheets/detail/climate-change-and-health.

16 UNICEF *Urban Water Scarcity Guidance Note Preventing Day Zero* 11.

17 Cox 2022 https://www.newgeography.com/content/007523-demographia-world-urban-areas-2022-released; He, Liu and Wu *et al* 2021 *Nature Communications* 2.

water demand in cities.[18] As the demand for water supply increases, phenomena such as drought and water scarcity have become core concepts in discussions related to universal water security.[19] This being the case, cities across the world struggle to maintain water supply systems capable of supporting growing urban populations.[20]

On average, South Africa is viewed as a water scarce country.[21] However, as climate change causes high temperatures and irregular rainfall within the country, severe and disastrous droughts are becoming more frequent.[22] The country experienced severe droughts across several provinces in 2015 that led to acute water stress in rural and urban areas.[23] The 2015 drought was one of the most severe droughts the country had experienced since 1982.[24] By the end of 2015, local drought disasters were declared throughout the Western Cape and as the severity of the drought continued to escalate, the fear of "Day Zero" was announced in the City of Cape Town, Western Cape in 2018.[25] As the drought persisted, it was observed that not only was the environment being impacted, but the supply of adequate drinking water as well.[26] Although the spotlight was on Cape Town, other provinces, such as the Eastern Cape, had also declared a provincial drought disaster in 2018.[27] Affected

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18 Heidari, Arabi, Warziniack and Sharvelle 2021 *Frontiers in Water* 1,2.

19 Water security is defined as "the capacity of a population to safeguard sustainable access to adequate quantities of acceptable quality water for sustaining livelihoods, human well-being, and socio-economic development, for ensuring protection against water-borne pollution and water-related disasters, and for preserving ecosystems in a climate of peace and political stability"- see UN-Water *Water Security & the Global Water Agenda* 1; He, Liu and Wu *et al* 2021 *Nature Communications* 2.

20 Heidari, Arabi, Warziniack and Sharvelle 2021 *Frontiers in Water* 1,2.

21 Mkhonza "Improving the legal protection of strategic water source areas: a South African perspective" 453.

22 Mkhonza "Improving the legal protection of strategic water source areas: a South African perspective" 453.

23 National Disaster Management Centre *Annual Report 2015/2016* 65.

24 Global Citizen 2020 https://www.globalcitizen.org/en/content/south-africa-drought-national-crisis-farmers/.

25 The Guardian 2018 https://www.theguardian.com/cities/2018/feb/03/day-zero-cape-town-turns-off-taps; National Disaster Management Centre *Annual Report 2015/2016* 65.

26 Carden and Fell 2022 tinyurl.com/mwhw56r8; Bloomberg 2022 https://businesstech.co.za/news/energy/588816/south-africa-facing-major-water-shortage-within-weeks/.

27 By November 2015, the following provinces had declared drought disasters: KwaZulu-Natal, North West, Free State, Limpopo and Mpumalanga. See National Disaster Management Centre Annual Report 2015/2016 65; National Disaster Management Centre *Annual Report 2017/2018* 74.

areas included the Kouga Local Municipality, the Makana Local Municipality and the Nelson Mandela Bay Metropolitan Municipality, to name a few.[28]

To limit the effects of water scarcity in urban areas, adequate water supply systems must be managed properly.[29] This means that when water sources are scarce, water supply systems should be managed in such a manner to maintain sufficient supply for urban areas. While national law prescribes measures to minimise the impacts of severe natural and man-made disasters, municipalities in densely populated urban areas still struggle to deal with actual water scarcity.[30] Municipal struggles relating to water scarcity may include oversight in managing drought and water stress in cities.[31] Municipal inattentiveness combined with poor infrastructure management results in leaking water pipes across urban areas.[32]

Municipalities have *inter alia* resorted to water restrictions to cope with water crises in some urban areas.[33] For example, the Nelson Mandela Bay is one of the areas subjected to severe water scarcity due to extreme weather-related droughts and low dam levels.[34] Water restrictions have been imposed to combat the threat of another potential "Day Zero".[35] However, factors such as damage to water pipelines and vandalism threaten the Nelson Mandela Bay Municipality's efforts to provide a consistent water supply under the current restrictive conditions.[36] Another example is the Pretoria water restrictions which were introduced in early January 2023. On the 26th of January, the City of Tshwane Metropolitan Municipality (CTMM)

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28 National Disaster Management Centre *Annual Report 2017/2018* 74.

29 UNICEF *Urban Water Scarcity Guidance Note Preventing Day Zero* 6.

30 National legislative efforts in combatting the effects of drought and climate change include legislation such as the *Disaster Management Act* 57 of 2002 (DMA), the *National Environmental Management Act* 107 of 1998 (NEMA) and the *Climate Change Bill* (B9-2022).

31 Bartlett 2022 tinyurl.com/582je7j5.

32 Bartlett 2022 tinyurl.com/582je7j5.

33 Winter and Brom 2022 https://tinyurl.com/5hbcck9k.

34 Nelson Mandela Bay refers to the demarcated area that the Nelson Mandela Bay Municipality is responsible for, as a metropolitan municipality. See Nelson Mandela Bay Municipality *Integrated Development Plan of Nelson Mandela Bay Municipality 2022/23 – 2026/27* 127 and 128; Ellis 2022 https://www.dailymaverick.co.za/article/2022-08-30-tough-restrictions-push-back-nelson-mandela-bays-day-zero-but-trouble-still-lies-ahead/.

35 Ellis 2022 https://www.dailymaverick.co.za/article/2022-08-30-tough-restrictions-push-back-nelson-mandela-bays-day-zero-but-trouble-still-lies-ahead/.

36 Ellis 2022 https://www.dailymaverick.co.za/article/2022-08-30-tough-restrictions-push-back-nelson-mandela-bays-day-zero-but-trouble-still-lies-ahead/.

implemented stage two water restrictions for the area due to high-level water demands in a short period of time.[37] The purpose of those restrictions were to reduce water usage in the city by 30% to manage the water shortage.[38] Restrictions such as these severely impact the quality of life of those residing in cities and will be further discussed in chapters 3 and 4 of this study.[39] The increase in water consumption led to a decrease in the levels of Rand Water's reservoirs, which supply water to Pretoria and other major metropolitans.[40]

In an effort to respond to the reality of drought and water scarcity, South African law and policy provide a framework that is directed towards the prevention and mitigation of disaster risks such as drought. At the centre of this framework is the *Constitution of the Republic of South Africa*, 1996 (Constitution) which determines how other laws and policies must function.[41] Other sectors of law that provide for a response to drought risk, include water law, environmental law, local government law, and disaster risk law.

As shown by the examples above, South Africa is prone to drought-related disasters and as such, all three spheres of government are responsible for preparing, planning, and minimising the impact of droughts in the country.[42] This shared responsibility through cooperative governance, is firmly established in provisions of the Constitution, specifically in the combination of sections 7(2), 40(2) and 41.[43] Section 7(2) refers to the mandate on all three spheres of government to respect,

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37 City of Tshwane 2023 https://www.tshwane.gov.za/?p=44664; Mahlokwane 2023 https://tinyurl.com/4msuattk.

38 City of Tshwane 2023 https://www.tshwane.gov.za/?p=44664.

39 These restrictions are enforced through by-laws and the use fines and higher usage charges when individuals exceed the requested water volumes in a day. See Fasemore 2017 https://tinyurl.com/um762rps.

40 City of Tshwane 2023 https://www.tshwane.gov.za/?p=44664; Rand Water is one of the largest bulk, potable water suppliers in both Africa and the world - see National Government of South Africa *Date unknown* https://nationalgovernment.co.za/units/view/150/rand-water*;* Crisis24 2022 https://crisis24.garda.com/alerts/2022/10/south-africa-water-utility-implements-stage-2-water-restrictions-in-parts-of-gauteng-province-effective-oct-4.

41 Constitution of the Republic of South Africa, 1996 (Constitution).

42 The DMA makes specific reference to national, provincial and local government in terms of disaster management. See chapters 3-5 of the DMA.

43 See ss 7(2), 40 and 41 of Constitution.

protect, promote and fulfil the rights contained in the Bill of Rights.[44] Section 40(2) states that all spheres must observe the objectives of chapter 3 of the Constitution, that provides for cooperative government.[45] Section 41 focuses on the principles of cooperative governance.[46] These sections will be examined in further detail in chapter 3.[47]

The Constitution makes reference to the right of all individuals in the country to have an environment that is protected and not harmful to their well-being.[48] The extent of the environmental right as provided for in section 24, is broad enough to include the need for proper drought risk management, considering the impact of droughts on the environment and society. The detrimental effects of drought and water scarcity in urban areas warrant a discussion of section 27 of the Constitution.[49] While section 27(1)(b) states that everyone has the right to access food and water supply, section 27(2) confirms the state's responsibility in terms of the realisation of this right.[50]

In dealing with drought-related disasters, government is in a position to adopt various plans, policies, strategies, and legislation to address, prepare for and prevent or reduce the impact of these disasters. This is done through what is collectively known as drought risk management.[51] Various international and national instruments actualise drought risk management through three recognised pillars: drought monitoring and early warning strategies; drought impact, vulnerability, and risk assessment; and finally, drought response and mitigation measures.[52] Extreme weather-related disasters such as droughts and floods cannot be prevented.[53] However, through adequate management, the *impact* of disasters can be

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44 Section 7(2) of the Constitution.
45 Section 40(2) of the Constitution.
46 Section 41 of the Constitution.
47 See para 3.2 below.
48 Section 24 of the Constitution.
49 Section 27 of the Constitution.
50 See ss 27(1)(b) and 27(2) of the Constitution.
51 See para 2.5 below.
52 See para 2.5.1.1 – 2.5.1.3 below.
53 National Geographic *Date unknown* https://education.nationalgeographic.org/resource/understanding-droughts.

anticipated and minimised, and long-term preparedness initiatives could be formulated. Thus, disaster risk management focuses on reducing the impact of disasters, creating efficient response initiatives to protect people and aiding post-disaster recovery efforts.[54]

Disaster risk management legislation is primarily covered in national legislation such as the DMA. However, the Constitution enables municipalities to act with executive and legislative authority in terms of local disasters.[55] As such, they have the governing authority to help develop drought risk management plans and strategies at the local level.[56]

1.2 Objectives

The primary objective of this study is to determine the extent to which South African local government, environmental, water and disaster risk law and policy provides for drought risk management in urban areas.

Ancillary objectives include:

- To describe drought and the importance of drought risk management in the South African urban context;
- To establish what the pillars of drought risk management are and what may be expected to feature in law and policy;
- To critically evaluate South African local government, environmental, water, and disaster risk law to establish the extent to which it provides for drought risk management in cities;
- To critically evaluate the municipal by-laws, local policies and plans of the Nelson Mandela Bay Municipality as a case in point to determine the extent to which the municipality provides for urban drought risk management; and

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54 Gen Not 654 in GG 27534 of 29 April 2005.
55 Section 156 of the Constitution.
56 Section 156 of the Constitution; sections 54 and 55 of the DMA.

- To conclude the study with findings and recommendations on the extent to which national and city-level legislation provides for urban drought risk management.

1.3 Research methodology

The study comprises literature-based research and is informed by South African legislation, policies, and a selection of by-laws relating to drought risk management. This study also includes sources from other scholarly disciplines related to drought risk management, such as water, agriculture, climate, and environmental sciences.

The mentioned disciplines inform an understanding of the need for drought risk management in South Africa. The case study presented in chapter 4 focuses on the Nelson Mandela Bay Metropolitan Municipality as it experienced the challenges of severe drought, poor water supply management and at the time of commencing with this research, a threat of "Day Zero" that loomed over the city.

Primary and secondary sources of law are examined and applied. Primary sources include the Constitution, the *National Environmental Management Act* 107 of 1998 (NEMA), the *Water Services Act* 108 of 1997 (WSA), the DMA and municipal regulations. Secondary sources include academic reports, journal articles, scholarly books, chapters, and internet sources related to the different disciplines that underlined this study.

1.4 Framework

This study comprises five chapters. Chapter 2 provides background information on drought and introduces the concept of drought risk management. The meaning of drought is discussed by examining definitions and categories of drought and establishing the context of drought risk in both the global and South African contexts. Chapter 2 introduces drought risk management as a broad discussion and narrows the research to the South African urban perspective. The elements of drought risk management are established, and three key pillars are identified against which the legal analysis in chapter 3 is framed.

As such, chapter 3 introduces the discussion on law and policy against the backdrop of drought risk management. The chapter does so by examining three areas of law as they relate to the three pillars of drought risk management, introduced in chapter 2. These areas include environmental law, water law and disaster risk law. Throughout this chapter, the South African legal framework is analysed to determine the extent to which drought risk management is regulated and/or provided for.

Chapter 4 examines a metropolitan municipality's actions in managing a drought disaster, drawing on the national legal framework and the municipality's own executive and legislative initiative. The case of Nelson Mandela Bay Municipality is examined to provide a critical overview of the municipality's drought risk management initiatives. The municipality's relevant local policies, plans and municipal by-laws are discussed.

Chapter 5 provides an overview of the preceding chapters and provides concluding remarks and recommendations.

Chapter 2 Drought in South African cities: the manifestation of a global crisis

2.1 Introduction

Drought is a complex natural occurrence, the definition of which has fascinated environmentalists, climatologists and other scholars alike for decades. As mentioned in chapter 1, various communities and ecosystems around the world are feeling the effects of drought.[57] To mitigate the potential impact of drought, it becomes necessary for countries such as South Africa to develop suitable drought risk management strategies. This chapter aims to contribute towards the contextualisation of drought by identifying and evaluating four categories of drought classification. Understanding the risks associated with each drought category may be utilised in discussions surrounding international, national, and local drought risk management strategies.

This chapter contributes towards the rest of this discussion by introducing drought risk management in the context of international and South African communities. It explores the elements and pillars of drought risk management, identified as the fundamental concepts against which the legal analysis will take place in chapters 3 and 4. Lastly, this chapter addresses the importance of drought risk management in South African urban areas to further narrow the scope of the discussion.

2.2 Drought defined

Before discussing the far-reaching implications of drought on cities and the natural world, drought as a (natural) disaster is explained. This requires an introduction of a potential drought definition and the climatological categories befitting a general understanding of drought. According to the South African Risk and Vulnerability Atlas, disasters may be defined as follows:

> A disaster is a progressive or sudden, widespread, or localised, natural or human-caused incident that: (a) causes or threatens to cause death, injury or disease,

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[57] See para 1.1 above.

> damage to property, infrastructure or the environment, or disruption of the life of a community, and (b) is of a scale that exceeds the ability of those affected by the disaster to cope with the effects using only their own resources.[58]

According to this definition, drought can be observed as a natural disaster.[59] However, the concept of drought is far more extensive than that which can be encapsulated in a mere example of disruptive events. Defining drought has been a decade-long challenge for the climatological community, with questions raised that concern the functionality of a single, universal definition.[60] The World Meteorological Organization (WMO) defines drought as:

> …a prolonged dry period in the natural climate cycle that can occur anywhere in the world. It is a slow onset phenomenon caused by a lack of rainfall. Compounding factors, such as poverty and inappropriate land use, increase vulnerability to drought.[61]

On the other hand, the South African Weather Service (SAWS) defines drought as:

> …the basis of the degree of dryness in comparison to normal or average amounts of rainfall for a particular area or place and the duration of the dry period.[62]

While this definition is functional for the purposes of SAWS, the weather service concurs that drought is not easily defined and that its basic definition is in line with meteorological droughts.[63] Even though a universal definition remains elusive, this study adopts the definition provided by the WMO. However, the researcher acknowledges that the concept of drought cannot solely be understood on the basis of this definition. A more appropriate approach to the conceptualisation of drought would be to consider the categories of drought originally coined by the scientists Wilhite and Glantz in 1985.[64]

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58 South African Risk and Vulnerability Atlas 2020 https://sarva.saeon.ac.za/disasters/.

59 South African Risk and Vulnerability Atlas 2020 https://sarva.saeon.ac.za/disasters/.

60 Slette, Post and Awad *et al* 2019 *Glob Change Biol* 3194.

61 The WMO *Date unknown* https://public.wmo.int/en/resources/world-meteorological-day/previous-world-meteorological-days/climate-and-water/drought.

62 South African Weather Service (SAWS) *Date unknown* https://www.weathersa.co.za/home/climateques.

63 Meteorological droughts are discussed in para 2.3.1.1 as part of a larger discussion on drought categories. These categories are essential in understanding various forms of drought and drought measurement - see SAWS *Date unknown* https://www.weathersa.co.za/home/climateques.

64 Wilhite and Glantz 1985 *Water International* 4-9.

2.2.1 The climatological categories of drought

In lieu of a universal definition for drought, four types of drought categories have been proposed and widely accepted by scholars across the globe,.[65] These categories are 1) meteorological; 2) hydrological; 3) agricultural; and 4) socio-economic droughts.[66] These categories also inform understanding of droughts in the context of urban areas, as will be shown below.

The drought categories are further observed as approaches to measuring drought in specific scenarios, instead of relying on one universal approach.[67]

2.2.1.1 Meteorological drought

Meteorological droughts may be viewed as weather-related droughts and are commonly described as a period of naturally occurring dry weather over a large, specific region.[68] To explain this type of drought more accurately, one must evaluate the area where dry periods are dominant. The reason for this being that the atmospheric conditions related to the level of precipitation deficiencies are irregular and fluctuate constantly.[69]

It is accepted that meteorological droughts occur naturally and more frequently than other forms of drought.[70] Therefore, these meteorological droughts play a noteworthy role in the occurrences of other forms of drought, including hydrological droughts.[71] Climate change and varying precipitation levels can influence meteorological droughts which may result in unfavourable anomalies in, for example, the consistency of water availability.[72] Other important factors influencing

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65 Slette, Post and Awad *et al* 2019 *Glob Change Biol* 3194; Wilhite and Glantz 1985 *Water International* 4-9; Mishra and Singh 2010 *Journal of Hydrology* 205-206.

66 Zhang Chen and Sheng *et al* 2019 *Sci. Total Environ* 2.

67 In chapter 4 of this study, these categories will be applied to the case study, to help classify the Nelson Mandela Bay drought.

68 Ndlovu and Demlie 2020 *Atmosphere* 2; National Integrated Drought Information System *Date unknown* https://tinyurl.com/58tv75pb.

69 National Drought Mitigation Centre *Date unknown* https://drought.unl.edu/Education/DroughtIn-depth/TypesofDrought.aspx.

70 Ayugi, Eresanya and Onyango *et al* 2022 *Pure Appl. Geophys* 1366.

71 Bae, Heesook and Lim *et al* 2019 *Natural Hazards* 7.

72 Ayugi, Eresanya and Onyango *et al* 2022 *Pure Appl. Geophys* 1366.

meteorological droughts include atmospheric climate drivers such as the El Niño-southern oscillation (ENSO).[73] Phenomena such as ENSO affect vast areas of land, impacting agricultural regions and urban areas.[74] For example, as cities become more populated, urban infrastructure is placed under pressure, and events such as ENSO put cities under additional stress by exacerbating climate conditions.[75] The 2015/2016 drought in South Africa is an example of a meteorological drought as it depicted a dry period which was worsened by the effects of ENSO.[76]

2.2.1.2 Hydrological drought

Hydrological droughts develop after the occurrence of meteorological droughts.[77] The former droughts are identified by low water supply caused by irregular precipitation levels, which result in abnormally low water levels in streams and reservoirs.[78] There is a distinction between meteorological drought and hydrological drought, in that hydrological drought is mainly concerned with the hydrological (water) cycle, whereas meteorological drought is mainly focused on atmospheric dry periods over specific regions.[79] Understanding hydrological droughts are necessary to measure various aspects of water supply shortages, such as interrupted downstream flows and inadequate water quality and irrigation systems.[80]

Hydrological droughts can negatively influence socio-economic systems critical to urban areas and natural ecological systems.[81] A lack of adequate water supply places

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73 In short, ENSO is a weather phenomenon where the Pacific Ocean surface warms up and sea surfaces temperatures become above-average and as such, influences weather and climate patterns. See L'heureux 2014 https://tinyurl.com/mrxnpkat; Ayugi, Eresanya and Onyango *et al* 2022 *Pure Appl. Geophys* 1366; Ndlovu and Demlie 2020 *Atmosphere* 2.

74 Shikwambana, Xongo and Mashalane *et al* 2023 *Atmosphere* 2.

75 L'heureux 2014 https://tinyurl.com/mrxnpkat.

76 Shikwambana, Xongo and Mashalane *et al* 2023 *Atmosphere* 1.

77 Zhou, Shi and Fu *et al* 2021 *JGR Atmospheres* 1.

78 National Drought Mitigation Centre *Date unknown* https://drought.unl.edu/Education/DroughtIn-depth/TypesofDrought.aspx.

79 National Drought Mitigation Centre *Date unknown* https://drought.unl.edu/Education/DroughtIn-depth/TypesofDrought.aspx.

80 National Drought Mitigation Centre *Date unknown* https://drought.unl.edu/Education/DroughtIn-depth/TypesofDrought.aspx.

81 Rivera, Otta and Lauro *et al* 2021 *Frontiers in Water* 1.

further strain on the economy, which may influence the occurrences of socio-economic droughts.[82] As with all four drought categories, hydrological droughts are intricate in nature and can be worsened by climate change.[83] Furthermore, hydrological droughts can create vulnerability in urban areas as population growth and an increasing need for water security in cities raise the urgency for sustainable water infrastructure and supply systems.[84]

2.2.1.3 Agricultural drought

Farmlands, pastures, and crops are particularly vulnerable to weather-related factors such as temperature changes, low precipitation levels, and irregular rainfall.[85] The impact of these factors influences the moisture levels in soil and the sustainability of reservoirs and dams.[86] Agricultural droughts may be defined as dry periods affecting agricultural lands and can be influenced by both meteorological and hydrological droughts.[87]

Another term for agricultural drought is soil moisture drought, which emphasises the moisture deficiency in the soil caused by dry temperatures.[88] This category of drought measurement is necessary as sustainable agriculture influences food security.[89] Agricultural droughts may not necessarily influence other types of drought, but instead they emphasise the impact that water scarcity can have on the farming community and other agricultural sectors.[90] Irregular rainfall and climate change may lead to an increase in agricultural droughts and increase risks associated with vegetation soil and crops.[91] As such, these risks may cause a

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82 Saha, Pal and Chowdhuri *et al* 2022 *Gondwana Research* 9.
83 Rivera, Otta and Lauro *et al* 2021 *Frontiers in Water* 1; Van Loon 2015 *WIREs Water* 359.
84 Van Loon 2015 *WIREs Water* 378.
85 National Weather Service *Date unknown* https://www.weather.gov/safety/drought-types.
86 Qu, Wang and Gan *et al* 2023 *Frontiers in Plant Science* 2.
87 National Drought Mitigation Centre *Date unknown* https://drought.unl.edu/Education/DroughtIn-depth/TypesofDrought.aspx.
88 Van Loon 2015 *WIREs Water* 361-362.
89 Meza Rezaei and Siebert *et al* 2021 *Sci. Total Environ* 2; Asian Development Bank *Date unknown* https://www.adb.org/what-we-do/sectors/agriculture/overview; UN *Date unknown* https://www.un.org/sustainabledevelopment/hunger/.
90 National Drought Mitigation Centre *Date unknown* https://drought.unl.edu/Education/DroughtIn-depth/TypesofDrought.aspx.
91 Van Loon 2015 *WIREs Water* 361-362.

distressing situation for various populations and ecosystems, including urban areas that rely on agriculture for food supply.[92]

2.2.1.4 Socio-economic drought

The fourth category of drought, which is universally observed, is socio-economic drought. Socio-economic drought may be defined as the form of drought that occurs where the water demand of the community has exceeded availability.[93] Meteorological, hydrological, and agricultural droughts play a role in the eventuality of socio-economic droughts.[94] The main characteristic of socio-economic drought is therefore the water supply and demand imbalance.[95] Essentially, these types of droughts are caused by the lack of natural water supply in a period where the demand for water resources is higher than the availability.[96] It is challenging to track socio-economic droughts as it depends entirely on variable factors, such as climate conditions.[97] Socio-economic droughts impact urban areas directly as water stress in cities increase infrastructure vulnerability by influencing water supply systems.

From the discussion above, it may be inferred that the drought categories are intrinsically complicated and can either influence or stem from one another. These categories will clarify the type of drought affecting Nelson Mandela Bay, and the discussion in chapter 4 will evaluate the municipality's laws and policy responses to the drought disaster.[98]

2.3 Drought in the global context

The consequences of drought are far-reaching, and within the last few centuries droughts have increased in duration, frequency and intensity.[99] The domino-like

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92 Van Loon 2015 *WIREs Water* 361-362.
93 Saha, Pal and Chowdhuri *et al Gondwana Research* 9.
94 National Centres for Environmental Information 2022 https://tinyurl.com/yurb8n3m.
95 Liu, Shi and Sivakumar 2020 *J. Geophys. Res. Atmos* 1, 3.
96 Liu, Shi and Sivakumar 2020 *J. Geophys. Res. Atmos* 1.
97 National Drought Mitigation Centre *Date unknown* https://drought.unl.edu/Education/DroughtIn-depth/TypesofDrought.aspx.
98 See para 4.1 below.
99 Tsegai, Medel and Augenstein *et al Drought in numbers – Restoration for Readiness and Resilience* 37.

effect of climate change on drought has caused large portions of desertification worldwide and contributed to famine and the increased spread of disease.[100] Examples of severe droughts include the millennium drought (2001–2009) in Australia and the ongoing drought in Afghanistan that escalated in 2021.[101] Low rainfall levels exacerbated the dry periods in both Australia and Afghanistan. The droughts in these countries have severely impacted the health of those living in the affected areas.[102] Diseases began to spread among communities, hygiene and sanitation were negatively influenced, and drinking water became scarce.[103]

What allows droughts to become so devastating is the fact that the onset is slow and that it takes place over a long period.[104] As a result, the effects of drought are not always immediately recognised, however, the impact is extensive.[105] Droughts are not limited by region and can spread over broad areas and affect biodiversity and the general well-being of ecosystems.[106] Low rainfall levels and prolonged periods of drought severely impact wetlands and rivers, causing habitat loss for several species and negatively impacting the natural life cycle of plants and animals.[107] Droughts further jeopardise the provision of food and water and affect various natural regulation cycles, which can cause severe ecological degradation.[108]

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100 United Nations Convention to Combat Desertification (UNCCD) *Fact Sheet: Drought and its socio-economic impacts* 1,2; IPCC *Climate Change 2022 Mitigation of Climate Change* 335.

101 Ward, de Ruiter and Mard *et al* 2020 *Water Security* 2.

102 Fleming- Muñoz, Whitten and Bonnett 2023 *AARES* 505; Government of South Australia 2023 https://www.environment.sa.gov.au/topics/river-murray/current-dry-conditions/millennium-drought; United Nations Office for the Coordination of Humanitarian Affairs *Funding dries up as humanitarian needs are at an all-time high* 1.

103 Government of South Australia 2023 https://www.environment.sa.gov.au/topics/river-murray/current-dry-conditions/millennium-drought; United Nations Office for the Coordination of Humanitarian Affairs *Funding dries up as humanitarian needs are at an all-time high* 1.

104 Wilhite and Buchanan-Smith *Drought as Hazard: Understanding the Natural and Social Context* 5.

105 Wilhite and Buchanan-Smith *Drought as Hazard: Understanding the Natural and Social Context* 5.

106 Natural Disasters Association *Date unknown* https://www.n-d-a.org/heat-drought.php#:~:text=Drought%20hazards%20develop%20slowly%2C%20there,due%20to%20famine%20or%20dehydration.

107 United Kingdom Centre for Ecology and Hydrology 2022 https://www.ceh.ac.uk/news-and-media/blogs/impacts-drought-water-quality-and-wildlife.

108 National Integrated Drought Information System *Date unknown* https://tinyurl.com/58tv75pb.

The paragraph above demonstrates the effect of drought on both the natural world and natural resources. However, it must be noted that droughts can also stem from anthropogenic influences and cause harm to human well-being.[109] For example, in South Africa, the Gauteng province faces water security concerns as Rand Water (the largest bulk water utility supplier in Africa) struggles to supply water throughout the province and has implemented "water-shifting" as the latest approach to minimising water stress within the area.[110] The lack of water supply could be blamed on natural drought occurrences, however, poor infrastructure management, corruption and maladministration by water suppliers such as Rand Water may also be at fault.[111] Furthermore, droughts affect economic growth, poverty, and the health of multiple communities as food security becomes threatened and hygienic care and sanitation become a scarce reality.[112]

It follows that countries need to collectively and individually develop strategies and policies related to drought risk mitigation to promote resilient communities.[113] These initiatives are generally undertaken by a range of international, national, and local (sub-national) organisations and authorities through so-called drought risk management strategies as defined below.[114]

2.4 South African perspective on drought

As a country with vast ecosystems and integrated biomes, South Africa's environment is unique.[115] However, it is exposed to the effects of changes in climate

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109 Pereira and Freitas 2017 *CINT* 523.

110 "Water-shifting" may be defined as the moving of water from one potable supply system to another to ensure a continuous, adequate supply of water to the community - see Du Plessis 2023 https://tinyurl.com/ybethnrh; Molapo 2023 https://ewn.co.za/2023/10/01/water-shifting-interim-plan-to-be-implemented-in-gauteng-says-minister-mchunu.

111 Du Plessis 2023 https://tinyurl.com/ybethnrh; Msimanga 2023 https://www.politicsweb.co.za/politics/da-serves-paia-application-on-rand-water--solly-ms.

112 National Integrated Drought Information System *Date unknown* https://tinyurl.com/58tv75pb; Alberta WaterPortal 2014 https://albertawater.com/impacts-of-drought/economic-impacts-of-drought/; Centre for Disease Control and Prevention 2020 tinyurl.com/2fwb5pc4.

113 United Nations International Strategy for Disaster Reduction (UNISDR) *Drought Risk Reduction Framework and Practices: Contributing to the Implementation of the Hyogo Framework for Action* viii.

114 See para 2.5 below.

115 Department of Forestry, Fisheries and the Environment *South African Environment 2022* 42.

and natural disasters.[116] The natural environment provides extensively for life, well-being and the existence of fauna and flora through its diverse biomes.[117] That being said, long-term droughts form a large part of the country's existence as South Africa is one of the driest countries in the world.[118]

As alluded to in chapter 1, drought in South Africa is exacerbated by climate change, as rising temperatures and lower than average precipitation levels threaten the stability of the water cycle.[119] Water insecurity has become an intensifying threat to urban and rural communities in recent years as a lack of adequate supply affects everyday sanitation and water usage, for example.[120]

With the prevalence of drought and water scarcity across South Africa, the mismanagement of water resources by government entities has become more obvious.[121] Water supply concerns are further impacted by the fact that the government cannot maintain the supply and demand for water due to various reasons such as poor management of water resources.[122] The inability to supply water due to factors such as climate change, recurring drought periods, municipal service delivery problems and rapid urbanisation throughout the country impacts living conditions.[123] Desertification, land degradation, soil erosion, and flash floods are all recurring events that take place more frequently as increased dry periods negatively impact the earth, vegetation and areas inhabited by people.[124]

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116 Department of Environmental Affairs and Tourism A National Climate Change Response Strategy for South Africa iv, 5.

117 Department of Forestry, Fisheries and the Environment *South African Environment 2022* 42.

118 Department of Forestry, Fisheries and the Environment *South African Environment 2022* 195.

119 Department of Forestry, Fisheries and the Environment *South African Environment 2022* 16.

120 Department of Water and Sanitation *National Water Resource Strategy 3* (2023) (NWRS-3) 34.

121 Water Integrity Network and Corruption Watch *Money down the drain: corruption in South Africa's water sector* 33-34.

122 Heggie *Date unknown* https://www.nationalgeographic.com/science/article/partner-content-south-africa-danger-of-running-out-of-water.

123 Being unable to supply basic water services due to a variety of factors may infringe the community's right in terms of access to water. See s 27(1)(b) of the Constitution.

124 Aquaread *Date unknown* https://www.aquaread.com/blog/what-causes-droughts-and-flooding/.

Ecological degradation (or more commonly known, environmental damage) is defined by the United Nations Environment Programme as follows:

> Environmental damage or degradation is the deterioration of the environment through depletion of resources such as air, water and soil; the destruction of ecosystems and the extinction of wildlife. It is defined as any change or disturbance to the environment perceived to be deleterious or undesirable.[125]

From the above, it can be deduced that droughts may be perceived as a form of ecological degradation, that causes severe harm to the surrounding environment.

2.4.1 Drought in South Africa's urban areas

Drought in cities results in a broad range of obstacles and challenges and require unique solutions to maintain water security.[126] Municipalities and local communities play a large role in minimising these obstacles in cities to avoid several urban-specific issues.[127] Drought-related issues in South Africa and elsewhere include maintaining consistent water supply to cities, preventing desertification and land degradation to the urban environment, and ensuring public health and safety.[128]

As indicated earlier, the most often cited example of drought in South Africa impacting its urban areas, is the 2015/2016 Cape Town drought, which resulted in the infamous threat of "Day Zero".[129] Numerous factors, including a multi-year drought, inadequate municipal planning, and unsustainable disaster risk management within the city exacerbated the Cape Town water crisis.[130] The City of

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125 United Nations Environment Programme *Date unknown* https://leap.unep.org/knowledge/glossary/environmental-damage.

126 Although water security was defined in chapter 1, it is important to consider a narrower definition for urban water security. As such, urban water security may be defined as the capacity available from city water supply systems to provide reliable access to sustainable and sufficient water supply that could be utilised for risk protection from threats such as climate change and other disaster - see Steenkamp *City-level law and governance of water security in South Africa* 39.

127 Drought-Ready Communities *A Guide to Community Drought Preparedness* 4, 7; Dilling, Daly and Kenney *et al* 2018 *Climate Risk Management* 39.

128 Centre for Disease Control and Prevention 2020 tinyurl.com/2fwb5pc4; Iberdrola *Date unknown* https://tinyurl.com/dkrt4ds4.

129 See para 1.1 above; City of Cape Town *Cape Town State of the Environment 2022* 71.

130 Baker *Date unknown* https://time.com/cape-town-south-africa-water-crisis/.

Cape Town made international headlines as the first, prosperous metropolitan in the world to potentially run out of water.[131] As climate change increased the unpredictability of rainfall in the Western Cape Province, dam levels began to drop, leading to concerns of water insecurity.[132]

Urban hydrological infrastructure began to break down under the pressure of a high water demand by residents and weak water supply systems.[133] Political bureaucracy, unsustainable infrastructure, and the increasing impact of climate change resulted in the unpreparedness for a drought as severe as that which affected Cape Town.[134] Municipalities arguably did not treat the rising concerns with enough urgency early on, and solutions focused on "water awareness" rather than infrastructure maintenance and municipal accountability in water supply.[135]

2.5 A comprehensive understanding of drought risk management

Drought risk management is defined by the United Nations International Strategy for Disaster Reduction (UNISDR) as:

> The systematic process of using administrative directives, organizations and operational skills and capacities to implement strategies, policies and measures for improved coping capacities in order to lessen, i.e., prevent, mitigate and prepare for, the adverse impacts of drought and the possibility of disaster.[136]

Drought risk management is an essential tool used globally to minimise the adverse effects of drought on humans and the environment.[137] Drought risk management involves the implementation of resilience-inspired measures to mitigate and reduce the impact of drought risk.[138] For response initiatives to be effective, they must be applicable to the environmental and health sectors, and be practical for example, to

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131 Baker *Date unknown* https://time.com/cape-town-south-africa-water-crisis/.
132 Baker *Date unknown* https://time.com/cape-town-south-africa-water-crisis/.
133 Baker *Date unknown* https://time.com/cape-town-south-africa-water-crisis/.
134 Joubert and Ziervogel *Day Zero* 3.
135 Baker *Date unknown* https://time.com/cape-town-south-africa-water-crisis/.
136 UNISDR (Now known as the United Nations Office for Disaster Risk Reduction) *Drought Risk Reduction Framework and Practices: Contributing to the Implementation of the Hyogo Framework for Action* 10.
137 Crossman *Drought Resilience, Adaptation and Management Policy* (DRAMP) *Framework* 8.
138 UN-Water Decade Programme on Capacity Development (UNW-DPC) *Capacity Development to Support National Drought Management Policies* 7.

the tourism sector.[139] Government entities must understand that the management of drought risk is based on a set of principles for drought risk reduction.[140]

In this discussion, drought risk reduction and drought risk management are two terms that may be used interchangeably. However, drought risk reduction can be viewed as the initial assessment of risk and provides a practical guideline according to which drought risk management strategies may be formulated.[141]

The UNISDR document titled: *Drought Risk Reduction Framework and Practices: Contributing to the Implementation of the Hyogo Framework for Action* (Drought Risk Reduction Framework) is utilised in this dissertation as a primary source on international drought risk reduction and risk management strategies.[142] Although it was published in 2009, it remains a useful indicator of the United Nations (UN) efforts to reduce drought risk across the globe. This document is also supported by more recent publications, such as the UN Office for Disaster Risk Reduction's (UNDRR) *Special Report on Drought* (2021) issued under their *Global Assessment Report* (GAR) series.[143]

According to the UN, drought risk management strategies form part of the essential tools that national and sub-national governments must adopt to better prepare for drought's adverse effects and mitigate the potential impact of drought disasters.[144] Countries such as those in the Global South must improve their drought risk management strategies to ensure a reliable government response.[145]

2.5.1 Drought risk management in South Africa

Climate vulnerable countries such as South Africa require extensive drought risk management plans to minimise the impact of water scarcity on the environment

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139 UNW-DPC *Capacity Development to Support National Drought Management Policies* 7.
140 PreventionWeb *Date unknown* https://www.preventionweb.net/understanding-disaster-risk.
141 PreventionWeb *Date unknown* https://www.preventionweb.net/understanding-disaster-risk.
142 UNISDR *Drought Risk Reduction Framework and Practices: Contributing to the Implementation of the Hyogo Framework for Action* 10.
143 United Nations Office for Disaster Risk Reduction (UNDRR) (Formerly known as the UNISDR) *Global Assessment Report* (GAR)*, Special Report on Drought 2021.*
144 UNDRR *GAR Special Report on Drought* (2021) 72,74.
145 *DRAMP Framework* 8.

and the community, such as the *Drought Management Plan* (2005) (DMP) that was developed by the Department of Agriculture, Land Reform and Rural Development.[146] Drought risk management plans form part of the essential tools that government entities may utilise to respond to drought and drought risk quickly and responsively.[147]

The DMP will be discussed in more detail in chapter 3 of this study. However, to understand the country's position on drought risk management strategies, the DMP must be mentioned as a primary source.[148] The DMP provides critical features of drought risk management strategies that are essential for short- and long-term drought mitigation responses.[149] These features are: prevention, mitigation, preparedness, rehabilitation, and response to drought disasters.[150]

The mentioned features align with the *United Nations Convention to Combat Desertification* (1994) (UNCCD), an important document when discussing drought risk management, which South Africa ratified in 1997.[151] While the features remain at the forefront of drought risk management in South Africa and abroad, the content of another influential publication must be acknowledged: The *Windhoek Declaration for Enhancing Resilience to Drought in Africa* (2016) (Windhoek Declaration) was adopted in 2016 during the annual African Drought Conference, held in Namibia.[152] The conference was attended by African member states and those countries that are party to the UNCCD, and as such, the document is applicable to South Africa.[153] The Windhoek Declaration listed the following elements as guidelines for effective drought risk management:

1. Drought policy and governance for drought risk management;

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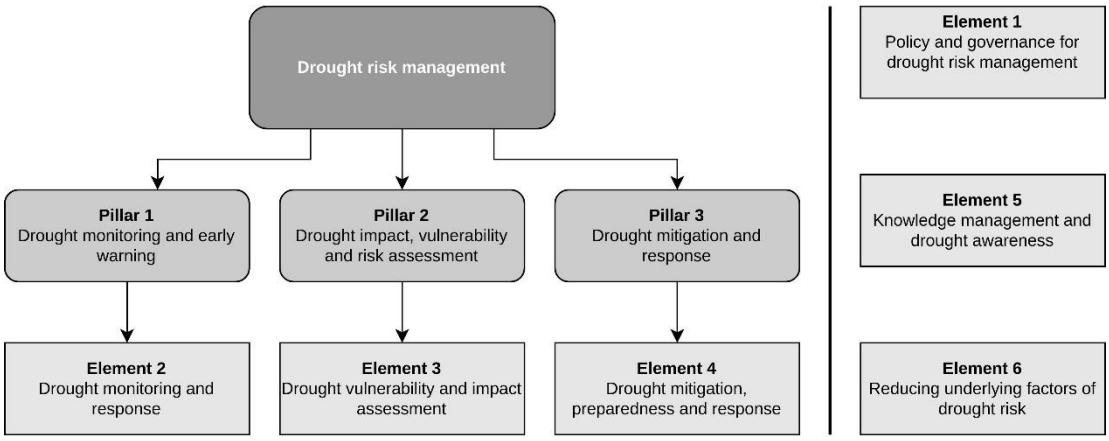
146 Department of Agriculture, Land Reform and Rural Development *Drought Management Plan* (DMP) 4.
147 DMP 5.
148 See para 3.4 below.
149 DMP 4.
150 DMP 4.
151 UNCCD *Date unknown* https://www.unccd.int/our-work-impact/country-profiles/south-africa.
152 African Drought Conference The Windhoek Declaration for Enhancing Resilience to Drought in Africa (Windhoek Declaration) 1.
153 The Centre for Coordination of Agricultural Research and Development for Southern Africa *Date unknown* https://www.ccardesa.org/knowledge-products/windhoek-declaration-enhancing-resilience-drought-africa.

2. Drought monitoring and early warning;
3. Drought vulnerability and impact assessment;
4. Drought mitigation, preparedness, and response;
5. Knowledge management and drought awareness; and
6. Reducing underlying factors of drought risk.[154]

In this study, these elements serve as guiding principles in the evaluation of drought risk management strategies. These principles are discussed below along the lines of according to the three internationally accepted pillars of drought risk management.[155] The three pillars of drought risk management and drought risk reduction emanate from the UNCCD's subsequent *Drought Resilience, Adaptation and Management Policy Framework* (2018) (DRAMP Framework) and the *Southern African Development Community's* document on *Drought Risk Management and Mitigation Strategy* (2022)(SADC DRIMMS).[156]

The first pillar relates to drought monitoring and early warning strategies; the second considers drought impact, vulnerability, and risk assessment; and the third pillar relates to drought response and mitigation measures.[157] The figure below demonstrates that the three pillars relate directly to the second, third and fourth elements listed in the Windhoek Declaration, while the first, fifth and sixth elements could intersect with the other elements.

Figure 2-1: Nexus between pillars and elements of drought risk management



154 Windhoek Declaration 1.
155 DRAMP Framework 1,2 and 6.
156 DRAMP Framework 1,2 and 6; Wilhite 2016 *Clim Res* 100; Southern African Development Community *Drought Risk Management and Mitigation Strategy* (SADC DRIMMS) 18-21.
157 SADC DRIMMS 18-21.

2.5.1.1 Pillar 1: Drought monitoring and early warning strategies

One of the key features of a satisfactory drought risk management plan is the implementation of both early warning strategies and drought monitoring initiatives.[158] Efficient early warning systems are necessary when bearing in mind the manner in which natural disasters such as drought spread.[159] These systems facilitate quick government response initiatives that are necessary when drought-related disasters cause harm to the well-being of communities.[160]

In order to monitor drought efficiently, role-players must regularly observe streamflow, precipitation, and ground water levels, to name a few.[161] With the assistance of adequate drought warning systems, government entities across the world can better prepare for the harmful consequences of drought by decreasing drought vulnerability in communities.[162] Subsequently, drought monitoring and early warning strategies form part of the crucial pillars of drought risk management. As such, pillar 1 encompasses not only the second element of drought risk management, but can also include the first and fifth element, as indicated in the figure above.[163] In terms of the first element, government laws and policies should make reference to the inclusion of monitoring systems as far as disasters such as drought are concerned, and enforceable documents such as the DMP should make specific reference to the inclusion of early warning systems.[164] As far as the fifth element is concerned, disaster risk awareness is essential to the first pillar to ensure that the public is aware of drought and other disaster risks within the community.[165]

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158 UNDRR *GAR Special Report on Drought* (2021) 75.
159 UNDRR *GAR Special Report on Drought* (2021) 75; DRAMP Framework 3.
160 UNDRR *GAR Special Report on Drought* (2021) 75.
161 DRAMP Framework 3.
162 UNDRR *GAR Special Report on Drought* (2021) 75.
163 See para 2.5.1 and Figure 2-1 above; Pulwarty and Sivakumar 2014 *Weather Clim. Extreme* 17.
164 For example, the *National Water Act* 36 of 1998 (NWA) refers to the Minster's power to establish early warning systems as part of the departments duty to make information available to the public - see s 145(2) of the NWA.
165 The DMP provides a discussion on the importance of public awareness in managing drought-related disasters. See - DMP 4, 7, 8, 10 and 15.

2.5.1.2 Pillar 2: Drought impact, vulnerability, and risk assessment

The goal of the second pillar focuses on the impact of drought on vulnerable sectors.[166] Vulnerability identification is necessary as drought may impact persons and the environment alike and it is necessary to determine which groups are most at risk, given the specific circumstances.[167] Furthermore, assessment of potential drought risk is also important as government entities must be able to determine future harm on urban and rural communities.[168]

The second pillar promotes the implementation and adaption of vulnerability assessments as part of national government initiatives to combat drought's adverse effects.[169] Vulnerability assessments are valuable in drought risk management strategies as they may be used to determine who might be the most at risk, should a country be impacted by a severe drought period.[170] Vulnerability assessments may identify groups of people generally marginalised by various circumstances, including women and children.[171] By identifying these groups, vulnerability assessments could provide valuable insights through which government entities may provide public assistance.

As such, the importance of pillar 3 is derived from the third element of drought risk management but can also be understood with reference to elements 1, 5 and 6.[172] In short, element 1 is applicable to pillar 2 in the sense that government laws and policies can place emphasis on the protection of more vulnerable communities and ensure that government entities can be held accountable for efficient impact assessments in South Africa.[173] The fifth element is also applicable as the public should be aware of the community's vulnerabilities to specific disasters.[174] Finally,

166 DRAMP Framework 13.
167 UNDRR *GAR Special Report on Drought* (2021) 76.
168 UNDRR *GAR Special Report on Drought* (2021) 76.
169 DRAMP Framework 3, 19.
170 SADC DRIMMS 20.
171 DRAMP Framework 20.
172 See Figure 2-1 above.
173 See para 3.4 below.
174 See para 3.4 below.

the sixth element is relevant as vulnerability assessments can aid in reducing the underlying factors of drought risk in communities.[175]

2.5.1.3 Pillar 3: Drought response and mitigation measures

The third pillar of drought risk management considers active responses to drought and drought risk. Drought response and mitigation measures incorporate elements within the first and second pillars of drought risk management, underscoring the importance of sector-specific measures.[176] Response initiatives should include the provision of community assistance and state intervention in situations where the supply of basic necessities have been put at risk due to the effects of disasters.[177] Mitigation strategies can be short to long term in duration and must consider the vulnerable sectors which are being affected, as mentioned above.[178] Drought response strategies aim to enhance drought resilience and determine the appropriate proactive responses necessary to minimise the effect of drought on communities.

The strategies under the third pillar focus on strategic interventions. Financial aid forms part of various response and mitigation measures where disasters such as drought cause great economic hardship to communities.[179] Other interventions include maintaining water supply systems and assisting communities in the promotion of their socio-economic rights to promote overall well-being.[180] Whereas the other pillars essentially focus on administrative tasks involved in drought risk management, the third pillar provides the scope for active involvement in risk reduction.[181] Therefore, the third pillar encapsulates the 4th element primarily but can also include element 1, 5 and 6 as these elements relate to active participation in drought risk management and mitigation strategies.[182]

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175 See para 3.4 below.
176 UNDRR *GAR Special Report on Drought* 2021 76.
177 DRAMP Framework 27.
178 DRAMP Framework xvi, 27.
179 UNDRR *GAR Special Report on Drought* 2021 76.
180 DRAMP Framework 3.
181 UNDRR *GAR Special Report on Drought* 2021 76.
182 See Figure 2-1 above.

2.6 Concluding remarks

The objective of this chapter was to conceptualise drought and examine the importance of drought risk management strategies. Potential definitions for drought were provided to establish a working definition but emphasis was placed on the four climatological categories of drought. To address the objective, the concept of drought was examined from a climatological perspective in the domain of environmental sciences and focused largely on literature related to drought classification and impact assessment. This chapter found that a universal definition of drought cannot encapsulate the occurrences of drought in a way that adequately includes all relevant aspects.[183] However, it was found that the definition provided by the WMO is sufficient for the purposes of this dissertation as the organisation provides a global perspective on the concept.[184]

It was further found that the four climatological categories of drought may be utilised to better understand drought in specific circumstances.[185] In the context of this study the categories of drought should form the basis of the understanding of drought as each category is distinct.

This chapter aimed to determine the impact of drought globally and did so by examining drought in the context of natural disasters that affect various aspects of life. This introduces the topic of drought risk management as a necessary tool to promote drought risk reduction.[186]

In further understanding droughts, this chapter also explained the presence of drought in South Africa with a focus on drought in South African urban areas. It was found that the consequences of drought are far-reaching and can affect cities across South Africa.

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183 See para 2.4 above.
184 See para 2.4 above.
185 See paras 2.2.1.1 - 2.2.1.3 above.
186 See para 2.3 above.

It is accepted that drought risk management requires the implementation of the three internationally established pillars of drought mitigation, these being early warning strategies, impact assessments, and mitigation responses. To utilise these pillars effectively in South Africa, government must implement drought risk management plans across all three spheres of government and regulate these plans through adequate laws and policies. The following chapter will consider the pillars established above through the lens of the framework of South African law.

Chapter 3 Drought risk management in South African national law and policy

3.1 Introduction

As stated in the previous chapter, drought risk management is necessary to improve water security.[187] Long-term drought relief in cities is essential to ensure a good quality life for all those living in urban areas. According to the provisions of the Constitution, the South African government must ensure that the harm caused by natural disasters is minimised and that drought risk reduction strategies are enforced.[188]

The objective of this chapter is to consider the areas of law relevant to drought risk management and to further determine the extent to which the South African regulatory framework provides for drought risk management on a national level. In South Africa, drought risk management plans are developed and implemented by the three spheres of government. Drought risk management is regulated by laws and policies such as the DMA, the DMP and other legal provisions to be discussed. In this chapter, "drought" is used interchangeably with the term "land degradation" and "desertification" to allow for a broader interpretation of the relevant law and policies.[189]

The relevant legal sectors include disaster risk law, environmental law and water law. As drought risk management is a specific form of disaster management caused by water scarcity that influences the environmental well-being of communities, and although other statutes may no doubt also find indirect application, the researcher has identified the above as the areas of law that are most directly relevant. While

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187 See para 2.3 above; DMP 5-6.

188 Schedule 4A of the Constitution; Chapters 3 – 5 of the DMA.

189 Land degradation and desertification may be viewed as two concepts that interlink with drought. In South Africa, drought, land degradation, and desertification are discussed as one topic in government documents such as the *Second National Action Programme for South Africa to combat desertification, land degradation and the effects of drought* (2018-2030) (NAP DLDD) that was published by the Department of Forestry, Fisheries and the Environment. Land degradation and desertification may both be exacerbated or caused by drought. As such, these concepts may be discussed synonymously with drought. See NAP DLDD.

the aforementioned fields form the legislative back bone for the discussion to follow, local government law will also be considered to establish the basis for the local government-specific analysis in chapter 4.

The pillars of drought risk management, identified in chapter 2 serve as a yardstick in critically evaluating the relevant regulatory framework of drought risk management in South Africa.[190] This is done below, followed by a discussion of the fit and relevance of the system of cooperative government in this regard.

3.2 Cooperative government for the making and implementation of relevant law

In South Africa, the primary legislative response to drought focuses on risk reduction.[191] In paragraph 2.3 above, it was established that drought risk responses are essential as rapid urbanisation and increasing poverty rates threaten people's well-being across the country.[192] Therefore, enforceable documents such as the DMP place a duty on government to implement proactive risk reduction strategies across the country.[193] Schedule 4A of the Constitution allocates the duty of disaster risk management on the national and provincial spheres of government.[194] International organisations such as the UNDRR underscore this responsibility.[195]

Different government structures are involved in drought risk management. Governmental institutions have been established to systemise disaster management strategies and national policies in South Africa.[196] These include the Intergovernmental Committee on Disaster Management and the National Disaster

190 UNDRR *GAR Special Report on Drought* (2021) xvi.
191 DMP 23.
192 See para 2.3 above.
193 DMP 21.
194 Schedule 4A of the Constitution.
195 UNDRR *Date unknown* https://www.undrr.org/risk-governance.
196 The International Federation of Red Cross *Analysis of legislation related to disaster risk reduction in South Africa* 6.

Management Advisory Forum. Under the DMA, the National Disaster Management Centre (NDMC) was established.[197] The key objective of the NDMC is:

> …to promote an integrated and co-ordinated system of disaster management, with special emphasis on prevention and mitigation, by national, provincial and municipal organs of state, statutory functionaries, other role-players involved in disaster management and communities.[198]

The NDMC oversees disaster management across all spheres of government and may also advise the private sector and communities on disaster prevention and mitigation strategies.[199] Furthermore, the NDMC must ensure that all state entities comply with the DMA and must oversee post-disaster recovery on a national and local level.[200]

It may be inferred that various national departments must cooperate to manage natural disasters.[201] It is also necessary for government structures to develop adequate drought risk management plans that other spheres of government could utilise through intergovernmental cooperation.[202] Although the spheres of government function semi-independently, cooperative governance could be essential in disaster mitigation and in fulfilling the state's constitutional obligations.

The principle of cooperative governance is enshrined in the Constitution.[203] Section 41(1)(b) states that all spheres of government are responsible for promoting the well-being of those residing in South Africa.[204] This is a noteworthy principle to consider when discussing drought risk management in urban areas such as Nelson Mandela Bay, which will be discussed in chapter 4 of this study.[205] Section 41(1)(h) of the Constitution sets out how the government spheres must interact with one

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197 A disaster management centre may be defined as a physical structure that furnishes the various activities necessary to ensure disaster management initiatives' implementation. These centres provide the necessary institutional arrangements and processes to effectively implement disaster management plans and strategies. See section 8 of the DMA; Buffalo City Metropolitan Municipality *Disaster Management Policy* 1.

198 Section 9 of the DMA.

199 Section 9 of the DMA.

200 Section 15(1)(b) of the DMA.

201 DMP 8,9, 13 and 17.

202 UNDRR *GAR Special Report on Drought* (2021) xix.

203 Chapter 3 of the Constitution.

204 Section 41(1)(b) of the Constitution.

205 See para 4.2 below.

another.[206] All three spheres of government must act in good faith, support one another and coordinate legislation.[207] Although the national and provincial spheres of government are responsible for disaster management, local disaster risk management is undertaken by municipalities.[208]

As the sphere of government that works the closest to the people, municipalities should, in theory, bear the responsibility to support communities in immediate disaster relief and recovery efforts.[209] As per section 10A of the *Local Government: Municipal Systems Act* 32 of 2000 (MSA), municipalities must administrate disaster risk response, recovery, and mitigation strategies, with adequate national and provincial government financial support.[210] While municipalities can govern administrative matters listed within the functional areas of the national and provincial government, the structures needed for local disaster-related issues are often unclear.[211]

The DMA does not require the establishment of specific disaster risk management structures in the event of local disasters.[212] If a local disaster reaches boiling point and municipalities cannot adequately cope, the national and provincial spheres of government must intervene and support that municipality.[213] This, however, proves difficult if municipalities have not previously established their own disaster management structures. Developing these structures as part of an emergency response requires time and resources that could be better utilised in post-disaster recovery.[214]

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206 Section 41(1)(h) of the Constitution.
207 Section 41(1)(h)(iii) and (iv) of the Constitution; Wright, Dube and Du Plessis 2022 *WCL* 118.
208 DMP 11 and 19; Sections 54 and 55 of the DMA.
209 Item 1.3.1.3 in Gen Not 654 in GG 27534 of 29 April 2005.
210 Section 10A of the *Local Government: Municipal Systems Act* 32 of 2000 (MSA); item 7.1 in Gen Not 654 in GG 27534 of 29 April 2005.
211 Section 156(4) and Schedule 4A of the Constitution; item 1.3.1.3 Gen Not 654 in GG 27534 of 29 April 2005.
212 Item 1.3.1.3 in Gen Not 654 in GG 27534 of 29 April 2005.
213 Sections 4(3)(a) and 57 of the DMA.
214 Item 1.3.1.3 in Gen Not 654 in GG 27534 of 29 April 2005.

Although this proves to be a shortcoming in legislation, section 154(1) of the Constitution provides for cooperative governance in support of municipalities:

> The national government and provincial governments, by legislative and other measures, must support and strengthen the capacity of municipalities to manage their own affairs, to exercise their powers and to perform their functions.[215]

This section puts an obligation on the national and provincial spheres of government to assist municipalities. As such, it may be inferred that as local disasters develop, the two other spheres of government must be ready to provide municipalities with financial and other assistance.

The discussion below considers the constitutional mandate and the regulatory framework for drought risk management to evaluate how national laws and policies provide for drought management in the South African context. As indicated earlier, this is done along the lines of the pillars of drought risk management.

3.3 The constitutional mandate for drought risk management

Section 7(1) of the Constitution confirms that the Bill of Rights in the Constitution is the cornerstone of South Africa's democracy and encapsulates the rights of all South Africans.[216] Section 7(2) of the Constitution establishes the role of government in fulfilling the rights contained in the Bill of Rights and the importance of protecting them.[217] The relationship between law and government is important for this study as South African drought risk management plans are implemented by government and are enforced through law and policy. Section 24 of the Constitution calls for the environment to be protected against environmental degradation for the benefit of present and future generations and that legislative and other measures should be taken in support of its protection.[218] As such, section 24 forms the legal basis of the South African DMP and the introduction of legislation such as the NEMA, which will be discussed in this chapter.[219] Furthermore, section 27(1)(b) of the Constitution

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215 Section 154(1) of the Constitution.
216 Section 7(1) of the Constitution.
217 Section 7(2) of the Constitution.
218 Section 24(a) and (b) of the Constitution.
219 DMP 4.

provides for access to sufficient food and water.[220] Sufficient water supply is an enforceable constitutional obligation, and a duty is thus placed on the State to take legislative measures to ensure the realisation of this right.[221]

3.4 Pillar 1: Drought monitoring and early warning strategies

Pillar 1 concerns the implementation of early warning- and drought monitoring strategies.[222] It is therefore prudent that the relevant sector laws provide a repository of information on disasters such as drought to implement efficient early warning strategies and to ensure adequate monitoring of disaster risks. The analysis below considers the extent to which the core of pillar 1 features in South African national disaster management, water and environmental law and policy.

3.4.1 National disaster risk law and policy

The DMA is accepted as the cornerstone of the regulatory framework for disaster risk management in South Africa.[223] The DMA was promulgated in 2002. Its main purpose, stated in its preamble, is to provide for:

> an integrated and coordinated disaster management policy that focuses on preventing or reducing the risk of disasters, mitigating the severity of disasters, emergency preparedness, rapid and effective response to disasters and post-disaster recovery;
> the establishment of national, provincial and municipal disaster management centres;
> disaster management volunteers; and
> matters incidental thereto.[224]

Although the DMA does not refer to drought *per se*, the *National Disaster Management Framework*, 2005 (NDMF) for disaster management categorises drought as one of several hazards that the DMA applies to.[225] Consequently, the DMA finds application in discussions surrounding drought risk management. While

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220 Section 27(1)(b) of the Constitution.
221 Section 27(2) of the Constitution.
222 See para 2.5.1 above.
223 Mamabolo and Sebola 2021 *BMR* 132.
224 Preamble of the DMA.
225 See introduction, 2.1.6 and 2.1.8 in GN 654 in GG 27534 of 29 April 2005.

the DMA is the basis for disaster risk law in South Africa, it incorporates very few of the elements ascribed to the first pillar of drought risk management.

One of the few references to early warning systems, for example, is found in section 17(2)(e) of the DMA.[226] According to this sub-section, the disaster management information system, for which the NDMC is responsible, must contain an electronic database on disasters and must include information on early warning systems.[227] In relation to monitoring systems, section 17(2)(a) states that the electronic database mentioned above should include up-to-date information on events and occurrences that may influence disaster occurrences in South Africa.[228] For example, the NDMC's National Joint Drought Coordinating Committee provides for a drought monitoring tool that utilises the Standardized Precipitation Index to monitor drought and average rainfall patterns.[229] In turn, this information may be utilised by national, provincial and local government for drought risk management strategies.

While the DMA is somewhat lacking on information relevant to the first pillar, the NDMF provides a more well-rounded discussion on the practical implementation of disaster risk management.[230] Section 6(1)(a) of the DMA states that the Minister responsible for disaster management must prescribe a NDMF as national policy that should be based on the following sentiment:

> The national disaster management framework is the legal instrument specified by the Act to address such needs for consistency across multiple interest groups, by providing 'a coherent, transparent and inclusive policy on disaster management appropriate for the Republic as a whole'.[231]

It is necessary to note that the NDMF refers to several aspects of the first pillar and does so by listing disaster monitoring and early warning systems as part of the frameworks key performance areas.[232]

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226 Section 17(2)(e) of the DMA.
227 Section 17(2)(e) of the DMA.
228 Section 17(2)(a) of the DMA.
229 National Joint Drought Coordinating Committee 2023 https://tinyurl.com/bdeznu9a;
230 Section 6 of the DMA; Gen Not 654 in GG 27534 of 29 April 2005.
231 Introduction in GN 654 in GG 27534 of 29 April 2005.
232 Item 2.3 and 4.1 in GN 654 in GG 27534 of 29 April 2005.

Natural disasters are not uniform in nature, so government entities must have adequate monitoring systems in place that can observe the changing patterns of drought and other disasters.[233] Section 17(1) of the DMA is therefore applicable in disaster risk monitoring strategies as it requires government and role-players to keep information and records on disasters and underlying risk factors.[234] Plans such as the DMP provide further information on drought monitoring strategies.[235]

The DMP emphasises the importance of drought monitoring and early warning systems under its response initiatives and strategic objectives.[236] One of the strategic objectives of the DMP is that the key role-players must monitor drought through a similar information management system, as established by the DMA.[237] Another objective is that monitoring strategies should compile updated drought indicator maps with relevant information on drought occurrences.[238] Finally, early warning systems form part of another DMP objective whereby such systems must be implemented and maintained.[239] As such, the objectives of the DMP seem to complement pillar 1 of drought risk management.

According to the DMP, the Department of Agriculture, Land Reform and Rural Development is responsible for maintaining drought risk management plans and providing efficient monitoring systems and information management.[240] While this department acts as the main organ of state responsible for these plans, it does so by working with the NDMC and other organs of state in an integrated institutional capacity.[241]

While the NDMF refers to other sections that it deems relevant to monitoring strategies, it can be argued that there may be a difference in understanding as far as the interpretation of the Act is concerned. The sections in question refer

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233 Item 2.3.1 in Gen Not 654 in GG 27534 of 29 April 2005.
234 Section 17(1) of the DMA; Item 2.3.1 in Gen Not 654 in GG 27534 of 29 April 2005.
235 DMP 6.
236 DMP 6, 14 and 17.
237 DMP 6.
238 DMP 6.
239 DMP 6.
240 DMP 10.
241 DMP 13.

to monitoring but the focus emphasises disaster management plans and not the disasters themselves.[242] For the purposes of this discussion, the risk monitoring system provided for by the NDMF is instead considered.[243] The risk monitoring system established by the NDMF refers to three areas of monitoring: hazard tracking, vulnerability monitoring and disaster event tracking.[244] Vulnerability monitoring will be discussed below under the second pillar of drought risk management.[245]

Hazard and disaster event tracking is utilised when observing a change in disaster risk patterns or in observing events that may trigger disaster risks.[246] These systems are essential in disaster management and because of this, the national and provincial spheres of government must have adequate systems in place that can track disaster-related information.[247] Inadequate early warning systems and a lack of clear communication between the three spheres of government and other important role-players arguably inhibit quick response initiatives.

3.4.2 National water law and policy

Water law and policy play a vital role in all discussions surrounding the regulatory framework of drought risk management. Before the relevant legislation can be adequately examined, it is necessary to establish the executive authority responsible for water resource management in South Africa. According to section 3 of the *National Water Act* 36 of 1998 (NWA), the national sphere of government acts as the public trustee of the country's water resources.[248] The NWA's main purpose is to protect South Africa's water resources.[249] When protecting water resources, government must take into account factors such as equitable access to water and

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242 The National Disaster Management Framework (NDMF) refers to ss 17(1), 21, 34, and 48 of the DMA. Also see item 2.3.1 in Gen Not 654 in GG 27534 of 29 April 2005.
243 Item 2.3.1 in Gen Not 654 in GG 27534 of 29 April 2005.
244 Item 2.3.1 in Gen Not 654 in GG 27534 of 29 April 2005.
245 See para 3.5.1.
246 Item 2.3.1.1 in Gen Not 654 in GG 27534 of 29 April 2005.
247 Item 2.3.2 in Gen Not 654 in GG 27534 of 29 April 2005.
248 Section 3 of the NWA.
249 Section 2 of the NWA.

the management of drought and floods.[250] It is the responsibility of the national sphere of government to oversee various role-players in managing access to water resources.[251]

As far as natural disasters such as droughts are concerned, access to information is one of the key focus areas in mitigation efforts. Section 145 of the NWA places a duty on water management institutions to make information relevant to the Act available to the public.[252] This should include information on flood risks or droughts, for example.[253] Water management institutions refer to several catchment management agencies that can accumulate water-related information.[254] Information on flood risk, for example, is essential when monitoring severe droughts, as drought can cause ecological degradation that may cause flash floods.[255]

The NWA further gives authority to the Minister responsible for water, to develop and implement early warning systems as they relate to drought occurrences.[256] While the NWA includes these provisions on issuing early warnings, confusion may occur as other government sectors are tasked with the same responsibilities. For example, the NDMC and the Department of Agriculture, Land Reform and Rural Development are equally tasked with issuing early warnings relevant to impending or immediate disasters that may affect the country or the agricultural sector.[257] The question may be asked as to which organ of state would be in the best position to establish a relevant early warning system for specific drought occurrences. The purpose of delegating this to one organ of state would be to avoid vague dual channels of information and to ensure departmental accountability.

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250 Section 2(k) of the NWA.
251 Steyn 2022 *SAPL* 6.
252 Section 145 of the NWA.
253 Section 145(1)(a) and (b) of the NWA.
254 Section 1(1)(xxvi) of the NWA.
255 See para 2.4 above.
256 Section 145(2) of the NWA.
257 See para 3.3.1; Parliamentary Monitoring Group 2023 https://pmg.org.za/committee-question/22223/.

The WSA may also be considered in terms of pillar 1.[258] Although the WSA does not provide relevant information on early warning systems, it does provide for information sharing, water resource monitoring and interventions.[259] The WSA confirms the relevance of a national information system as far as water resources are concerned:

> The purpose of the national information system is—
> (a) to record and provide data for the development, implementation and monitoring of national policy on water services; and
> (b) to provide information to water services institutions. consumers and the public…[260]

Access to water is a constitutional right, and the WSA was promulgated to help actualise this right.[261] In this instance, monitoring refers to the observation of water service authorities or institutions to ensure that the relevant authorities or institutions comply with the norms and standards of the WSA.[262] To do so, these institutions must make available any information that the Minister responsible for water is entitled to request, including resources such as the water service institutions' books and records.[263]

The WSA provisions may not directly apply to the first pillar of drought management *per se*, but it does provide value to the discussion. The Act provides the support needed to reinforce the indispensability of providing access to basic water supply.[264] It further emphasises the need for performance monitoring in water service institutions to uphold the quality of offered services.[265]

One of the primary tools utilised by the national sphere of government is the National Integrated Water Information System (NIWIS).[266] The NIWIS was

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258 The *Water Services Act* 108 of 1997 (WSA).
259 Sections 62, 63 and 68 of the WSA.
260 Section 68(a)-(b) of the WSA.
261 Section 27(1)(b) of the Constitution; preamble of the WSA.
262 "Water services institution" refers to any water board as well as any water services authority, provider or committee. "Water services authority" refers to any municipality that is responsible for access to water supply - see ss 1(xx), (xxi) and 62(1) of the WSA.
263 Section 62(2) of the WSA.
264 Section 27(1)(b) of the Constitution; sections 2 and 3 of the WSA.
265 Sections 2(f) and 62 of the WSA.
266 Department of Water and Sanitation *Date unknown* https://www.dws.gov.za/niwis2/; *The White Paper on Water Supply and Sanitation Policy* 27.

established to provide relevant information on South Africa's water resources to ensure proper reporting on the South African water value chain.[267] The NIWIS includes disaster management information that focuses on several areas of drought risk management. These information channels provide information on drought affected settlements and drought and dam status overviews.[268]

3.4.3 National environmental law and policy

Although drought risk management takes place primarily within disaster risk and water law, environmental law regulations could also be applied to drought management. The NEMA is the primary law that regulates environmental matters.[269] While the NEMA does not contain any explicit provisions related to droughts specifically, it does include several sections pertinent to compliance monitoring.[270] Compliance monitoring is a necessary tool for maintaining good environmental governance.[271] Compliance monitoring requires that government entities and private individuals abide by the environmental principles set out in section 2 of the NEMA.[272] Although these principles are essential to environmental management, none are relevant to pillar 1 of drought risk management. As previously discussed, pillar 1 focuses on early warning systems and monitoring strategies, while the principles listed in the NEMA focus on ensuring sustainable development.[273]

Even though pillar 1 cannot be directly applied to the principles set out in the NEMA, other environmental laws and policies may be regarded as more relevant in terms of drought risk management. As drought occurrences are exacerbated by climate change and rising temperatures, it is essential that South African legislation provides for climate regulation. The Department of Forest, Fisheries and the Environment introduced the Climate Change Bill (B9-2022) (Climate Change Bill) in Parliament in

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267 Department of Water and Sanitation *Date unknown* https://www.dws.gov.za/niwis2/.
268 Department of Water and Sanitation *Date unknown* https://www.dws.gov.za/niwis2/.
269 Preamble of the NEMA.
270 Section 3(2)(b)(ii) of the NEMA.
271 Department of Forestry, Fisheries and the Environment *Date unknown* https://www.dffe.gov.za/branches/regulatorycompliance_sectormonitoring.
272 Section 2(1)-(4) of the NEMA.
273 The relevance of these principles will be discussed later on in paragraphs 3.4.3 and 3.5.3, as they relate to pillars 2 and 3. See s 4 of the NEMA; para 3.4.3 and 5.3.3.

early 2022.[274] The Bill was officially passed by the National Assembly on the 24th of October 2023 and will be the first legislative framework that primarily focuses on the effects of climate change within South Africa once enacted into law.[275] The Climate Change Bill does not directly refer to drought risk management, and only refers broadly to disaster risk assessments once in section 18(5)(c).[276] Still, the Bill may be of relevance to the present discussion. It alludes to the need for early warning systems in the pursuit of adaption scenarios and the need for monitoring assessments relating to climate change, for example.[277]

To anticipate the need for adaptation strategies that are related to climate change, early warning systems play an important role that must be utilised by government.[278] However, the Climate Change Bill only briefly mentions the need for early warning strategies and does not expand further. Instead of focusing on the Climate Change Bill, one may consider the role of the *National Climate Change Adaptation Strategy* (NCCAS).[279] The NCCAS reaffirms the role of the NDMC in providing information on drought through the provision of early warning systems.[280] The NCCAS provides further information on practical steps government entities can take to disseminate information relevant to climate change and other related risks.[281] These include the establishment of a national climate information and early warning system and the development of municipal early warning systems, to mention a few.[282] Furthermore, the NCCAS confirms that SAWS plays a vital role in providing information relevant

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274 Department of Forestry, Fisheries and the Environment *Climate Change Bill (B9-2022)* (Climate Change Bill).

275 Parliament of the Republic of South Africa 2023 https://tinyurl.com/57wcuu2z; University of Cape Town and the African Climate and Development Initiative *Comments on the Climate Change Bill* 4; Joubert and Rushton 2022 https://www.fasken.com/en/knowledge/2022/06/9-key-aspects-of-south-africas-much-anticipated-climate-change-bill.

276 Section 18(5)(c) of the Climate Change Bill; see para 3.5.3 below for a further discussion on this section.

277 Sections 17(2)(b) and 18(3)(a) of the Climate Change Bill.

278 Section 17(2)(b) of the Climate Change Bill.

279 Department of Forestry, Fisheries and the Environment *National Climate Change Adaption Strategy* (NCCAS).

280 Department of Forestry, Fisheries and the Environment NCCAS 32.

281 Department of Forestry, Fisheries and the Environment NCCAS 35.

282 Department of Forestry, Fisheries and the Environment NCCAS 36.

to drought and do so by sharing drought-related information through a so-called Drought Monitoring Desk.[283]

3.5 Pillar 2: Drought impact, vulnerability and risk assessment

Pillar 2 relates to vulnerability, risk and impact assessment in drought management.[284] The three predetermined areas of law must provide laws and policies on drought-related risk assessments. In turn those areas of law must consider society's vulnerability or public safety as the cornerstone for efficient disaster strategies. The discussion to follow will consider the extent to which law and policy provides for the content of pillar 2 in national disaster risk, water and environmental law.

3.5.1 National disaster risk law and policy

Under the second pillar of drought risk management, emphasis is placed on vulnerability, impact, and risk assessments.[285] Drought and other natural disasters affect many communities and individuals, but a specific reference must be made to those in vulnerable and/or marginalised groups across South Africa. In the context of disaster management, the DMA defines vulnerability as follows:

> "vulnerability" means the degree to which an individual, a household. a community or an area may be adversely affected by a disaster.[286]

In South Africa, drought risk vulnerability stems from several factors, such as poverty and economic hardships, urbanisation, and overall low precipitation levels.[287] As stated by the DMP, drought education is generally absent or *sub-par*, at best.[288] This influences the rise in ecological degradation, land degradation, and desertification.[289] It therefore becomes essential to distribute information on disaster

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283 SAWS *Monthly Drought Bulletin* 1-7; NCCAS 32.
284 See para 2.6.2 above.
285 DRAMP Framework 19.
286 Section 1 of the DMA.
287 DMP 5.
288 DMP 8.
289 DMP 5.

risks to vulnerable communities, as per section 17(1)(d) of the DMA.[290] Furthermore, opportunities must be taken to educate these communities on drought mitigation and risk reduction strategies.[291] The NDMF sets out a comprehensive summary of "disaster risk" that adequately describes the concept of vulnerability in drought and other related disaster management strategies:

> South Africa faces many different types of risk on a daily basis, including health risks, environmental risks, financial risks and security risks. However, disaster risk specifically refers to the likelihood of harm or loss due to the action of natural or other hazards or other external threats on vulnerable structures, services, areas, communities and households.[292]

It can therefore be inferred that the concept of vulnerability assessments relates to the understanding of who may be adversely impacted by disaster risk and what can be done to mitigate this risk.[293] Drought impact generally integrates with drought vulnerability as it examines the harm caused by drought on all affected areas. One of the objectives of the DMP is to establish adequate drought management plans that may utilised in minimising drought impact and conserving the environment and preserving human well-being.[294]

While drought risk awareness is essential, so is information on at-risk areas, especially if the information concerns areas and groups of people in more risk prone areas.[295] For this reason, it is important that the electronic database hosted by the NDMC is kept up to date on disaster, potential disaster risks and disaster-vulnerable communities in South Africa, as stated in section 17(2) of the DMA.[296] The DMA refers to prevention and mitigation initiatives and states that the NDMC must provide role-players in risk reduction with guidance on disaster impact potential in vulnerable communities.[297] As can be seen,

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290 Section 17(1)(d) of the DMA.
291 Item 5.4.5 in Gen Not 654 in GG 27534 of 29 April 2005.
292 Item 2.1 in Gen Not 654 in GG 27534 of 29 April 2005.
293 DRAMP Framework 19.
294 DMP 6.
295 Section 17(2)(f) of the DMA.
296 Section 17(2) of the DMA.
297 Section 20(1)(a)(ii) of the DMA.

vulnerability and impact assessments are key features of pillar 2 on drought risk management. The remaining feature of pillar 2 refers to risk assessment.

The DMP provides a clear description of the importance of risk assessment in drought risk management strategies.[298] To ensure that role-players produce adequate strategies, research must first be done to produce enough information on the relevant risks so that efficient decision-making discussions can take place.[299] Through adequate risk assessments, policy makers and other officials should be well informed when considering the next step in drought management.[300] This facilitates the ever important evidence based decision making.

3.5.2 National water law and policy

Water is necessary to sustain an adequate form of living.[301] As a result, laws and policies must take into consideration the impact of drought on urban and rural communities. The purpose of the NWA, for example, is to support the sustainable use of water for all South Africans through efficient water resource management and by ensuring the quality of such water resources.[302] To do so, focus must be placed on equitable access to water resources and water resource management that considers the vulnerability factors of every community.[303] With regards to drought risk management, vulnerability does not necessarily only refer to marginalised communities but to all who reside in areas that are not adequately protected against the effects of drought and water scarcity.[304]

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298 DMP 13.
299 DMP 13.
300 DMP 13.
301 See para 4.3 below.
302 Preamble of the NWA.
303 National Water Resource Strategy (2012) 12, 13 and 77.
304 Meza, Hagenlocher and Naumann *et al* Drought vulnerability indicators for global-scale drought risk assessments 2.

Several provisions of the NWA and the WSA can be relied on to establish the government's duty to advance the protection of water resources and promote access to water in South Africa.[305]

The *White Paper on Water Supply and Sanitation Policy,* 1994 (WSSP) discusses vulnerable communities in the scope of drought management, emphasising the importance of drought management for the well-being of the people.[306] According to the WSSP, the more vulnerable communities include those living in poverty-stricken areas.[307] Drought vulnerability becomes a greater risk as instances of poor water management exacerbate dry circumstances.[308] In some cases, water scarcity occurs in areas where drought did not necessarily cause the strain but rather the lack of adequate water supply system management.[309]

Vulnerability assessments play a critical role in drought risk management but can also be observed in laws, policies, and strategies that focus on access to water and water availability. For example, while the NWA does not provide for vulnerability assessments as a factor for adequate water management, the *National Water Resource Strategy 3* (NWRS-3) includes provisions applicable to this discussion.

For example, the NWRS-3 provides the scope for several water and sanitation regulation aspects and emphasises the role of equity as the guiding principle for achieving adequate water resource regulations.[310] The NWRS-3 states that all regulations related to water services must promote access to water and water use in an equitable manner that underscores the inclusion of vulnerable communities.[311] The desire to ensure equitable access to water services may directly relate to section

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305 The WSA states that every individual has the right to access of basic water supply and sanitation and that every water service and authority must take reasonable measures to realise this right - see s 3(1)-(3) of the WSA. The NWA emphasises that the purpose of the Act is to protect the country's water resources and takes into consideration factors such as basic needs of the people, to promote access to water, and to do so for the beneficial interest of the public - see s 2(a)(b) and (d) of the NWA.

306 Department of Forestry and Water Affairs *White paper on water supply and sanitation* (1994) (WSSP) 29.

307 WSSP 29.

308 WSSP 29.

309 WSSP 29.

310 NWRS-3 43.

311 NWRS-3 43.

9 of the Constitution.[312] This section states that everyone is equal before the law and as such, is entitled to equal benefit of the law and that the equal enjoyment of human rights must be promoted through legislative and other means.[313]

The NWRS-3 further includes a provision on the policy objectives that relate to water use and services.[314] The Strategy establishes the role of the National Water and Sanitation Master Plan (2018) (NWSMP) in aligning the objectives of laws and polices related to water management.[315] While the NWSMP does not address vulnerability assessments, it provides a general discussion on the impact of drought on South African communities.[316] To comprehend the role of legislation on drought impact assessments, one must first understand the effect of drought on South African communities. Drought impacts several socioeconomic sectors in South Africa, such as the agricultural sector, food and water security and community well-being, to name a few.[317]

From a local government perspective, every municipality in South Africa must provide a water services development plan (WSDP) in terms of section 12 of the WSA.[318] The purpose of a WSDP is to account for the manner in which municipalities will provide water services within a five-year cycle.[319] WSDP's must be included in municipal IDPs and should set out vulnerabilities that water supply systems may experience.[320]

The DMP reiterates the need for decision-makers to be fully aware of the risks associated with drought occurrences.[321] According to the DMA and the DMP,

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312 Section 9 of the Constitution.
313 Section 9(1) and (2) of the Constitution.
314 NWRS-3 98.
315 NWRS-3 98; Department of Water and Sanitation *National Water and Sanitation Master Plan* (NWSMP).
316 NWSMP 2.
317 Drought Impacts Toolkit *Date unknown* http://tinyurl.com/2s4d549t; NWSMP 2.
318 Section 12(1) of the WSA.
319 Sections 12(1)(a) and 13(c) of the WSA.
320 Sections 12(1)(a) and 13 of the WSA.
321 DMP 13.

government entities must assess the severity and seriousness of any potential disaster to prepare their relief and mitigation efforts better.[322]

Awareness of the potential impact of drought disasters in South Africa assists key role-players in determining the options available to mitigate the associated risks.[323] Drought and water scarcity can be exacerbated by poor water supply management and infrastructure damage to water supply sources, such as dams.[324] An environmental impact assessment (EIA) is a regulatory/planning instrument that is utilised to determine the overall impact of proposed developments, such as dams, on the environment.[325] Poor dam infrastructure can pose a risk to downstream inhabitants as droughts and floods could be caused if dam walls are not maintained properly.[326] The impact of such a drought could lead to a variety of health issues for communities if proper water and sanitation supplies are negatively impacted.[327]

Regarding the NWA, an EIA must be requested by the Minister responsible for waterworks if the Minister establishes a waterwork for the benefit of the public.[328]

3.5.3 National environmental law and policy

To an extent, the NEMA may be applicable to the second pillar, as the purpose of the Act is to provide sufficient environmental cooperative governance across all three spheres of government.[329] The NEMA provides several environmental principles that government can use to guide decisions that could potentially affect the environment.[330] Examples of these principles include utilising environmental

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322 Section 23(1)(a) of the DMA; DMP 9.
323 DMP 13.
324 Department of Health *Management of Environmental Impact Assessments (EIA) of Proposed Development Activities: A guiding handbook for Environmental Health Practitioners* 37.
325 Department of Environmental Affairs *20 Years of Environment Impact Assessment in South Africa* 1,2.
326 Department of Health *Management of Environmental Impact Assessments (EIA) of Proposed Development Activities: A guiding handbook for Environmental Health Practitioners* 37.
327 Department of Health *Management of Environmental Impact Assessments (EIA) of Proposed Development Activities: A guiding handbook for Environmental Health Practitioners* 37.
328 A waterwork may be defined as any form of equipment that is installed or used in relation to water usages. Examples include water transfer schemes and storage dams - see s 1(1)(xxviii) and chapter 11 of the NWA.
329 The preamble of the NEMA.
330 Section 2 of the NEMA.

management to place people and their needs at the forefront and to ensure that development is socially, environmentally and economically sustainable.[331] The core of these principles indirectly relate to risk and vulnerability assessments. Section 2(4)(b) of the NEMA states that environmental management must be integrated and should consider all aspects of the environment that the decisions of relevant role-players may impact.[332] If one considers a broader interpretation of this section, it may be deemed applicable to risk and impact assessments because government entities should consider the extent of harm that could be caused by poor water-resource management of, for example, municipal dams or desalination plants.[333]

Although the discussion above provides an example of how certain aspects of environmental law may be relevant for the second pillar of drought risk management, the sources are limited, and the immediate relevance is lacking. It may be argued that there are no environmental laws or policies directly relevant to the discussion on pillar 2, and instead, for present purposes, the focus should be placed on disaster risk and water law.

3.6 Pillar 3: Drought response and mitigation measures

Pillar 3 focuses on drought response and mitigation measures and can be viewed as the most proactive pillar of drought risk management.[334] Pillar 3 of drought risk management incorporates strategic interventions, response initiatives, and mitigation strategies.[335] Therefore, it is crucial that South African laws and policies incorporate provisions which are attentive to active implementation responses to combat drought risk-related disasters. The extent to which South Africa laws and policies provide for mitigation and response initiatives is discussed next.

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331 Section 2(2)-(3) of the NEMA.
332 Section 2(4)(b) of the NEMA.
333 See para 4.3.1.3 below.
334 See para 2.5.1.3 above.
335 See para 2.5.1.3 above.

3.6.1 National disaster risk law and policy

The purpose of the three pillars of drought risk management is to guide all three spheres of government towards the pragmatic implementation of risk reduction strategies.[336] Pillar of drought risk management provides practical steps that should be taken by government and other role-players to ensure that the impact of drought on people and the environment is minimised.[337] The DMA establishes the duties of the NDMC in disaster response and mitigation.[338]

The NDMC is responsible for the development of guidelines that integrate and support the response and mitigation goals of disaster management through strategies developed by the relevant organs of state.[339] In terms of section 20 of the DMA, the NDMC has a legal duty to provide organs of state and others with guidance on several aspects of disaster risk management, that focus specifically on prevention and mitigation measures.[340] According to the DMA, the NDMC must do so by establishing levels of risk, observing the impact of disasters on at-risk communities, and propose how these communities can minimise drought risk impact.[341] Furthermore, the NDMC must promote the development of mitigation and prevention initiatives and support the integration of these initiatives in other developmental plans.[342] Finally, according to section 20(2) of the DMA, the NDMC must work with the three spheres of government and the private sector to promote behaviour that supports risk-avoidance.[343]

As this section establishes the authority of the NDMC, it is important to note that state departments may oversee disaster management plans, such as the DMP.[344] The Department of Agriculture, Land Reform and Rural Development developed the

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336 DRAMP Framework 3.
337 DRAMP Framework 18.
338 Section 9 of the DMA.
339 Section 19(e) of the DMA.
340 Section 20 of the DMA.
341 Section 20(1)(a)(i)-(iii) of the DMA.
342 Section 20(b) and (c) of the DMA.
343 Section 20(2) of the DMA.
344 Section 20(2) of the DMA; DMP 7.

DMP in 2005 to answer the call for governmental responsibility in drought risk.[345] While the Department of Agriculture, Land Reform and Rural Development may take the lead with these plans and initiatives, the DMA confirms that the NDMC must, in all instances, monitor the response strategies that are established by other state entities and private individuals.[346] The NDMC furthermore has an obligation to ensure that these drought mitigation initiatives are integrated with other developmental plans.[347] Municipal integrated developmental plans that relate to drought and disaster risk management will be further discussed in chapter 4 of this study.[348]

Continuing with the discussion on response and mitigation, the electronic database forms part of the essential mitigation tools that the NDMC and other role-players utilise in disaster risk management.[349] The database ensures that the NDMC provides up-to-date information on disasters and related risks and can inform organs of state on applicable mitigation and prevention strategies.[350] While the establishment of such a database is enshrined in the DMA, information around the establishment of these systems are vague and possibly outdated.[351]

Kunguma[352] argues that disaster risk centres across South Africa lack adequate information systems and that absent up-to-date systems may hinder disaster management implementation strategies. While the DMA states that information systems must be developed and maintained, the NDMC has yet to establish databases to the extent that they would be valuable to all South African communities.[353]

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345 DMP 7 and 10.
346 Section 21(a)(ii) of the DMA.
347 Section 21(b) of the DMA.
348 See para 4.1.2.1 below.
349 Section 17 of the DMA.
350 Sections 17(1)(a) and 17(2)(d) of the DMA.
351 The International Federation of Red Cross *Analysis of legislation related to disaster risk reduction in South Africa* 48.
352 Kunguma 2022 *SAJIM* 1,4 and 9.
353 The International Federation of Red Cross *Analysis of legislation related to disaster risk reduction in South Africa* 48.

The NDMF is one of the most reliable sources of information on response and mitigation initiatives. Section 7(2) of the DMA states the importance of the NDMF and, amongst other duties, notes that:

> The national disaster management framework must reflect a proportionate emphasis on disasters of different kinds, severity and magnitude that occur or may occur in southern Africa, place emphasis on measures that reduce the vulnerability of disaster-prone areas, communities and households, and must –
>
> (b) establish prevention and mitigation as the core principles of disaster management.[354]

The NDMF has several crucial provisions on disaster management. For example, the DMA requires the NDMF to include provisions on a framework that organs of state may use to fund disaster management strategies.[355] Funding mechanisms are necessary to implement proper disaster risk response strategies across South Africa.[356]

The NDMF further defines a disaster response as the assistance provided to communities and those affected after or during a disaster.[357] The goal of a disaster response is to assist with the provision of basic services and may be either short- or long-term responses.[358] Regarding drought risk management responses, the DMP focuses on response and recovery during drought disasters.[359] All strategies to reduce the impact of drought disasters must consider a list of factors and issues as set out by the DMP response objectives.[360] These include adequate research plans, drought predictions and monitoring systems, appropriate response tools and the impact of environmental changes on drought occurrences.[361]

Drought recovery is an essential element of drought response and mitigation efforts. However, the DMP focuses heavily on the role of agricultural sectors in drought recovery plans.[362] Although the agricultural sector is essential for sustainable well-

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354 Section 7(2)(b) of the DMA.
355 Section 7(2)(k) of the DMA.
356 Introduction in Gen Not 654 in GG 27534 of 29 April 2005.
357 Gen Not 654 in GG 27534 of 29 April 2005.
358 Gen Not 654 in GG 27534 of 29 April 2005.
359 DMP 14-15.
360 DMP 14.
361 DMP 14.
362 DMP 15.

being in South Africa, it can be argued that the DMP places more emphasis on farming communities than urban and rural communities. According to the NDMF, several state departments are responsible for effective drought risk management.[363] Responsible state departments include the Department of Agriculture, Land Reform and Rural Development, the Department of Cooperative Governance and Traditional Affairs and other state organs responsible for sectors that may be harmed by drought.[364] While the Department of Agriculture, Land Reform and Rural Development may not be the only role-player, particular reference is made to the strategic interventions that the Department is responsible for.[365] The Department of Agriculture, Land Reform and Rural Development is given specific provisions within the DMP to source funds from the National Treasury for drought assistance programmes.[366] Several other strategic interventions by the Department of Agriculture, Land Reform and Rural Development focus on the agricultural sector, and other sectors do not seem to receive the same guidelines for drought recovery in terms of the DMP.[367]

The DMA sets out several objectives relevant to response strategies and focuses on disaster management plans, strategies and reports that involve mitigation and prevention initiatives.[368] Section 19 of the DMA states that the NDMC must regularly develop guidelines and must review relevant stakeholders' disaster risk management plans[369]. The purpose is to ensure that all national, provincial, and local disaster risk plans are aligned and that the coordination and implementation of these plans are dealt with effectively.[370]

Disaster management plans must consider several relevant factors, such as the magnitude of the potential disaster, the extent thereof and the expected

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363 Sections 7(2)(d) and (f), 19 and 20 of the DMA; Gen Not 654 in GG 27534 of 29 April 2005.
364 Item 4.3.1 in Gen Not 654 in GG 27534 of 29 April 2005.
365 Item 3.1.1 in the DMP.
366 Item 3.1.1 in the DMP.
367 Item 3.1.1 in the DMP.
368 Section 19-24 of the DMA.
369 Section 19(a) and (b) of the DMA.
370 Section 19(c)-(e) of the DMA.

manageability of a disaster.[371] In the context of drought occurrences, because droughts can occur across a large geographical area that can influence the manageability of the risk, drought disasters are influenced by both the magnitude of the occurrence and the potential impact.[372] As the primary example of drought risk management, the DMP states that a response strategy for drought risk should include four focus areas:

> …institutional arrangements, integrated institutional capacity, disaster risk assessment and reduction planning, and response and recovery.[373]

The DMP is the foremost mechanism for drought risk management as it focuses on guiding drought-related interventions on a national, provincial, and local level.[374] According to the DMP, there are four basic components that are essential for drought mitigation in South Africa.[375] These include raising awareness, avoiding harm, implementing early warning systems, and promoting the rehabilitation of areas affected.[376] One can thus observe some overlap with pillar 1.

The importance of drought and other disaster management plans can be seen through response and mitigation strategies involving a financial component.[377] Section 25(1)(vi) of the DMA states that disaster management plans must provide emergency plans and contingency strategies related to disasters.[378] These plans must include information on the finances needed to support these strategies.[379]

Financial assistance is vital to enable the implementation of disaster relief strategies across the national, provincial and local spheres.[380] Section 56 of the DMA is based on sections 16 and 25 of the *Public Finance Management Act* 1 of 1999 which addresses emergency funding in the event of a disaster.[381] According to section 56

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371 Item 3.2.1 in Gen Not 654 in GG 27534 of 29 April 2005.
372 Item 3.2.1 in Gen Not 654 in GG 27534 of 29 April 2005.
373 Executive summary in the DMP.
374 Introduction to the DMP.
375 DMP 9.
376 DMP 9.
377 Section 25(1)(vi) of the DMA.
378 Section 25(1)(vi) of the DMA.
379 Section 25(1)(vi) of the DMA.
380 Section 56(2) and (4) of the DMA.
381 Section 56(1) of the DMA; sections 16 and 25 of the *Public Finance Management Act* 1 of 1999.

of the DMA, all three spheres of government may contribute financially to response, recovery, and rehabilitation strategies for disaster occurrences. However, to utilise such funds, several factors may be taken into consideration. These factors include whether any steps were taken to mitigate the disaster occurrence, whether a disaster could have been avoided, what financial assistance is available from the public, and to what extent the severity of the disaster may have affected the community.[382] Section 56(2)(b) of the DMA is noteworthy in this regard because it provides that:

> the cost of repairing or replacing public sector infrastructure should be borne by the organ of state responsible for the maintenance of such infrastructure.[383]

With regards to the focus on drought, this subsection may be significant. Dams for example, are regarded state infrastructure that is maintained by the national department responsible for water resources.[384] Well-maintained dams are essential for proper drought mitigation strategies as communities rely heavily on access to potable water supply in both urban and rural communities.[385] In the event that dams are not properly maintained during times of drought, adequate water supply-systems begin to struggle, and a strain is placed on the people's ability to access water, which a constitutionally guaranteed right.[386] A more comprehensive discussion on the nexus between dam maintenance and drought risk will follow in chapter 4.[387]

Pivoting back to the focus on fiscal response initiatives, the DMA states that financial assistance may be provided by any sphere of government as long as the assistance is aligned with the NDMF.[388] The DMP reiterates that government carries the costs to assist with response and recovery initiatives in drought occurrences.[389] To ensure that government has the fiscal resources necessary to support emergency funding

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382 Section 56(4)(a)-(f) of the DMA.
383 Section 56(2)(b) of the DMA.
384 Steyn 2022 *SAPL* 6.
385 Schedule 4B of the Constitution.
386 Section 27(1)(b) of the Constitution.
387 See chapter 4 below.
388 Section 56(4) of the DMA; Gen Not 654 in GG 27534 of 29 April 2005.
389 DMP 16.

for disaster relief initiatives, the DMA and the NDMF require all government spheres to budget accordingly.[390]

3.6.2 National water law and policy

Section 3 of the NWA states that the Minister responsible for the water resources of South Africa is primarily responsible for the allocation and beneficial use of water resources.[391] Under his or her trusteeship, the Minister must ensure that the water resources are managed in a sustainable manner and that the water of South Africa is conserved and managed in an adequate way.[392] This responsibility highlights the responsive role of the Minister during periods of severe drought and emphasises his or her responsibility to protect both the water supply and related resources.[393] The Minister is furthermore responsible for the flow, usage, and overall control of the country's water and must ensure equitable allocation of water supply for the beneficial use by all citizens.[394]

The WSSP provides a brief discussion on assurance of supply, as it relates to water resources in South Africa:

> The supply should provide water security for the community. Two factors are important here. First, schemes for domestic water supply should ensure the availability of 'raw' water for 98% of the time. This means that the service should not fail due to drought more than one year in fifty, on average. Second, the operation and maintenance of the system must be effective. The aim should be to have no more than one week's interruption in supply per year.[395]

This discussion on national water laws and policies relating to drought management includes elements of the first and second pillar on drought risk management. It calls for the monitoring of risks that could affect water supply and considers the role of water security in communities.

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390 Section 56(3) of the DMA; item 7.7.1.2 in GG 27534 of 29 April 2005.
391 Section 3(2) of the NWA.
392 Section 3(1) of the NWA.
393 Centre for Environmental Rights *Date unknown* https://water.cer.org.za/legal-toolbox.
394 Preamble and 3(2) and (3) of the NWA.
395 WSSP 15.

To ensure water supply in South Africa, section 26(1) of the NWA allows the Minister to make regulations whereby water restrictions may be imposed to limit the use of water in circumstances where the balance between supply of and demand for water resources is precarious.[396] Implementing water restrictions may be a harsh response to drought and water insecurity in South Africa, however, it is a proactive and immediate response to water stress.[397] Water restrictions will be further discussed in chapter 4, as these restrictions are implemented at a local level in urban and rural areas.[398]

3.6.3 National environmental law and policy

Section 24(b)(i) of the Constitution states that the legislative and other measures required for the protection of the environmental right should be for the purpose of preventing ecological degradation.[399] Ecological degradation in the South African context was discussed in chapter 2 of this dissertation. Legislative steps have been taken to protect the environment from damage caused by drought that may harm land and soil and affect the agricultural, urban and rural communities.[400]

Section 2 of the NEMA places emphasis on the importance of sustainable development and lays down the principles for environmental management, that are relevant to all environmental management plans and decision-making.[401]

Section 2(4) of the NEMA states that sustainable development must include measures to ensure that environmental loss, ecological degradation and disturbances are avoided, and where avoidance is not possible that the harmful impact be minimised as far as possible.[402] As discussed in chapter 2, urban developers lean towards minimising public spaces that require water provisions when cities are in a period of drought.[403] While this does lessen the pressure on

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396 Section 26(1)(a) of the NWA.
397 Calverley and Walther 2022 *Frontiers in Water* 10, 13.
398 See para 1.1 above and para 4.3 below.
399 Section 24(b)(i) of the Constitution.
400 NAP DLDD vii, 1 – 3.
401 Section 2 of the NEMA.
402 Section 2(4)(a)(i) and (ii) of the NEMA.
403 See chapter 2.

municipalities to provide water in cities where water is scare, it could be argued that some damage is caused by this strategy, as ecosystems and biodiversity within urban areas may be impacted negatively.[404]

In addition, Chapter 7 of the NEMA discusses environmental hazards under the scope of compliance, enforcement and protection.[405] Although section 28 provides a detailed discussion on the role of people who may have or have caused significant ecological degradation, the chapter provides little to no information on the duty of care as far as natural hazards are concerned.[406] An argument could be made that the duty of care falls under the jurisdiction of disaster management laws and policies. However, one may also argue that natural disasters can cause further ecological degradation if they are not minimised or adequately prepared for and responded too. As such, legislation that concerns environmental hazards should be guided by both disaster risk legalisation as well as environmental law and policies.

While the NEMA may prove to be lacking in provisions that support drought risk management in a direct fashion, the Department of Forestry, Fisheries and the Environment was tasked with the development of a national action programme on drought mitigation responses for 2018-2030.[407] The Second *National Action Programme for South Africa to Combat Desertification, Land Degradation and the Effects of Drought* (NAP DLDD).[408] The NAP DLDD sets out a detailed programme on risk reduction strategies and plans to combat the effects of drought on people, conservation and the protection of other related natural resources.[409]

The South African NAP DLDD was developed as an action programme in accordance with the UNCCD.[410] The objective of the UNCCD is set out in Article 2 of the Convention as:

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404 The International Federation of Red Cross *Analysis of legislation related to disaster risk reduction in South Africa.*
405 Chapter 7 of the NEMA.
406 Section 28 of the NEMA.
407 NAP DLDD.
408 NAP DLDD.
409 NAP DLDD vii.
410 NAP DLDD 1.

> 1. The objective of this Convention is to combat desertification and mitigate the effects of drought in countries experiencing serious drought and/or desertification, particularly in Africa, through effective action at all levels, supported by international cooperation and partnership arrangements, in the framework of an integrated approach which is consistent with Agenda 21, with a view to contributing to the achievement of sustainable development in affected areas.[411]

In order to achieve the objective set out above, the UNCCD requires party members to initiate integrated strategies at national and local level with a focus on the management of land and water resources.[412]

The NAP DLDD sets out numerous strategies and plans that are supported by national laws and policies and have the potential to be implemented on a local level.[413] While the goal of the NAP DLDD is to improve the effects of desertification, land degradation and drought impact on South Africa by 2030, very few of the medium-term strategies have been implemented.[414] The NAP DLDD provides for seven outcomes that government is supposedly pursuing, but very little information is available on the implementation strategies for the outcome initiatives.[415] Thus far, no information is publicly available on outcome one, two, four, five, or seven of the NAP DLDD even though the deadline for implementation of these strategies were between 2019 and 2020.[416]

3.7 Local government law and policy

An objective is placed on municipalities to promote a safe and healthy environment, per section 152 of the Constitution.[417] As the discussion focuses on disaster management, it is necessary to once more emphasise that the Constitution does not list disaster management as part of the functional areas of local government.[418] However, section 156(1)(b) states that municipalities can administer any matter

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411 Article 2 of the UNCCD.
412 Article 2 of the UNCCD.
413 NAP DLDD 7, 10, 18 and 19.
414 NAP DLDD 21.
415 NAP DLDD 21.
416 NAP DLDD 21.
417 Section 152(1)(d) of the Constitution.
418 As mentioned in para 3.2, disaster management forms part of the functional areas of national and provincial government. See also Schedule 4A of the Constitution.

assigned to local government by either the national or provincial government.[419] Section 156(4)(a) and (b) provides further detail on these assigned matters and states that:

> The national government and provincial governments must assign to a municipality, by agreement and subject to any conditions, the administration of a matter listed in Part A of Schedule 4 or Part A of Schedule 5 which necessarily relates to local government, if—
>
> (a) that matter would most effectively be administered locally; and
> (b) the municipality has the capacity to administer it.[420]

Accordingly, municipalities can oversee disaster management strategies as part of local responses to disaster risk scenarios in urban areas. From a national legislative perspective, the DMA provides further detail on the role of municipalities in administrating local disaster management efforts.[421] Section 42(1) of the DMA states that it is the responsibility of each municipality to establish a disaster management framework to ensure a uniform approach to disaster risks in all municipal areas.[422] The DMA further provides for the establishment of municipal disaster management centres (MDMC) and section 44 of the DMA sets out an extensive list of the duties and functions of these centres as far as disaster management is concerned.[423] These centres are not equipped with law-making powers, but the centres provide legislatively enforceable support for adequate risk management services.[424] Section 44 of the DMA states that MDMCs can assist with the implementation of laws and policies relevant to disaster risk management and are further tasked with engaging in lawful activities to perform such duties.[425]

This shows that MDMCs are tasked with independent powers and duties as far as local disaster risks are concerned. MDMCs must act as conduits of any and all information relevant to disaster risk and disaster management within the municipal

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419 Section 156(1)(b) of the Constitution.
420 Section 156(4)(a) and (b) of the Constitution.
421 Chapter 5 of the DMA.
422 Section 42(1) of the DMA.
423 Sections 43(1) and 44(1)-(4) of the DMA.
424 Section 43(1) of the DMA.
425 Section 44(1)(l) and (2) of the DMA.

areas. Information relevant to disaster warnings and the escalation or de-escalation of disasters must be made available through municipalities.

Based on the aforementioned provisions of the DMA that relate to local government, the DMP delves into further detail on the role of municipalities in drought prevention and mitigation.[426] For example, the DMP states that as far as the occurrence of drought risk is concerned, local government entities have a crucial function in drought management and the procurement of local resources.[427]

Cooperative governance and interdepartmental assistance in drought risk management is an essential tool in reducing the impact of disasters in South African communities.[428] For cities to reduce the impact of drought and water scarcity on communities, municipalities must work with other state departments to maintain water infrastructure and to ensure that the community is not overusing water resources.[429] Although potable water supply falls within the function area of local government, the national government must ensure that dams and other waterworks are maintained.[430] It is also the national, provincial and local spheres of government's duty to promote the conservative usage of water resources through intergovernmental cooperation.[431]

Section 156 of the Constitution, read with schedule 4B, envisages municipal planning as part of the local government sphere's assigned functions.[432] Several laws, policies and plans fall within the scope of municipal planning. Examples of municipal plans include the *Long-Term Development Strategy*, the *National Spatial Development Framework 2022* and an *Integrated Development Plan* (IDP).[433] For

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426 Sections 42(1) and 44 of the DMA; item 7.2 of the DMP.
427 Item 3.1.3 of the DMP.
428 Cooperative governance was discussed in para 1.1 and 3.2 above; section 7(2)(d) of the DMA; WSSP 29.
429 NWRS-3 has established the lowering of water demand in urban areas to 15% as a target for 2023. To do so, all relevant sectors, including municipalities, must promote water conservation. See para 3.6.1 above; Schedule 4B of the Constitution; The NWRS-3, 2022- 36.
430 See para 3.6.1 above; Schedule 4B of the Constitution.
431 See para 3.6.1 above.
432 Section 156 and schedule 4B of the Constitution; Forbes *An introduction to Municipal Planning within South Africa* 4.
433 Forbes *An introduction to Municipal Planning within South Africa* 7 and 8.

the discussion on urban drought risk management, the *National Spatial Development Framework 2022* refers to drought occurrences as one of the climate challenges facing South Africa.[434] The Framework briefly mentions the relevance of disaster risk interventions and the expenditures of, for example, drought relief paired with these interventions as it may impact human settlements and community well-being.[435] Even though this Framework is vital for proper municipal planning, greater focus will be placed on IDPs. Municipalities across South Africa are legally compelled to develop IDPs and they can utilise them as plans that could be used with drought and other disaster risk mitigation strategies.[436]

According to section 25 of the MSA, an IDP is a uniform, strategic plan that all municipalities must adopt.[437] An IDP must integrate and coordinate municipal plans, align the municipal resources, and form the basis of a policy framework for developmental local government.[438] The MSA has determined several key components of an IDP. The most important component for this discussion is that an IDP must reflect an applicable disaster management plan.[439] The *White Paper on Local Government* (1998) states that disaster management should be a matter of great importance in development policies and planning.[440] At this point, one must remember that drought forms part of a wide variety of disaster risks that could negatively impact a community. Although the MSA only refers to disasters in a more general sense, it does not lessen the direct applicability and potential of the Act and specifically, IDPs for drought risk management.

As previously discussed, national and provincial government share a responsibility to provide financial and other support in the event of a disaster.[441] This responsibility is extended to the local sphere of government as municipalities can contribute

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434 Item 3.5 in GN 47999 in GG 692 of 1 February 2023.
435 Item 3.6 in GN 47999 in GG 692 of 1 February 2023.
436 Forbes *An introduction to Municipal Planning within South Africa* 7; section 26 of the MSA.
437 Section 25(1) of the MSA.
438 Section 25(1)(a)-(c) of the MSA.
439 Section 26(g) of the MSA.
440 Item 2.1 in GN R423 in GG 18739 of 13 March 1998.
441 Section 56(2)(a) of the DMA.

financial assistance towards disaster recovery initiatives.[442] Furthermore, the disaster management plans that municipalities are mandated to prepare must include contingency plans and measures to finance municipal disaster management strategies.[443] Section 29 of the *Local Government: Municipal Finance Management Act* 56 of 2003 (MFMA) also provides that the mayor of a municipality may authorise unforeseen expenditures that the municipality did not necessarily budget for.[444] Budgeting and planning for disaster risk occurrences and recovery initiatives is vital for risk management strategies. However, municipalities can also utilise other financial resources to mitigate the impact of disasters such as droughts. One such example would be to utilise municipal tariffs for water conservation during prolonged periods of drought.[445]

In accordance with section 74 of the MSA, every municipal council must provide for a tariff policy that relates to the fees for services provided.[446] The tariff policy is applicable to several service provisions, such as water, waste management and electricity and must reflect a variety of tariff-related principles.[447] Tariff policies are enacted through municipal by-laws to give effect to such policies.[448] Water tariffs will be discussed in more detail in chapter 4, as they relate to the Nelson Mandela Bay Municipality's drought mitigation strategies.[449]

In essence, the MSA, the MFMA, municipal planning instruments, institutions and other relevant laws and policies on disaster management provide guidelines in law for the involvement of local government in matters related to drought and other disasters. A legal basis for urban drought risk management was briefly introduced. In the next chapter, the municipal by-laws, local policies and plans of the Nelson

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442 Section 56(2)(a) of the DMA.
443 Section 52(1)(a)(vi) of the DMA.
444 Section 29 of the *Local Government: Municipal Finance Management Act* 56 of 2003 (MFMA).
445 Municipal tariffs may be defined as "means a tariff for services which a municipality may set for the provision of a service to the local community and includes a surcharge on such tariff" - see section 1 of the MFMA.
446 Section 74(1) of the MSA.
447 Section 74(2) of the MSA.
448 Section 75(1) of the MSA.
449 See para 4.3.1.3 below.

Mandela Bay Municipality is evaluated to determine the relevance for drought risk management.

3.8 Concluding remarks

The objective of this chapter was to evaluate national disaster risk, water, environmental and local government law and policy to determine the extent to which these laws provide for urban drought risk management. This chapter introduced the constitutional basis for the study at hand and considered the role of sections 24 and 27 of the Constitution in drought risk management. Section 24(b)(iii) of the Constitution was established as the constitutional basis for the DMP, while section 24(a) and (b)(i) were discussed in parallel as important, supporting sub-sections.

This analysis was done against the three pillars of drought risk management as introduced in chapter 2.[450] Subsequently, chapter 3 described the government institutions that are responsible for the implementation of laws and policies relevant to the three pillars of drought risk management.

The authority of the NDMC in matters related to disaster management was determined.[451] Furthermore, the duty and function of the Minister of Water Affairs in water response and mitigation initiatives was established.[452] The research pointed out legislative fragmentation as far as drought management is concerned. Further, although the DMA and the DMP set out a proactive approach to drought risk, both documents are quite outdated and do not consider the role of cities in drought risk management. In this regard, the DMP provides mainly for the agricultural sector.

Chapter 3 considered the role of local government law and policy as it relates to urban drought risk management. While disaster risk management forms part of the functional areas of national and provincial government, local government has some authority over disaster risk management within the local sphere. National laws and policies such as the DMA, the DMP, the MSA and the MFMA provide for the role of

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450 See para 2.5.1.1 – 2.5.1.3 above.
451 See para 3.2 above.
452 See para 3.6.2 above.

local government in administrating disaster risk management, that can be utilised in urban drought risk management. Metropolitan and district municipalities must also establish MDMCs that oversee any issues or concerns related to disasters within the municipal sphere.

In the next chapter the Nelson Mandela Bay Municipality's by-laws, policies and plans are evaluated to determine the extent to which local laws and policies provide for urban drought risk management.

Chapter 4 City-level law and drought risk management: the case of Nelson Mandela Bay Municipality

4.1 Introduction

This chapter analyses the relevant by-laws, policies and local drought risk strategies of the local sphere of government by way of a case study of the Nelson Mandela Bay Municipality (NMBM). Local government comprises metropolitan, district, and local municipalities as established by the Constitution.[453] In terms of section 155(1)(a) of the Constitution, a metropolitan municipality may be defined as one "that has exclusive municipal executive and legislative authority in its area".[454] An example of such a municipality is the NMBM in the Eastern Cape.[455]

As was done in chapter 3, the discussion is structured along the pillars of drought risk management.[456] This case study aims to determine the extent to which the municipality's regulatory framework provides for drought risk management.[457]

The NMBM was first established in December 2000 as one of the first local authorities in a democratic South Africa.[458] The NMBM integrates several cities and towns, including Gqeberha, Kariega and Despatch.[459] The geographical area of the NMBM is roughly 1959,02 km², with a population density of approximately 1,296,000 people.[460] Since 2015, NMBM has been experiencing a severe drought, and at the time of writing, the local authority continues to struggle to maintain an

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453 Section 155(1)(a)-(c) of the Constitution.
454 Section 155(1)(a) of the Constitution.
455 The rationale for the selection of Nelson Mandela Bay Municipality (NMBM) was explained in chapter 1 of this study. See para 1.3 above.
456 See para 2.6 and 3.4 - 3.6 above.
457 Item 1.1 in GN 423 in GG 18739 of 13 March 1998.
458 Department of Cooperative Governance and Traditional Affairs *Profile: Nelson Mandela Bay Metro* 6.
459 Department of Cooperative Governance and Traditional Affairs *Profile: Nelson Mandela Bay Metro* 6.
460 Nelson Mandela Bay Municipality *Date unknown* https://nelsonmandelabay.gov.za/page/about-nelson-mandela-bay; Macrotrends *Date unknown* https://www.macrotrends.net/cities/22499/nelson-mandela-bay/population.

adequate water supply.[461] Primarily, a hydrological drought caused the drought and has affected the residents severely, as most rely on the area's dams for potable water supply.[462]

In 2017, the then-executive mayor of NMBM declared the drought a local disaster in terms of section 55 of the DMA by way of a notice in the Provincial Gazette.[463] A few months later, a provincial disaster was declared in terms of section 41 of the DMA, and in 2021, the situation in the area was officially declared a national disaster area by the NDMC by way of Government Notice 44876 in Government Gazette 638 of 20 July 2021.[464]

4.2 Approach adopted

The case study examines the municipal laws and policies applicable to urban drought risk management. It looks at the legislative framework of the NMBM against the national framework provided for in chapter 3. The case study in this chapter is based on a literature review of the NMBM's laws and policies related to urban drought risk management which are publicly available.[465]

On the one hand, the scope of the research into the NMBM focuses on laws, policies and strategies that directly relate to urban drought risk management. On the other, the research also looks into legislation that refers indirectly to urban drought risk management, as drought management is a complex administrative process that can be influenced by several laws and policies that may not necessarily refer to drought *per se*.

While this case study aims to provide an analysis of the NMBM's laws and policies on urban drought management, reference to national provisions on local

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461 Brown 2022 https://www.washingtonpost.com/world/2022/06/19/south-africa-water-day-zero/.

462 NMBM *Drought Mitigation Plan* 2; the concept of hydrological droughts was discussed in para 2.2.1.2 above.

463 Section 55(2)-(5) of the DMA; GN 3895 in PG 19 of 14 August 2017.

464 Subsections 27 and 41 of the DMA; GN 44876 in GG 638 of 20 July 2021; NMBM *Drought Mitigation Plan* 2.

465 A empirical study was not possible due to resource and time constraints.

government will inevitably have to be made. The reason is that national laws and policies play a distinct role in drought risk management and intersect with municipal by-laws, plans and relevant policies through intergovernmental relations and cooperation in disaster risk management.[466]

4.3 Local by-laws, policies, and plans on drought risk management

Although the Constitution prescribes disaster management as part of the functional areas of the national and provincial government, the DMA places a certain level of responsibility on local government.[467] This responsibility ties in with the municipal sphere's duty to provide uninterrupted basic services for the community.[468] To ensure that the provision of services remains uninterrupted, municipalities such as the NMBM must place the well-being of communities at the forefront.[469] The then-executive mayor of NMBM wrote in his foreword of the municipality's *2021/2022 Annual Report* that the municipality struggles with water loss within the area due to the ongoing drought.[470] He echoed the municipality's duty to work with other role-players in mitigating poor service delivery caused by drought and other dilemmas.[471] The then-mayor further stated that the citizens of NMBM deserve adequate, uninterrupted service provision that is not compromised by the municipality.[472]

As the NMBM forms part of the sphere of government that works the closest with communities, it is crucial that the NMBM has preventative measures in place to combat specific local disasters, such as drought. Prevention, mitigation, and response strategies form part of local initiatives on drought response within the NMBM.[473] These initiatives are essential to minimise the impact of potential disasters and aid communities in urgent post-disaster relief. Furthermore, the NMBM must

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466 Section 3(1),(2) and (3)(d) of the MSA; Ss 34, 35 and 37 of the MFMA.
467 See para 3.2 above; Schedule 4A of the Constitution; Chapter 5 of the DMA.
468 Section 81(1)(e) of the MSA.
469 Section 81(1)(e) of the MSA.
470 NMBM *2021/22 Annual Report* 2.
471 NMBM *2021/22 Annual Report* 2.
472 The statement made by the then-executive mayor of NMBM reinforces the idea of municipal accountability in providing uninterrupted service delivery. See NMBM *2021/22 Annual Report* 2.
473 The author groups the above strategies under local strategies as the focus is placed on the executive authority of the NMBM in combatting drought-related disasters.

ensure proper administration, adequate budgeting, and careful planning to ensure the community's well-being.[474] The discussion below will, therefore, discuss the drought mitigation strategies, plans, policies, budgets, and relevant by-laws of the NMBM per the previously established pillars of drought risk management.

It is accepted that municipal planning plays an integral part in drought prevention.[475] The NMBM, like all other municipalities, have to provide the public with a five-year term of office plan in the form of an IDP.[476] The NMBM's IDP sets out the municipal strategic plan that focuses on improving the well-being of the Nelson Mandela Bay community.[477]

4.3.1 Pillar 1: Drought monitoring and early warning strategies

Pillar 1 was extensively explained above.[478] The discussion below will identify the legislative and executive authority of the NMBM to determine the municipality's role in distributing, generating and documenting information relevant to urban drought risk management.

The *Disaster Risk Management Policy Framework for the Nelson Mandela Bay Metropolitan Municipality* (2011) (NMBM Disaster Risk Management Policy) sets out the various responsibilities of the NMBM in terms of disaster risk management.[479] The significance of the NMBM Disaster Management Policy is recognised by section 11(3)(a) of the MSA, which states that municipalities develop policies to exercise their legislative and executive authority in local government matters.[480]

The NMBM Disaster Risk Management Policy provides a vital framework for disseminating early warnings across the Nelson Mandela Bay area.[481] While no direct

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474 NMBM *Integrated Development Plan of Nelson Mandela Bay Municipality 2022/23 – 2026/27* (NMBM IDP) 4.
475 See para 3.7 above.
476 NMBM IDP 2.
477 NMBM IDP 1.
478 See para 2.5.1.1 above.
479 NMBM *The Disaster Risk Management Policy Framework for the Nelson Mandela Bay Metropolitan Municipality* (NMBM Disaster Risk Management Policy).
480 Section 11(3)(a) of the MSA.
481 NMBM Disaster Risk Management Policy 41.

mention is made of specific types of disasters, such as drought and floods, the policy is accepted as the municipal framework for disaster risk management.[482] As such, it is an essential tool for drought risk management. Following the NMBM Disaster Risk Management Policy, the NMBM must work cooperatively with other municipal stakeholders in identifying and monitoring disaster risks to issue early warnings that may affect the community.

Although no information is publicly available on the NMBM's communication policy, the municipality's *Public Participation Procedure Manual Volume 3* (2014) states that all information discussions with the Nelson Mandela Bay community must be done sensitively.[483] The NMBM must utilise multidisciplinary strategies to disseminate early warnings to the population and must further ensure that these communicative strategies reach the more vulnerable communities.[484] The NMBM Disaster Risk Management Policy makes provision for the dissemination of early warnings by implementing communication strategies that are accessible by all, including those in high-risk areas.[485] As such, the policy does provide procedures for the dissemination of early warnings for various types of disasters and can be applied to drought disasters.[486] However, it could be argued that the policy has not been updated since 2010 and that the procedures of which the policy speaks may have changed.

The *Nelson Mandela Bay Metropolitan Municipality Disaster Management By-law* (2007) (Disaster Management By-Law) states that the municipal council, alongside the MDMC, must act as the executive authority regarding the municipality's disaster management plan in the event of a disaster.[487] The municipality must do so against

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482 NMBM IDP 149.
483 NMBM Public Participation Procedure Manual Volume 3 3.
484 NMBM Disaster Risk Management Policy 41 and 42.
485 NMBM Disaster Risk Management Policy 41, 47, 62 and 66.
486 NMBM Disaster Risk Management Policy 62.
487 Item 4 in GN 172 in PG 1803 of 30 November 2007.

the directions given in item 5 of the Disaster Management By-law.[488] Even though the Disaster Management By-law is the only one enacted on disaster management within the NMBM, it does not address the implementation of disaster monitoring strategies.[489] Instead, the by-law mentions the municipality's duty to ensure community preparedness in the event of a disaster, but this does not adequately encapsulate the need for drought and other related disaster monitoring.[490]

Nevertheless, it is noted that the NMBM does comply partially with the information-repository objectives set out by the DMA. Resources concerning drought risk management in NMBM can primarily be found on the NMBM's website.[491] Regarding early warning-and drought monitoring strategies, it may be accepted that the NMBM focuses on the quantitative updates concerning dam levels within the NMBM.[492]

Providing information regarding dam levels and other water-based infrastructure can form part of drought monitoring strategies, which falls within the scope of pillar 1. Although water works, such as dams, are operated and maintained by the Department of Water and Sanitation, municipalities should support and assist national government as municipalities rely on the state infrastructure to secure the availability of water supply, needed to delivery basic services.[493]

The provision of quantitative information on dam levels to communities forms part of a cooperative governing initiative between the NMBM and the Department of

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488 Items 4 and 5 in GN 172 in PG 1803 of 30 November 2007. Item 5.1 of the Disaster Management By-law states that the municipality may issues directives or issue directions to be taken if a local state of disaster is declared and item 5.2 merely states that these directives will have been issued sufficiently if they had been done in terms of the municipality's disaster management plan. See item 5.1 and 5.2 in in GN 172 in PG 1803 of 30 November 2007.

489 The author infers that by including a provision on monitoring strategies, the municipality's responsibility to monitor drought and other disasters could have assisted the community in better preparing for future disasters.

490 Item 2 in GN 172 in PG 1803 of 30 November 2007.

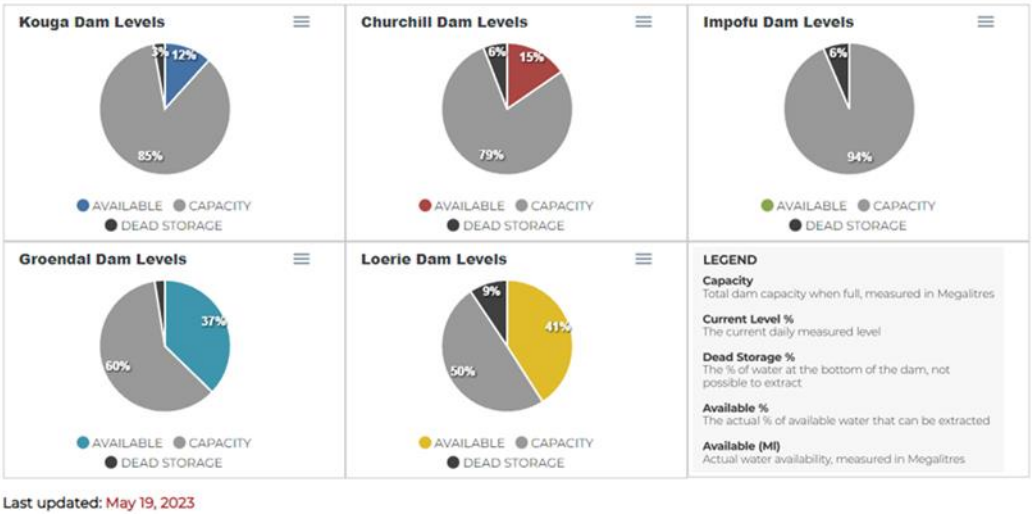
491 NMBM *Date unknown* https://www.nelsonmandelabay.gov.za/page/drought-mitigation-plans-and-projects.

492 NMBM *Date unknown* https://www.nelsonmandelabay.gov.za/page/drought-mitigation-plans-and-projects; NMBM 2023 https://nelsonmandelabay.gov.za/damlevels.

493 S 41(1)(h) and Schedule 4B of the Constitution; chapter 11 and s 138 of the NWA; South African Government 2023 https://www.gov.za/speeches/water-and-sanitation-dam-levels-4-jan-2023-0000.

Water and Sanitation.[494] For example, Figure 4-1 below represents the dam levels of the NMBM's five dams in May 2023 and indicates the then-available megalitres of each.[495] On the 19th of May, 2023 the available megalitres combined amounted to 12.03% of the total capacity of the dams.[496] Providing information regarding dam levels and other water-based infrastructure can form part of drought monitoring strategies, which falls within the scope of pillar 1.

Figure 4-1: Dam levels of Nelson Mandela Bay[497]



The information above offers an example of how monitoring systems in relation to drought risk management work. The NMBM Disaster Management Policy further supports this form of monitoring.[498]

Dam levels can rise and fall drastically, impacting water supply availability. For example, the Impofo dam was decommissioned by the NMBM in early January 2023, as the dam could not provide an adequate supply of potable water.[499] During this time, pressure increased for the municipality to provide potable water (per their

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494 NMBM 2023 https://nelsonmandelabay.gov.za/damlevels.
495 NMBM 2023 https://nelsonmandelabay.gov.za/damlevels.
496 NMBM 2023 https://nelsonmandelabay.gov.za/damlevels.
497 The figure was taken from the NMBM website. See NMBM 2023 https://nelsonmandelabay.gov.za/damlevels.
498 The policy states that the NMBM must monitor reoccurring hazards to be able to disseminate early warnings when necessary. See NMBM Disaster Risk Management Policy 35, 41.
499 Buso 2023 https://www.algoafm.co.za/local/nmb-s-impofu-dam-barges-decommissioned-due-to-low-level; Bezuidenhout 2023 https://www.news24.com/news24/community-newspaper/pe-express/impofu-dam-decommissioned-as-levels-plummet-20230130.

constitutional duty) by making additional water available within its supply system.[500] However, this supply forms part of untreated groundwater and generally threatens the well-being of the metropolitan community.[501] Untreated water can lead to health concerns such as the spread of preventable diseases and can negatively infringe upon the right to access sufficient water and an environment that is not harmful to their health, as enshrined by sections 27(1)(b) and 24 of the Constitution.[502]

Disaster monitoring strategies are rarely discussed within the context of NMBM's environmental initiatives. The NMBM's Environmental Sustainability Policy (2021) (ESP) is the newest version of the municipality's environmental policy, and a brief comment is made on the NMBM's available monitoring tools.[503] According to the ESP, the municipality has to conduct regular environmental monitoring through which an evaluation of the area's resources will be examined.[504] In the context of the ESP, environmental monitoring does not necessarily provide substantive information that could be related to drought monitoring, as no further information to provide a nexus is currently available.

As far as early warning systems are concerned, municipalities are not obliged to provide such systems, as disaster management does not form part of the functional scope for municipalities.[505] Although the NMBM's resources on early warning systems are fairly limited, the ESP states that the municipality has a duty to plan for disaster occurrences and must promote early warning systems.[506] However, it must once again be noted that the ESP merely references early warning systems and does not provide guidelines on the implementation or affective promotion of these systems.

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500 Schedule 4B of the Constitution; Matavire 2023 https://mg.co.za/news/2023-03-13-battle-for-water-in-dry-nelson-mandela-bay/.

501 Matavire 2023 https://mg.co.za/news/2023-03-13-battle-for-water-in-dry-nelson-mandela-bay/.

502 Sections 24(a) and 27(1)(b) of the Constitution; South African Human Rights Commission *The Right to Water and Sanitation* 5; it must be noted that in September 2023, the situation with the Impofo dam changed drastically as the dam levels increased to 12% availability, and conversations began to utilise the dam once more.

503 NMBM Environmental Sustainability Policy (ESP) 20.

504 NMBM ESP 20.

505 Schedule 4A of the Constitution.

506 NMBM ESP 15.

Even in the scope of local water service delivery, the *Nelson Mandela Bay Metropolitan Municipality: Water and Sanitation Services By-law* (2010) (NMBM Water By-law) makes no reference to the dissemination of early warnings nor the related systems.[507] However, as the drought in Nelson Mandela Bay has been severe, the NMBM and the Department of Forestry, Fisheries and the Environment assist one another through cooperative governance in distributing early warning-related information.[508] The Department makes use of the SAWS as an agency to distribute weather warnings across South Africa.[509] NMBM provides further warning-related information through the municipality's social media pages, as part of public engagement initiatives.[510]

It can be observed that the NMBM has a vast number of resources available on the first pillar of drought risk management. However, less information is available on the second pillar of drought risk management as the NMBM has not publicly published as many resources that concern the content of pillar 2.

4.3.2 Pillar 2: Drought impact, vulnerability, and risk assessment

As shown in chapter 3, local government laws, policies and enforceable documents must enforce the obligation to prioritise the safety of those residing within the municipal area, through vulnerability assessments, for example.[511] The NMBM Disaster Risk Management Policy defines vulnerability as:

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507 GN 57 in PG 2361 of 14 May 2010.

508 Department of Forestry, Fisheries and the Environment *Date unknown* https://tinyurl.com/2pf3vyvy.

509 SAWS *Seasonal Climate Watch* 1-10; Department of Forestry, Fisheries and the Environment *Date unknown* https://tinyurl.com/2pf3vyvy.

510 Although social media platforms may not be the most effective for communication with the public, as platforms such as Facebook cannot be accessed by all who reside in NMBM, it still provides an adequate example of municipal initiatives. See Nelson Mandela Bay 2023 https://www.facebook.com/NMBayM/photos/a.113452804323023 3/7079414502074861/.

511 NMBM IDP 19.

> The conditions determined by physical social economic and environmental factors or processes which increase the susceptibility of a community to the impact of hazards.[512]

According to the NMBM's IDP, ensuring the safety of the community through well-resourced disaster management is a key strategic objective for the municipality.[513] Prioritising safety as far as droughts are concerned, may be linked to ensuring access to water, as enshrined in section 27(1)(b) of the Constitution.[514] According to the NMBM's *Disaster Risk Assessment Report* of 2010, access to water plays a critical role in assessing the metropolitan's vulnerability.[515] It may thus be said that, should the taps run dry due to the ongoing drought, the communities' rights concerning access to water will be severely affected.[516] Furthermore, should the taps run dry and the NMBM not be able to provide potable water, the spread of diseases might be exacerbated, which in turn will threaten public health.[517] At present, the NMBM does not have a municipal health plan, even though such a plan is warranted by section 33 of the *National Health Act* 61 of 2003.[518] A municipal health plan could provide valuable insights for drought risk assessments to potentially limit the impact of public health challenges within the NMBM.[519]

According to the NMBM Disaster Management Policy, vulnerability reduction includes objectives such as the establishment of a MDMC depository for all information relevant to vulnerability within the community, as discussed in chapter 3.[520] However, following a review of the NMBM's available resources, the author observed

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512 NMBM Disaster Risk Management Policy 8; Policies and laws are discussed interchangeably throughout this section, as the MSA states that municipalities exercise their legislative and executive duties by developing policies, plans and strategies while also implementing national and provincial legislation and municipal by-laws as applicable - see Section 11(3)(a) and (e) of the MSA.

513 NMBM IDP 17.

514 Section 27(1)(b) of the Constitution.

515 SRK Consulting *Disaster Risk Assessment for the Nelson Mandela Bay Municipality* 54, 71.

516 Section 27(1)(b) of the Constitution.

517 NMBM IDP 194.

518 Section 33 of the *National Health Act* 61 of 2003; NMBM IDP 194.

519 Droughts are listed as an environmental impact that creates a public health crisis within NMBM - see NMBM IDP 194.

520 NMBM Disaster Risk Management Policy 62; See para 3.7 above.

that while the NMBM provides for a MDMC in its IDP, no further information is available on the centre itself.[521]

Drought-related disaster assessments are essential in providing information on the impact of drought on communities. Risk assessments are utilised to prioritise the greatest risks to the community, to assist municipalities in prioritising their resources for specific disasters and climate change-related threats. According to the risk assessment captured in the NMBM's *Climate Change and Green Economy Action Plan* (2015) (Green Action Plan), drought is considered to be the community's greatest threat.[522] The second greatest threat is unpredictable changes in rainfall patterns.[523]

Disaster risk assessments are very important, as the classification of a disaster (local, provincial or national) is dependent thereon.[524] For example, the DMA requires that a local disaster be declared should the assessment indicate that the event has affected either a metropolitan, district or local municipality and assess whether the affected municipality is able to handle the disaster efficiently.[525]

Based on the above, the NMBM could declare a local disaster and perform the municipality's legislative duty of managing the drought disaster affecting the metropolitan since 2017.[526] The NMBM is, furthermore, legally tasked with continuous assessment of the drought occurrence in Nelson Mandela Bay, to ensure that the appropriate disaster classification remains up to date.[527]

The NMBM also has a Drought Mitigation Plan (2022) that forms part of its initiatives relative to Pillar 2.[528] According to this plan, the drought assessment at the time indicated the severity of the drought and indicated that a short-term solution to the

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521 NMBM IDP 145.
522 NMBM *Green Action Plan* 3.
523 NMBM *Green Action Plan* 3.
524 National Disaster Management Centre *Explanatory Note: Classification, Declaration and Extension of a State of Disaster* 11.
525 Section 23(4)(a) and (b) of the DMA.
526 See para 4.1 above; GN 3895 in PG 19 of 14 August 2017.
527 Section 49(1) and (2) of the DMA.
528 Nelson Mandela Bay *Drought Mitigation Plan* 89.

drought may be the implementation of water collection points as well as tanks.[529] Although these solutions are only seen as short-term, they have assisted the municipality to meet its obligation to the community in ensuring access to water for all.[530] The NMBM's Drought Mitigation Plan sets out the extensive impact of past drought occurrences on dam storage and the Nelson Mandela Bay community.[531] The Drought Mitigation Plan provides detailed statistics and figures on the impact of drought on dam levels to demonstrate the effect of water demand on a dwindling supply of water resources.[532]

4.3.3 Pillar 3: Drought response and mitigation measures

Pillar 3 of drought risk management concerns response and mitigation initiatives, related to drought risk management.[533] Of the three pillars listed throughout this research, pillar 3 is where most of the contribution of local law and policy lies. This is because pillar 3 provides an active response to drought-related disasters.[534]

Although the concept of disaster risk reduction has been thoroughly discussed in the previous chapters, it becomes necessary to briefly mention the NMBM's definition of risk reduction:

> The conceptual framework of elements considered with the possibilities to minimise vulnerabilities and disaster risks throughout a society to avoid (prevention) or to limit (mitigation and preparedness) the adverse impact of hazards within the broad context of sustainable development.[535]

The definition above encapsulates all three pillars of disaster risk management, provides an adequate basis for the discussion on NMBM and introduces the concept of mitigation measures. The Drought Mitigation Plan of NMBM was adopted in 2022 which is relevant for drought response, reduction and mitigation strategies and ultimately prevent the harm caused to communities and the surrounding

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529 Nelson Mandela Bay *Drought Mitigation Plan* 89.
530 Sections 7(2) and 27(1)(b) of the Constitution.
531 Nelson Mandela Bay *Drought Mitigation Plan* 2, 11 and 79.
532 Nelson Mandela Bay *Drought Mitigation Plan* 11.
533 See Para 3.5 above.
534 See Para 2.5.3 above.
535 NMBM *Disaster Risk Management Policy* 7; See paras 2.5 and 3.5.1 above.

environment.[536] The Drought Mitigation Plan was developed by the NMBM's infrastructure and engineering department to provide a document that will assist the NMBM in preventing the areas' dams from running dry and present information on water augmentation, water saving measures and other related strategies.[537]

Furthermore, the Drought Mitigation Plan aims to document the metropolitan's water supply system, the strategy in place to mitigate the impact of the current drought and measures related to reducing the area's water demand, to name a few aspects.[538] To implement the Drought Mitigation Plan effectively, the NMBM must have other, by-laws and strategies that can support the objectives set out by in Plan.

The NMBM IDP, focuses partly on mitigating the impact of the drought affecting the Metropolitan and emphasises the dedication of the municipality in being a water-secure sector and prioritising drought recovery initiatives.[539] In terms of the NMBM's strategic goals, the metropolitan municipality aims to:

> Prioritise a drought response and recovery in order to mitigate against the impacts of the drought and ensure water security in the future.[540]

In achieving the objectives of the NMBM's IDP, the municipality relies on the Nelson Mandela Bay Metropolitan Municipality: Water and Sanitation Services By-law (NMBM Water By-law).[541] Although this by-law does not refer to drought mitigation or drought risk management *per se*, several sections of the by-law may find application.[542] In order to mitigate the impact of drought in Nelson Mandela Bay, the

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536 Nelson Mandela Bay *Drought Mitigation Plan*.
537 Nelson Mandela Bay *Drought Mitigation Plan* 4.
538 Nelson Mandela Bay *Drought Mitigation Plan* 4.
539 NMBM IDP 1 and 2; integrated developmental plans are essential for good governance and are legislatively required under section 23(1) of the MSA.
540 NMBM IDP 19.
541 GN 57 in PG 2361 of 14 May 2010.
542 According to the NMBM drought mitigation plan, water conservation may be defined as preventing the loss and or waste of water by preserving water resources, protecting these resources and ensuring the proper usage of water supply. See NMBM *Drought Mitigation Plan* 66.

NMBM Water By-Law acknowledges that it is essential for the NMBM to implement water conservation strategies.[543]

The NMBM Water By-law provides several provisions on water conservation and the mitigating water waste within the Nelson Mandela Bay.[544] Section 65 of the by-law concerns the waste of potable water within the municipal area.[545] This section provides for the duty of the consumer in mitigating water waste in Nelson Mandela Bay. It states that the consumer may not permit the wasteful usage or discharge of water from any terminal water fitting.[546] In the NMBM's efforts to mitigate the impact of the current drought crisis, the public has been urged to reduce the overall consumption levels of the metropolitan.[547] Despite this, the overall consumption levels of the municipality have remained high. The current estimate of litres used daily within Nelson Mandela Bay is around 230 million litres, averaging approximately 46 million litres per day over the metropolitan's target for water conservation.[548] The NMBM Water By-Law is thus necessary to enforce water conservation within the community and allows the municipality to take a proactive approach to conserving water by enabling the enforcement of water restrictions.[549]

According to Item 31 of the NMBM Water By-Law, the municipality can restrict water consumption through public notice. The municipality may do so for the various purposes listed under Item 31(1)(a)-(d) of the NMBM Water By-Law:

> (1) The Municipality may:-
> (a) for the purposes of water conservation;
> (b) where drought conditions prevail or are imminent;
> (c) to prevent the wasteful use of water, or
> (d) in the event of a water shortage, drought or flood, by public notice…[550]

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543 NMBM *Drought Mitigation Plan* 66.
544 Chapter 6 in GN 57 in PG 2361 of 14 May 2010.
545 Item 65 in GN 57 in PG 2361 of 14 May 2010.
546 Item 65 in GN 57 in PG 2361 of 14 May 2010.
547 NMBM *Drought Mitigation Plan* 14, 77; NMBM *Date unknown* https://www.nelsonmandelabay.gov.za/page/drought-mitigation-plans-and-projects.
548 NMBM *Water Supply and Usage Statistics* 1-4.
549 Item 31 in GN 57 in PG 2361 of 14 May 2010.
550 Item 31(1)(a) - (d) in PG 2361 of 14 May 2010.

The NMBM Water By-law provides the scope of these restrictions in great detail.[551] It acknowledges how water restrictions may occur and, under these restrictions, determines the quantity of water consumed by those residing within the area.[552] The current restrictions place a 50-litre water usage limit on every individual within the Nelson Mandela Bay and commercial and industrial organisations must reduce their water consumption by 20%.[553] Other restrictions include prohibiting the use of municipal water resources to water gardens and wash cars, not approving applications to build swimming pools and restricting the use of automatic urinal flushing systems.[554] The water restrictions further confirm that a nexus is established between these restrictions and the NMBM Water By-Law, as the water restrictions emphasise that, "all requirements of the NMBM Water and Sanitation By-Law will be enforced".[555]

The NMBM has also derived benefit from the municipality's water tariffs to conserve water during the prolonged drought occurrence. The Nelson Mandela Bay Metropolitan Municipality *Tariff Bylaw* (2011) (NMBM Tariff By-law) was enacted to give effect to the municipality's tariff policy, as required by section 75 of the MSA, which was discussed in chapter 3.[556] The NMBM Tariff By-law is used as a guide for calculating tariffs, fees and related surcharges.[557] The NMBM Tariff By-law further classifies the various services provided by the municipality and classifies "water" as part of trading services.[558] The focus in law for tariffs is placed on policies but the NMBM's Tariff By-law makes specific reference to surcharges that may be applied to water tariffs during drought occurrences.[559] This provision reiterates the importance of water-related provisions in drought risk management to ensure proper conservation of urban water supply.

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551 Item 31(1)(d) in PG 2361 of 14 May 2010.
552 Item 31(1)(d) in PG 2361 of 14 May 2010.
553 NMBM 2023 https://nelsonmandelabay.gov.za/page/water-restrictions.
554 NMBM 2023 https://nelsonmandelabay.gov.za/page/water-restrictions.
555 NMBM 2023 https://nelsonmandelabay.gov.za/page/water-restrictions.
556 Section 2(1) of the NMBM Tariff By-law; section 75 of the MSA.
557 Section 2(2) of the NMBM Tariff By-law.
558 Section 5(1)(a) of the NMBM Tariff By-law.
559 Section 3(f) of the NMBM Tariff By-law.

While the NMBM Tariff By-law provides valuable insight on water tariffs utilised for water conservation, the municipality's Tariff Policy (2016) (NMBM Tariff Policy) provides further information on surcharges as they could potentially relate to drought occurrences.[560] According to the principles in the NMBM Tariff Policy, surcharges may be applied in circumstances requiring such provisions. The municipality may encourage the community to use resources efficiently by utilising stepped tariffs to discourage excessive use.[561] Although these principles do not refer to drought directly, they may find application regarding drought tariffs.

The NMBM *2022/2023 – 2024/2025 Budget Report* states that a punitive tariff structure is applied during drought occurrences as high-water usages may be charged at increased rates.[562] Furthermore, drought tariffs work in conjunction with water restrictions. In 2020, the NMBM gave notice in accordance with section 4 of the WSA and clause 31 of the NMBM Water By-law to place the appropriate water restrictions on the Nelson Mandela Bay area.[563] The notice further set out the schedule and structure of the applicable water tariffs for the area. The tariff structure encapsulates three parts. Part A of the structure refers to normal water conditions, part B implements water restrictions as dam levels fall and water supply becomes strained and part C refers to extreme, emergency conditions.[564] Accordingly, the notice stated that both the residential community and the industrial sector's tariffs remained in part B, as is applicable during water shortages.[565]

Water restrictions and tariffs may assist in alleviating the pressure on municipal water supply systems. An alternative approach to mitigating the impact of drought disasters is to implement emergency augmentation strategies, such as groundwater abstraction or desalination plants.[566] The Department responsible for water and

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560 The NMBM's Tariff Policy (2016) (NMBM Tariff Policy).
561 Item 3.1(g) and (h) of the NMBM Tariff Policy.
562 NMBM *2022/2023 – 2024/25 Budget Report* 41.
563 Section 4 of the WSA; Item 31 GN 57 in PG 2361 of 14 May 2010; NMBM *Notice: Restriction on the use of water!* 1.
564 NMBM *Date unknown* https://www.nelsonmandelabay.gov.za/faq?searchtext=tariff&category=Water.
565 NMBM Notice: Restriction on the use of water! 1.
566 NMBM *Drought Mitigation Plan* 5.

sanitations has stated that groundwater is not utilised to its fullest potential in South African communities.[567] Groundwater abstraction is an augmentation strategy that could mitigate the potential harm caused by drought and is accepted as a cost-effective option.[568] Boreholes drilled by municipalities are regulated by the WSA, per the concept of water services works.[569] Section 79(1) of the WSA specifically states that a water services institution, such as a municipality, may be responsible for a water service work, such as boreholes.[570] In terms of the NMBM Water By-law, item 83 regulates boreholes but does not directly refer to the municipality itself as an owner. It could be assumed that the norms and standards placed on a private person should also apply to the municipality but there is no further information available to support this statement.

Desalination on the other hand is defined by the NWRS-3 as "The removal of unwanted salts (constituents) from water to make it fit for use".[571] The NMBM Drought Mitigation Plan states that desalination plans form part of water augmentation strategies that has not been impacted by climate change.[572] While the potential for a desalination plant has not been fully realised, it must be noted that these augmentation plants are incredibly expensive.[573] Nevertheless, the NMBM is in the process of establishing a desalination plant in partnership with the Coega Development Corporation which may assist the municipality in mitigating the adverse effects of the current drought occurrence.[574] While desalination plans have great potential, environmental impact assessments play a great role in determining whether or not the proposed site locations for desalination plants are viable.[575] As discussed in previous sections, environmental impact assessments are used to

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567 NMBM *Drought Mitigation Plan* 46.

568 The NMBM has implemented the Bushy Park Wellfield Borehole Project to assist the NMBM in supplying water for the community. The project will see that treated borehole water will be pumped into the Churchill dam's pipeline - see Bezuidenhout 2023 https://tinyurl.com/2muwbjcw. NMBM *Drought Mitigation Plan* 46.

569 Sections 1(xxiv), 73(1)(a) and (b), 79(1) of the WSA.

570 Section 79(1) of the WSA.

571 NWRS-3 188.

572 NMBM *Drought Mitigation Plan* 53.

573 NMBM *Drought Mitigation Plan* 53.

574 NMBM *Water Outlook Report November 2021* 23; NMBM *Drought Mitigation Plan* 53.

575 NMBM *Drought Mitigation Plan* 53.

determine the potential harm that may be caused to the environment through specific developments.[576]

Further, the NMBM's *Enterprise Risk Management Policy Volume 3* (2021) (ERM)[577] is a comprehensive policy on risk management, that largely focuses on enabling the NMBM to:

> …effectively deal with uncertainty and associated risk and opportunity to enhance the capacity to build value.[578]

The ERM emphasises the need to ensure adequate service delivery by assisting municipalities in anticipating changes (risks) that may affect service delivery.[579] The ERM identifies drought as an example of external risks faced by the municipality, which reiterates the need to provide municipal risk mitigation strategies.[580] The ERM identifies several national acts related to risk management, which includes the DMA, the NEMA, the NWA and the MSA.[581] The policy further provides relevant guidelines on response initiatives to identify a variety of risks.[582] For example, risk assessments will be conducted to determine the cause of each risk (which creates a nexus with pillar 2 as the guideline discussed in ERM enables a response measure to be taken in the form of risk assessments as discussed above).[583] It can be deduced from the above that pillar 3 provides an actionable approach to drought risk management, to mitigate the potential harm that communities such as the NMBM can be affected by. The NMBM Drought Mitigation Plan, related by-laws and mitigation plans play an important role in reducing the impact of drought within the area.

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576 See para 3.5.2 above; Department of Environmental Affairs *20 Years of Environment Impact Assessment in South Africa* 1,2.
577 NMBM *Enterprise Risk Management Policy Volume 3* (2021) (ERM).
578 Item 3.1 in ERM.
579 Item 1.4 in ERM.
580 Item 9.1 in ERM.
581 Item 9.1 in ERM.
582 Item 9.4 in ERM.
583 Item 9.4.3 in ERM.

4.4 Concluding remarks

This chapter evaluated the NMBM's by-laws, policies and plans to determine the extent to which it provides for urban drought risk management. The discussion took place against the established pillars of drought risk management.

It was found that although the NMBM has several resources available on drought and other-disaster risk management such as the NMBM Disaster Mitigation Plan, the NMBM Disaster Risk Management Policy, the municipality's Disaster Management By-Law and the NMBM's municipal website are amongst the NMBM's publicly available resources.[584] While the documents provided for by the NMBM are highly relevant to the discussion above, several documents are older than ten years.[585] Although it must also be said that while the NMBM Disaster Risk Management Policy (2010) is relatively dated, the NMBM Disaster Mitigation Strategy provides a detailed scope of the municipalities mitigation plans and includes information on alternative augmentation initiatives.

Furthermore, a comparison could be drawn between the national framework on drought risk management, established in chapter 3, and the local framework established by the NMBM. According to the national framework, municipalities must have IDPs that include disaster management plans; MDMCs in metropolitan and district municipalities; laws, policies and plans on water conservation; and tariff policies that could be applied to times of drought occurrences. In chapter 4, it was found that the NMBM has such a legal framework in place. The NMBM has strategies, such as the Drought Mitigation Plan, that ensure drought relief for vulnerable communities. The Drought Mitigation Plan also encourages water conservation and supports ideas for alternative augmentation plans. Water conservation during drought occurrences is further promoted by utilising municipal by-laws, policies on disaster risk management and planning powers. Furthermore, as discussed in chapter 3 of this study, metropolitan municipalities must also establish MDMCs. The

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584 See para 4.2.1.2 above.

585 The NMBM Disaster Risk Policy was adopted in 2010; the NMBM Disaster Risk By-law was adopted in 2007; the NMBM Water By-law was adopted in 2010, the NMBM Tariff By-law was adopted in 2011, to name a few.

NMBM's IDP states that the municipality does indeed provide for such a centre, however no further information is available concerning the operationality of the centre.[586]

Although, the NMBM has utilised its law and policy making powers to a great extent, some things could still be improved. The case study analysis further suggests that the NMBM has far more resources available on disaster risk and water law and that more attention could be given to the environmental aspect of urban drought risk management.

[586] See paras 3.7 and 4.3.2 above.

Chapter 5 Conclusion and recommendations

5.1 Background

Drought is a reoccurring natural phenomenon that traverses geographical areas and globally affects communities and the natural environment.[587] Drought is a prevalent natural occurrence in South Africa that also affects the country's unique ecosystems and inhabitants. As such, water insecurity is a threat to the well-being of people residing in South Africa.[588] Drought occurrences within urban and rural communities cause a strain on potable water supply services, as low rainfall levels lead to irregular water supply from national dams. Government mismanagement of potable water supply systems further exacerbates the situation if state infrastructure is not adequately maintained.[589] These impacts are not without legal relevance as this study sought to illustrate.

As drought-related disasters worldwide, and more specifically in South Africa, evolve in severity and frequency, the international community has proposed and accepted three universal pillars of drought risk management.[590] These pillars formed the backbone of much of the discussion in this study as they describe how to mitigate drought risk and how it could be applied to the regulatory framework established in law for urban drought risk management.

5.2 Study focus, methodology and research limitations

5.2.1 Research question and study focus

The primary question of this study was to determine the extent to which four areas of South African law and policy (indicated below) provide for urban drought risk management and to contextualise its application with reference to the municipality

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587 See para 2.3 above.
588 See para 2.4 above.
589 See para 2.4 above.
590 These pillars were listed: 1.) Pillar 1: Drought monitoring and early warning strategies; 2.) Pillar 2: Drought impact, vulnerability, and risk assessment and 3.) Pillar 3: Drought response and mitigation measures. See para 2.5.1 above.

of Nelson Mandela Bay.[591] To answer this question, the study focused on the laws and policies applicable to urban drought risk management. The study was limited in its scope to the extent that it focused on specifically identified areas of law and a single municipality.

5.2.2 Research methodology

As explained in chapter 1, the study followed a multifaceted approach to the meaning of urban drought risk management that was based on a literature review. The study considered primary and secondary sources of international, national and local law and policy, climatology, and environmental sciences. The research further provided an in-depth analysis of the national and local regulatory frameworks for urban drought risk management. This analysis considered four interrelated areas of law and a case study on the Nelson Mandela Bay Municipality. At the time of writing, the NMBM was experiencing a prolonged drought.[592] The predetermined areas of South African law focused on local government, disaster risk, water and environmental law.[593]

5.2.3 Limitations

The execution of this study had limitations. Empirical research was impractical due to time and resource constraints. The study was therefore limited to a literature (desk-based) review. Although the literature perused for this study was sufficient for the scope of the research, some sources proved outdated or to be unavailable in the public domain. It transpired that the laws and policies that were studied focus heavily on disaster risk management as a general concept and do not focus explicitly on drought risk management or urban drought risk management.

The research was further limited in terms of its scope. Firstly, the study focused on the three pillars of drought risk management, which were used as a conceptual lens through which to examine the standard strategies relevant to drought risk

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591 See 5.2.2 below.
592 See para 1.3 above.
593 The basis for the selection of these areas was explained in chapter 1. See para 1.1 above.

management. While these pillars guided the research, this had its restrictions. Secondly, the study was limited in the context of country and case study. Even as the study primarily focused on South African law and policy with a brief reference to some global perspectives, a comparative study on another drought-prone country, region or municipality could have provided valuable insight on best practice for laws and policies addressing drought risk management. In terms of the case study, the research was limited to one metropolitan municipality in South Africa's Eastern Cape Province which means that the findings cannot meaningfully be extrapolated as is, to any other municipality. It is, however, argued that the overall findings of this study hold meaning and bear relevance to other drought-stricken municipalities considering the overarching application of the national law and policy instruments and the general application of the pillars.

5.3 Main findings

The main findings of this study are as follows:

5.3.1 Government role-players should implement the three recognised pillars of drought risk management at city-level

The standard procedures on urban drought risk management were established through the DRAMP Framework, the SADC DRIMMS and the DMP.[594] These instruments form part of the international, regional and local documents on drought risk management. For this study, the DRAMP Framework and the SADC DRIMMS served to explain the role of the three pillars of drought risk management.[595] The first pillar focused on early warning and drought monitoring strategies, the second pillar examined the role of risk, vulnerability and impact assessments and the third pillar considered drought mitigation and response initiatives.[596]

The research found that by analysing these three pillars, one can determine whether or not national and local laws and policies sufficiently provide for urban drought risk

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[594] See para 2.5.2 above.
[595] See para 2.5.1 above.
[596] See para 2.5 above.

management. The three pillars could be (and were) used as a lens through which to determine the extent to which laws specifically focus on city-level drought risk management.

5.3.2 South African law and policy do not provide for urban drought risk management to the fullest extent

Several provisions of the NWA, the DMA, the WSSP and NAP DLDD conform to the standards implicated by the three pillars of drought risk management.[597] However, the South African regulatory framework for drought risk management does not fully provide for each of the pillars. Where plans and strategies exist for drought risk management, they do not necessarily mention urban droughts. One example of this is the DMP, which does not adequately account for the impact of drought on urban areas but primarily focuses on the agricultural sector. [598]

The DMA also focuses on disasters in a more general sense and does not refer to drought disasters or urban drought directly.[599] As far as pillar 1 is concerned, the DMA briefly mentions the need for early warning systems and monitoring strategies but does not directly address the need for drought-specific warnings or monitoring systems.[600] On the other hand, the DMP relates directly to drought risk in South Africa and provides several provisions on drought monitoring and the dissemination of early warnings but lacks information relevant for urban drought risk management.

As far as drought impact and risk assessments are concerned, the national legal framework does provide for pillar 2 through its disaster risk and water law and policy.[601] However, it was found that South African environmental law does not sufficiently provide for vulnerability, risk or impact assessments, as far as urban drought disasters are concerned.[602]

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[597] See paras 3.4 - 3.6 above.
[598] See para 3.4.1 above.
[599] See para 3.4.1 above.
[600] See para 3.4.1 above.
[601] See para 3.5.1 and 3.5.2 above.
[602] See para 3.5.3 above.

Pillar 3 essentially focuses on the work of the responsible spheres of government expected to utilise state resources to mitigate and respond to drought occurrences. While several laws and policies provide for mitigation initiatives or responses to disasters, there is a lack of consistency as to which sphere of government is responsible for specific duties in drought and other-related disaster responses. From a local government perspective, municipalities have a duty to assist in local disaster response and mitigation strategies but the extent to which municipalities are specifically responsible remain unclear.

5.3.3 Drought risk management is scattered across many laws and policies

This study found that while disaster risk, water, and environmental law and policy are crucial for effective drought risk management, the provisions that could be utilised are disjointed, inconsistent and scattered. The NDMC, the Department of Agriculture, Land Reform and Rural Development and the Department of Cooperative Governance and Traditional Affairs are some of the state entities that are responsible for aspects of drought risk management, which should demonstrate the importance of cooperative government and intergovernmental relations.[603] However, limited laws and policies on drought risk management can lead to ambiguity about what area of drought risk management each sphere of government is responsible for. This fragmentation is cause for concern. When discussing for example, the first pillar of drought risk management, the study found that the NDMC, the Department responsible for agriculture and the Department responsible for water and sanitation may concurrently be responsible for disseminating early warnings that involve a threat to water security.[604]

Legislative fragmentation and overlap could hinder effective drought risk management strategies across South Africa.

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603 See para 3.4.2 and 3.6.1 above.

604 Section 17(2)(e) of the DMA states that the NDMC is responsible for compiling early warnings. On the other hand, section 145(2) of the NWA states that Minister responsible for water must disseminate information on early warnings as far as they relate to water supply - see paras 3.4.1 and 3.4.2 above.

5.3.4 The role of local government in urban drought risk management could be strengthened

It was found that local government plays a fundamental role in urban drought risk management. Although disaster risk management does not form part of local government's functional areas, municipalities have a responsibility to mitigate the impact of disasters within their communities.[605]

The four areas of law under this study showed that local government is mandated to have a variety of laws, policies and strategies in place that relate to urban drought risk management. IDPs, disaster risk by-laws, policies and mitigation plans, as well as water conservation strategies must be put in place to ensure proper urban drought risk management.

In times of emergencies or disasters, the legislative and executive responsibility of municipalities could be strengthened.[606] Municipalities are responsible for declaring, responding and mitigating local disasters, but this responsibility is not always actualised to such an extent that an immediate response to drought-induced emergencies is ensured. For example, one of the primary executive duties/responsibilities of metropolitan and district municipalities is to establish MDMCs.[607] MDMCs are responsible for the processes and guidelines necessary for good urban drought risk management. Without MDMCs, it may be unclear as to which area of law to adhere to and in what order.[608]

5.3.5 Lack of available information on an operational MDMC of the NMBM

The most recent edition of the NMBM's IDP mentions the municipality's MDMC, which indicates that a centre should exist within the area.[609] However, this study found that there is no contact information available for such a centre, nor is there a physical address available that the community can utilise for information on

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605 See paras 3.3 and 3.7 above.
606 See para 3.7 above.
607 See para 3.7 above.
608 See para 3.7 above.
609 See par 4.3.2 above.

drought and other disasters.[610] MDMCs are the primary executive bodies responsible for matters that relate to drought and other disaster risk concerns.

5.3.6 NMBM's local law and policy framework is primarily equipped through disaster risk law

The NMBM municipality has utilised by-laws, policies, plans, and strategies to mitigate drought. As the municipality is currently experiencing a prolonged drought, it was interesting to find that the NMBM has three by-laws,[611] four policies[612] and three local plans that are relevant to drought risk management.[613]

The study found that the municipality has far more provisions available on drought risk management from a disaster risk and water law perspective than from an environmental law perspective.[614] The municipality has used many of the tools provided for in national disaster risk and water law, but the research found that environmental law is as relevant to drought risk management as disaster risk and water law and should be featured accordingly.[615]

While the focus of the NMBM is on disaster risk law and policy, this study found that neither the NMBM Disaster Risk Management Policy nor the Disaster Risk By-law encapsulates the need to mitigate drought disasters, specifically.[616] To some degree, the municipality's Drought Mitigation Plan provides crucial information on reducing the impact of the drought.[617] While the Drought Mitigation Plan did not feature in the analysis of the first pillar of drought risk management, it did provide insight that is relevant to the second and third pillars. This is a significant finding as it suggests

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610 See para 4.3.2 bove.
611 The NMBM Water By-law, the NMBM Disaster Management By-Law and the NMBM Tariff By-law - See paras 4.3.1.1 and 4.3.1.3 above.
612 The NMBM Disaster Risk Management Policy, the NMBM Tariff Policy, ESP and ERM - See paras 4.3.1.1 and 4.3.1.3 above.
613 The NMBM IDP, the NMBM Drought Mitigation Plan and the Green Action Plan - see paras 4.3.1.1 - 4.3.1.3 above.
614 See paras 4.3.1.1-4.3.1.3 above.
615 See para 3.1 above.
616 See para 4.4 above.
617 See para 4.3 above.

that municipalities may tend to focus on a reactive approach to drought occurrences, rather than tackling droughts proactively.

In terms of the second pillar of drought risk management, the Drought Mitigation Plan included a risk assessment on the potential impact of prolonged droughts on the community's potable water supply.[618] Stress caused by drought could negatively influence the supply of potable water, to the extent that the community's constitutional right to access of water may be infringed upon.[619] The Drought Mitigation Plan is especially relevant to the third pillar of drought risk management, as the plan was developed to assist the municipality in preventing a potential "Day Zero" in recent years.[620]

5.4 Recommendations

The following recommendations are made following the gaps identified in the list of findings above:

- Intergovernmental cooperation and alignment are essential for effective drought risk management in urban areas. As such, the national departments responsible for the environment, agriculture, water and cooperative government should consider revising department-specific policies to prescribe for the manner in which relevant departments communicate with one another on, and collectively plan towards urban drought risk management. It is advisable that cooperation among national and local authorities be improved to ensure coherent planning, smart use of limited resources and continuous intergovernmental communication.

- The national department responsible for cooperative government must work with other relevant national and provincial departments to revise the municipal sphere's statutory duties in terms of urban drought risk management. Even though MDMCs must be established in accordance with

618 See para 4.3.1.2 above.
619 See para 4.3.1.2 above.
620 See para 4.3.1.3 above.

the DMA, the NDMC should assist the national legislature and relevant executive authorities in preparing regulations to help ensure MDMCs are: (1) indeed established and; (2) that MDMCs are maintained by metropolitan and district municipalities; (3) that the centres are equipped to address the impact of local disasters and (4) that the MDMCs are provided with the necessary resources to ensure adequate urban drought risk management.

- The DMA, NWA and the DMP must be revised, to clarify whether it is the Minister responsible for agriculture, the Minister for water and sanitation or the NDMC, that is responsible for the dissemination of drought-related early warnings. Furthermore, the NDMC is typically in a position to help advise the national (and possibly the provincial) legislature on what is necessary to ensure such a role clarification and division of responsibility.

- The NMBM to make all available resources on the MDMC available to the public, including its operational status and relevant contact information.

- The NMBM to review its NMBM Disaster Risk Management Policy of 2010 to ensure it is being brought up to date to account for future drought occurrences and to align with the best available recent scientific information. The municipality should also consider revising its environmental by-laws and policies that could support drought risk management from an environmental perspective. As NMBM has a high concentration of biodiversity, the municipality should address the gaps in its local law as it relates to the nexus between urban drought and ecological degradation.

5.5 Future research themes

During the course of this study, other areas of research were identified that could benefit from future investigation. Some of the remaining questions include:

- In what ways can the lessons learnt from NMBM be applied to other municipalities in order to improve urban drought risk management across South Africa and possibly in other Southern African countries?

- How does the South African legal framework on cooperative government and intergovernmental relations serve to inform a joint response to and consolidated planning for the drought risk challenge in the country's cities and towns?

- Is the municipal and disaster risk funding model in South Africa suitable for the implementation of existing and potential future drought risk management measures provided for in multi-layered laws and policies?

- Does South Africa's unfolding climate change law and policy regime adequately cater for drought risk management across the three spheres of government as part of its vision for long-term climate adaptation?

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