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Title: Impacts of water provision on Alfred Duma Local Municipality, KZN, South Africa

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ORIGINALITY DECLARATION

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I, Zonke Bhekokuhle Nene, acknowledge that I have read and understood the University's policies and rules applicable to postgraduate research, and I certify that I have to the best of my knowledge and belief complied with their requirements.

I obtained an Ethical Clearance Certificate for the study in September 2022 (Ethical Clearance Certificate Number: UZREC 171110-030 PGM 2022/41, as I have complied with the requirements, and I have complied with the special conditions set out in the certificate.



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DEDICATION

The study is dedicated to my mother, Thembakazi Mchunu, my brother, Nkosikhona Ntombela, and my sister, Nonkululeko Masondo, as they have all supported me in completing my master's. This dedication is further extended to my grandfather, Nhlanhla Mchunu, who values education the most and has inspired me to study further in enquiring about the knowledge that the world has to offer.

ABSTRACT

The study aimed to explore water provision's impacts on rural areas of Alfred Duma Local Municipality. Rural areas under the jurisdiction of Alfred Duma Local Municipality are provided by the uThukela District Municipality with water via taps installed in their yards. The study was conducted in Alfred Duma rural communities. The objectives of the study were: to evaluate the quality of water governance of uThukela District Municipality for water provision to rural areas of Alfred Duma Local Municipality; to determine the accessibility, availability, and reliability of water supply to the rural households of Alfred Duma Local Municipality; and to identify recommended measures to address poor municipal water supply that affect social and economic development in the rural households of Alfred Duma Local Municipality.

The study adopted an exploratory research design as it focused on exploring the experiences of participants regarding municipal water supply by uThukela District Municipality in their rural areas. Therefore, the study adopted a qualitative research approach to be able to get more out of the participants. The population of the study comprised of the Alfred Duma Municipality councillor, uThukela District Municipality officials from the Department of Water and Sanitation, and Alfred Duma Local Municipality community members. The study made use of semi-structured interviews to collect qualitative data to be analysed using thematic analysis.

The study discovered that there are gaps in water governance of uThukela District Municipality, since the communities they serve feel marginalised as they are without water supply that is within their right to have. The study discovered that the accessibility, availability and reliability of the municipal water supply for rural areas is inequitable and dirty, and therefore poor. The clinic, agricultural NPOs and small businesses are negatively affected. The community meetings are only held when there is a protest, and even when held issues raised on water are not addressed in a manner that satisfies the community needs. The communities rely on boreholes, rivers, wells, dams and rain water harvesting using rain gutters. The communities travel long distances to get water for domestic purposes, and to keep businesses, schools, and NPOs running. The study discovered that the communities call for the establishment of more boreholes closer to households, dams to be released from privatisation, water trucks to be deployed weekly, and coordination, collaboration and cooperation to be adopted effectively in water governance.

Keywords: Water governance, Decentralisation, Water provision, Accessibility, Affordability, Water legislation

ACRONYMS AND ABBREVIATIONS

WHO	World Health Organization
UNW	United Nation Water
UNDP	United Nations Development Programme
UNICEF	United Nations International Children's Emergency Fund
IDP	Integrated Development Plan
DWS	Department of Water and Sanitation
CIGIA	China Industrial Gases Industry Association
NWA	National Water Act
WSA	Water Service Act
SDP	Sustainable Development Plan
RWH	Rural Water Household
HWI	Household Water Insecurity
OEDC	Organization for Economic Cooperation and Development
BHs	Boreholes
WB	World Bank
WRC	World Resources Commission
SDGs	Sustainable Development Goals
MDGs	Millennium Development Goals
IWS	Intermittent Water Supply
EPA	Environmental Protection Agency
SRFs	State Revolving Funds
BIL	Bipartisan Infrastructure Law
Republic of South Africa	RSA

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CHAPTER ONE: ORIENTATION OF THE STUDY

1 INTRODUCTION

This study explores the impact of poor water provision on Alfred Duma Local Municipality in Kwa-Zulu Natal (South Africa), particularly in rural areas. This chapter outlines the background information on the challenges and consequences of water provision. It also outlines who is obligated to provide water in order to ensure safe, sustainable, efficient, and equitable water provision for all people that is available, accessible and reliable. Alfred Duma Local Municipality has 36 wards, with 22 of them being rural, where the study was conducted. This chapter further looks at the problem statement, aim of the study, objectives and research questions, significance of the study, and the outline of the study. This brings about an understanding of what informed the conducting of the whole research and how it is structured.

1.1 Background

After the apartheid era ended in 1994, South Africa underwent a major transition to democracy. This enabled its first democratic government to put an end to the previous water shortages and secure sound laws and policies to deal with the issue. According to Hutton (2016) the World Health Organization (WHO) and United Nations International Children's Emergency Fund (NICEF) in the year 2017 stated that the safely managed water for consumption indicator involves three conditions: available when needed, free from pollution, and accessible on premises. Water suppliers such as municipalities are responsible for achieving these conditions. In addition, the South African Government (2017) stated that South Africa has eight (8) metropolitan cities, forty-four (44) district municipalities, and two hundred and twenty-six (226) local municipalities, and they all have a core responsibility for the delivery of clean potable water, sanitation, markets, refuse removal, and land management. It is, however, regrettable that after twenty-seven (27) years of the "post-apartheid dawn", the basic right as enshrined by the Constitution to have unpolluted potable water is still not fulfilled. This is supported by Omarova et al. (2018) who argue that achieving such a high level of quality is difficult for all classes of income in all countries.

Muller (2020) stated that the effectiveness of the functioning of South Africa's water sector has deteriorated, evidenced by the declining level of reliable water provision services according to official data. The payment for water is declining, resulting in increasing municipal debt, which undermines the delivery of services in many communities where there is a lack of funding for operations and maintenance. Contaminated water in rivers caused by failing administration of

municipal wastewater and mining enterprises under unprofessional regulations are rapidly expanding. Furthermore, Muller (2020) stated that the Management of the National Department of Water collapsed along with billions of rands of irregular expenditure, enormous debts, and unsuccessful projects, as outlined in the 2018 Auditor-General and the parliament's standing committee on public accounts report. This statement hints that, besides climate change, pollution, and population growth factors like mismanagement and corruption are hindering the successful implementation of water provision aligned with existing water policies.

According to Bourblanc and Blanchon (2019) anxieties about access to water quality are globally and heavily contested in South Africa's post-apartheid political scene. According to Barnes (2018) and McFarlane and Silver (2017) the political aspect has been addressed in the literature towards the availability of water to underprivileged areas and the policies put in place to grant them access in South Africa. Furthermore, the goals and shortcomings of the post-1994 water policies and initiatives, which include prepaid water meters and free basic water policies, have been funded. However, access to water, on the other hand, continues to bring up concerns about fairness and non-discrimination among people in South Africa. Disadvantaged people are affected by earlier discriminatory practices and policies.

The World Health Organization (2017a) states that about eight hundred and forty-four million people are deprived of accessing basic water supplies. Seventy-nine percent of those are rural communities. Simultaneously, twenty-one billion individuals without safely managed water for consumption supply system services. Furthermore, WHO (2017b) implies that fourteen point nine percent of urban and forty-five comma two percent of the rural population require improved services. Understanding the context of rural communities will assist in articulating some of the challenges that confront them, such as physical terrain, geographic disposition, and population.

Alfred Duma Local Municipality is part of the rural population requiring improved services. The integrated development plan (2020-2021) of uThukela District Municipality stated that all 36 wards under the jurisdiction of Alfred Duma Local Municipality are experiencing water problems. In those 36 wards, about 26 wards are rural areas (IDP, 2020-2021). The District Municipality relies majorly on water tankers. There are nine (9) operational water tankers that service twenty-three wards. The twenty-three wards are geographically dispersed, with only two water purification plants in the infrastructure, which are there such as standpipes. Water

does reach the lower-lying areas. However, it does not get to the higher-lying areas. One also needs to bear in mind that the maximum capacity of a water tanker is twenty thousand litres (20000 L). This is calculated to be approximately two to three buckets per household, provided there is someone who can carry the water, let alone walk to the water tanker's location.

Climate change, growing population, drought, pollution, mismanagement, and corruption hinder a successful implementation of water provision aligned with water policies, therefore subjecting communities to harmful impacts of poor water provision. This study is crucial in improving water governance and supply to bring about rural social and economic development.

1.2 Problem statement

According to Mukherjee et al. (2019) and Duttagupta et al. (2020) access to clean water for consumption and sanitation, is recognized as a prioritized goal of sustainable development around the world. Water provision with supporting water governance and water policies ensures such access. Municipal water provision has a noble significance in securing safe water that is available, accessible, equitable, and efficient for both social and economic development. However, Hoffman and Nkadimeng (2016) state that there is an increasing gap between urban and rural areas in service delivery related to water supply since rural areas are lagging. According to Adeyeye et al. (2019) water provision in rural areas is subjected to failure and becoming increasingly unreliable and difficult to access, subjecting rural communities to untested water sources or to be without water. Therefore, such water provision badly affects the social and economic development of the rural areas.

The researcher was motivated by this problem regarding water provision in rural areas and thus explored the impacts of poor water provision on Alfred Duma Local Municipality in rural households to determine the quality of water provision and water governance.

1.3 The aim of the study

The study explores the impacts of water provision on rural areas of Alfred Duma Local Municipality and how to improve water governance to address social and economic development challenges.

1.4 Objectives of the study

- i. To evaluate the quality of water governance of uThukela District Municipality for water provision to rural areas of Alfred Duma Local Municipality.
- ii. To determine the accessibility, availability, and reliability of water supply to the rural households of Alfred Duma Local Municipality.
- iii. To identify recommended measures to address poor municipal water supply that affect social and economic development in the rural households of Alfred Duma Local Municipality.

1.5 Research questions

- i. What is the quality of water governance of uThukela District Municipality for water provision to the rural households of Alfred Duma Local Municipality?
- ii. To what extent is water supply available, accessible and reliable in all rural areas of Alfred Duma Local Municipality?
- iii. What are the recommended measures to address poor municipal water supply that affect social and economic development in the rural households of Alfred Duma Local Municipality?

1.6 Significance of the study

The study is crucial for all areas under the jurisdiction of the Alfred Duma Local Municipality, as they have challenges with municipal water provisioning (IDP of uThukela District Municipality, 2020-2021). The study provides measures for ensuring water security, provisioning, accessibility, and sustainability. These measures are unique, generated from understanding the lived experiences of the rural communities under Alfred Duma Local Municipality regarding water provision and accessibility. The Department of Water and Sanitation (DWS) can also benefit from this study since the study is people-centred, meaning the DWS mainly exists to understand the needs of the people so to supply service delivery according to people's needs. The study seeks to explore the impacts of water provision through understanding people's experiences with water provision and formulate measures to address them to improve the social and economic development of rural areas. This study has the potential to contribute to resolving the known water provision crisis experienced globally, affecting the local development of most countries and their rural areas. The UN-water (2018), Kabeer (2016) and United Nations Development Programme (2018) substantiated that rural areas are deprived of basic service delivery rights, while the obligation to accommodate every individual requires more focus on the rural areas.

This study promotes the importance of rural areas to be recognized by the national, provincial, and local governments in service delivery. Because rural areas are the ones that still accommodate natural water sources, that could be our solution regarding the water crisis, and it is the people in these areas who must protect the environment as they mostly rely on it for their survival. Hence, Lique et al. (2016), Lopes-Lima, 2018, and Oral *et al.* (2020) stated that there is a developing body of evidence that natural-based solutions are capable of water storage and supply, for example, watershed restoration and conservation, green infrastructures like rain gardens and wetlands, and managed groundwater and aquifer recharge.

1.7 Feasibility

The feasibility of this research has relied on the availability of participants, financial resources, and time. These factors were necessary in data collection for this study to be completed successfully. The study was qualitative. Therefore, participants were required to express their experiences regarding the impact of water provision on rural areas under Alfred Duma Local Municipality. These participants had to be residing in the rural areas of Alfred Duma Local Municipality. The financial resources were deemed important for this study as they were required to compile the whole dissertation, and for proof reading by an official editor who issued a certificate. Time was also considered an important factor as it was required in collecting data from the participants residing in areas that were the focus of the study.

1.8 Intellectual property

This property belongs to the institution where the candidate is registered and that is the University of Zululand. Consent from both the institution and the researcher will be given regarding any publishing of this knowledge. Furthermore, it will be made available for all to access.

1.9 Knowledge dissemination

In terms of knowledge dissemination, to give back to the community the researcher will organize workshops for community members to summarise what the study has found. Furthermore, the researcher will organize a presentation to share findings with the Alfred Duma Local Municipality. The community, organizations, and other educational institutes can access both electronic and hard copies of the dissertation in the University Repository and the UZULU collection in the university library. According to the quality of the findings of this study, an

article may be published discussing measures that can be taken to enhance or improve water provision, mostly in rural areas. The article will be titled: *The significance of effective, efficient, sustainable, and equitable water provisioning in Alfred Duma Local Municipality rural households.*

The reason for publication is to share knowledge and information that might help Alfred Duma Local Municipality and its community in ensuring the availability of safe water, sustainable access to safe water, and equitable distribution of safe water. The possible communication channels that will be utilized in disseminating knowledge include websites, announcements at public meetings or events of community needs, and social media such as Facebook. Recommendations will be made for the rural areas under Alfred Duma Local Municipality. However, where applicable they can also be used for eradicating challenges to water provision in other local municipalities as well.

1.10 Outline of the study

Chapter one: introduction

This chapter contains the introduction of the study with a background on the topic. It also outlines the problem statement, the aim of the study, research objectives and research questions, and the significance of the study.

Chapter two: literature review

This chapter has a literature review concerning the significance of water provision and water governance, and challenges regarding the availability, accessibility and reliability of municipal water, as well as the consequences and potential measures. Considering an international and national context, then in South African context.

Chapter three: theoretical framework

This chapter presents the theoretical framework of the study, locating the relationships examined in the study in the context of manufacturing or testing formal theories. The water governance theory will be discussed.

Chapter four: research design and methodology

This chapter has an outline of methodology that was used in the study and the limitations of the study. This section is structured around the philosophy and paradigm, research design,

research approach, study area and sampling method, data collection, and analysis of this study. Ethical considerations and measures to provide trustworthiness will also be discussed.

Chapter five: data analysis

This chapter emphasizes the process and collection of qualitative data. The results are presented in themes and sub-themes. The qualitative data was collected through interview questions, observations and document analysis. The findings are presented in tables, followed by interpretation and analysis.

Chapter six: recommendations and conclusion

In this chapter, the conclusion is described, and recommendations are suggested to water provision entrepreneurs and policy-makers. The recommendations gave guidance on how survivalist or micro-enterprises should grow to larger, more financially viable water services.

1.11 Chapter summary

The chapter has discussed the introduction and the background of the study, problem statement, aim, objectives and research questions, significance of the study, feasibility, intellectual property, knowledge dissemination, and the outline of the study. The reader is introduced to the topic of this study in chapter one. Any worthwhile research must have a purpose, which is why the first section of this chapter discusses the study's goal.

CHAPTER TWO: LITERATURE REVIEW

2 INTRODUCTION

The chapter provides the universal literature concerning the impacts of poor municipal water supply on rural areas. The focus of the study is on the significance of municipal water supply, the quality of water governance in rural areas, and availability, accessibility, and reliability of the municipal water supply in rural areas. The study also identifies the current measures addressing the impact of poor municipal water supply that affects the social and economic development of rural areas. The discussion focuses first on the international and national context, and then on South Africa. Reviewing the literature has assisted the researcher in identifying setbacks, leading to further unresolved challenges.

2.1 Significance of good municipal water provision to rural areas

Dinka (2018) argued that the municipal water supply is essential for providing suitable water for the population through a water supplier to reduce the risks of water pollution in various elements of the water supply system like water source, treatment, and distribution of water. In addition, the municipal water supply is crucial as it provides a system of hydrological and hydraulic components that include all buildings and facilities to meet the water needs of industrial centres and the general population. This includes the collection of untreated water directed to the drainage basin, which is directed to the water treatment pipes, then to the treated water transfer pipes, and from there to the drinking water supply pipes before being directed to pumping stations. Finally, it is stored in tanks and can be distributed to consumers (Jia et al., 2016).

Nounkeu et al. (2021) indicated that water is a significant nutrient and must be consumed sufficiently, as it plays a crucial role in human physiology and optimal health. Countries adopted a common idea to supply water that has undergone water treatment in public or private

water utilities for improved social and economic development. However, there are communities that do not get the same benefits from municipal water provision. For instance, twenty one million individuals were exposed to contaminated drinking water in 2015 as a result of documented violations of water quality requirements in nine percent of all American water systems. The likelihood of these infractions was higher in rural locations, where it is frequently difficult for local governments to secure funding for system upkeep (Condon, 2019). Furthermore, a study in Abuja (Nigeria) discovered that one-third of homes with piped water reported using household water treatment because of their regular encounters with “dirty” water brought on by rusted pipes, lengthy water outages, or water pollution brought on by pipe breaks (Abubakar, 2018). Furthermore, in Emakhabeleni, a rural area in northern KwaZulu-Natal of South Africa, the taps had remained dry for three weeks. Streams are presently used by about two thousand families (Majola, 2021). This means the municipalities are failing them as a community and now rural communities are forced to spend money on water treatment supplies, which the poor cannot afford.

Nounkeu et al. (2021) stated that poor water provision results in unsafe water usage and poor sanitation. From a nutritional point of view, these can increase the frequency of recurring diarrheal and intestinal parasitic infections due to inadequate food utilization and inadequate absorption of nutrients, especially in children. In American farming regions, located mostly in rural areas such as in Flint, nitrate levels in drinking water are frequently dangerously high because manure and fertilizer leach into the groundwater. Yet, in eighty five percent of rural areas natural water sources with nitrate breaches, there are no nitrate removal systems (Condon, 2019). Forty point one percent of Nigerians rely on dangerous drinking water sources, which include uncovered wells and springs, twenty point six, surface water thirteen point nine percent, and bottled or sold water five point six percent (NPC and ICF International, 2019).

Furthermore, South African rural areas rely on boreholes, dams, rivers, and rain water harvesting; numerous South African provinces have reported drinking water contamination from ground water that contains excessive quantities of fluoride (Bretzler et al., 2017 and Durowoju et al., 2016). This all means that people are at risk of poor school attendance, loss of working days, poverty, and malnutrition. Girls and women lacking access to sanitized facilities and safe water, their education become negatively affected due to experiencing period poverty, and cannot afford menstrual products to clean themselves safely (Rodriguez, 2019).

According to Sommer et al. (2016) poor water supply result to individuals losing their dignity and affect their education particularly children at school, and grown-ups at work.

2.2 The quality of water governance in rural areas

Water governance is seen as a critical aspect in achieving Sustainable Development Goal number 6 – to provide universal access to and sustainable water and sanitation management; however, it is still uncertain which governance approaches may be considered sustainable (Martinez-Cordoba et al., 2020; Jimenez et al., 2020; Romano and Akhmouch, 2019). Additionally, according to studies, political, social, and economic factors affect governance as well as the effectiveness of any management or technological solution used to promote water sustainability (Ahmed and Arral, 2019; and Romano and Akhmouch, 2019). Furthermore, this is because it is impossible to identify one size fits all solutions or for local governments to select a single optimal option in a context where each government varies. As a result, the question becomes how local governments can incorporate global aspirations into local policy and guarantee that their plans, policies, decision-making processes, and management practices reflect sustainable water governance.

Cisneros (2019) stated that numerous Latin American nations have modified their water policy, due to on-going privatized water delivery schemes and disjointed administrations in some nations which lead to access disparities. These adjustments were made in response to criticism from various international organizations. Political environmental institutions have undergone some transformation as a result. The primary shifts have been away from hierarchical, centralized organizations, and toward new plural, hybrid arrangements with a re-evaluation of local territorial players at multiple administrative levels (Cordova' Montfar, 2018 and Delgado et al., 2019). Local people have also been more active in social movements, protesting draconian changes to ecosystems and the services they provide, calling for environmental justice in the provision, distribution, and access to natural resources. This call defends the water supply from privatization (1CIGIA, 2019).

According to Perez-Orellana et al. (2019) top-down plans characterize the designs for present governmental participation in Latin America. Additionally, Nicolas-Artero (2016) stated that forty million individuals from various nations receive water from Latin American rural community organizations. Furthermore, many of these self-organized community institutions have developed their own legal frameworks and laws for the control of water resources as local

community groups. These groups include multi-actor collective organizations, with water rights and administrative responsibilities. Chile's rural water committees are crucial in this regard.

According to Delgado et al. (2019), an important topic on the public agenda and in national policy discussions in Chile has been the need for better water governance. Early in October 2019, several Chilean social groups made the decision to express their dissatisfaction with the country's policies, calling for changes to them in a number of sectors including water de-privatization. In accordance with Article 19 No. 24 of the 1980 Chilean Constitution, any person who has a legal right to use a body of water is considered to own that body of water. Although Chile's Civil Code article 595 from the year 2000 declares that all waters are national assets for public use, this assertion is purely symbolic (Political Constitution of the Republic of Chile, 1980). In Chile, there are still multiple governmental entities who frequently disagree on how to manage water sustainably, and conflicts over water have arisen frequently under this governance style, particularly in areas with limited supply (Urquiza et al., 2019).

According to Delgado et al. (2019) the prevailing water governance systems in Latin America are hierarchical, which results in flawed policies and fragmented perspectives on a complicated issue. Furthermore, according to Meller et al. (2019) following a recent assessment of the water difficulties facing Latin Americans, Chile's water governance has several deficiencies, including technical, financial, and political gaps that it shares with other nations in the region. It has been suggested that other issues like institutional fragmentation, a lack of coordination, and a lack of context have caused a variety of social disputes (Urquiza et al., 2019).

According to Obeta (2018) water governance is driven by the Nigerian Mineral Act of 1945, which came into effect in 1946, the Nigerian Water Act of 1963, the Nigerian Water Act of 1990, and the National Water Supply and Sanitation Policy of 2000, which outlined the institutional framework for rural and urban water supply and development. According to Arimoro and Musa (2020) the National Water Policy lays forth a strategy to emphasize the value of private sector involvement in the community-level delivery of rural water supply and sanitation services. A plan to encourage decentralized maintenance and replacement parts of supply for rural and small-town water sources was also outlined; however, it is unlikely that this tactic has been used since it was first considered. Furthermore, the legal basis for Nigeria's management of its water resources is provided by the Water Resources Act of 1993, giving the

federal government the authority to utilize and manage all the nation's surface and groundwater. It also mandates the submission of an application for the issuance of a permit required for any commercially significant water diversion, storage, pumping, or usage, as well as for the construction, maintenance, operation, or repair of any boreholes or hydraulic works. The Act of 1993, however, has no explicit information regarding water management in rural areas.

It is important to note that many rural areas have local customs governing water management. These laws and customs are mostly oral and passed down from one generation to the next (Goldface-Irokalibe, 2020). Watercourses or other bodies of water in any community are common to everybody and cannot be individually held under customary law. It is known that the Federal Government of Nigeria is making an effort to enact a new Water Resources Bill into law. The National Water Resources Bill's main goal, if it becomes law, is to guarantee that the nation's water resources are safeguarded through the creation of a legal framework for water management. It has been highlighted that the Bill aims to accomplish the SDGs' goals (Utomi, 2019).

According to Gbajabiamila (2019) the new Water Resources Bill 2018 protects people's right to use water while opposing private water ownership and ensuring that the nation's water resources are managed sustainably and fairly for the benefit of all citizens. Furthermore, the National Council on Water Resources, the Water Resources Regulatory Commission, River Basin Development Authorities, the Hydrological Services Agency, and a National Water Resources Institute are all intended to be established by the Bill (The Nation, 2018). The Federal Government's intended control of the water resources in the states of the federation is one such issue that has caused controversy surrounding the Bill (Arimoro and Musa, 2020). Additionally, Vanguard (2019) stated that some opponents of the Bill claim that doing so would amount to the federal government taking more authority away from the states and would further erode the idea of real federalism. The proposed Bill, like the Act of 1993, does not clearly define rural areas' responsibilities for the effective management of the nation's water resources.

According to Merem et al. (2017) sub-Saharan Africa is lacking the key element which is to make right policies to guide the management institutions. Furthermore, the weak institutional and legislative framework of water management system has been cited as a serious issue by a number of academics. Due to these flaws, public institutions are hampered by duplication of

efforts, a lack of resources, vested political interests, and corruption. When it comes to effective water use, there is currently a lack of execution, insufficient policy formulation, and poor water governance. Inadequate water management and the resulting water shortage are factors in sub-Saharan Africa's security concerns (Ngene et al., 2021).

According to Makaya et al. (2020) water governance in South Africa is driven by the Constitution of the Republic of South Africa of 1996 and water laws such as the National Water Act 36 of 1998 and the Water Service Act 108 of 1997. Furthermore, the Water Service Act is responsible for governing domestic water supply and transferring responsibility for these services to those responsible for the distribution network and water service staff responsible for water use. In addition, according to Mwenge-Kahinda et al. (2016), the National Water Act of 1998 (NWA) identified the significance of catchment management agencies and water users' associations in that they must achieve robust water management.

According to WRC (2018) a system of water governance in South Africa is a three-dimensional system of elements, inter alia legislation and policies, mandate and principles, institutional arrangements and practice, regulatory framework; international level, national level, regional level, local to neighbourhood level; and responsibilities of government, non-government organizations, and integration of civil society between the institutions of national government institutions and the informal institutional provisions in South Africa. Hornby et al. (2016) stated that there is a lack of integration between national government institutions and informal institutional frameworks in South Africa, for example beyond the existence of water policies, according to the DWS narrative, municipalities do not effectively plan for provision of water and are intrinsically inefficient (Weaver et al., 2017). Municipalities assert that they welcome change and are eager to re-allocate water for diverse uses, not only household ones. The DWS, on the other hand, appears less interested in delegating its mandate to other entities since it prefers to keep control over water allocation (Weaver et al., 2017). Murat and Islam (2018) stated that transparency is important for the integrity and reliability of public institutions such as those responsible for water supply to promote public trust and public support. It ensures accountability of the institution towards the communities and allows the communities to get all the information they need about the work of the institution and partake in decision-making.

According to Neto et al. (2018) the execution of South Africa's water legislation is difficult. A significant policy evaluation shows a shift back toward re-centralization from de-

centralization. There have been a number of ad hoc, intensely politicized, but largely unsuccessful projects in recent years. Some issues are dealt with by participation, but frequently only with the help of powerful and prominent parties. Coordination strategies in South Africa are unclear. Although sharing and free access to data and information are clearly defined by South African legislation, many monitoring systems are deteriorating, and data quality management appears to have decreased.

Neto et al. (2018) stated that evaluation of enforcement is extremely challenging. Although citizen science is becoming a significant part of water governance in many parts of the country, government and decision-makers do not view it as a reliable data source. The licensing process takes place at the federal level, far from the region, stakeholders, and repercussions. There seems to be a new era of stakeholder fatigue, because of the constant shifting of the goal posts and the lack of decision-making. Due to the environment and resource quality that is constantly declining across the nation, there is no assurance or confidence in the government's ability to address historical injustices and ensure sustainable water management.

2.2.1 Decentralised water governance in rural areas

Decentralisation is adopted because it can bring decision-makers and local communities into closer contact and empower local actors to shape policy reforms, thus making governments more accountable and responsive to local needs (Remmert, 2016 and Schnegg et al. 2016). For example, according to Castillo (2016) in Chile, Colombia, Peru, Mexico, Bolivia, and Ecuador, the private and public entities are maintaining a closer contact with rural communities and have achieved community management, mostly because of transparency and regulations enforcement to guarantee users' satisfaction and sustainable service quality.

According to Mapedza et al. (2016) decentralisation has improved local participation in relation to water governance. For example, according to Remmert (2016) in Southern Africa the Namibian government delegated ownership and responsibility for managing village-level water resources since 1997, to communities via water users' associations (WUAs), basin-management committees (BMCs), and water-point committees (WPCs). However, it must be noted that for decentralisation to boost community participation in water governance, depends entirely on the capacities of the local actors. This is because without resources and proper skills to be able to engage with local government structures, community participation can become tokenistic.

According to Chilenga-Butao (2020), decentralization has played a key role in the formation of South Africa's many levels of government and the empowerment of local governments. Furthermore, the Constitution of the Republic of South Africa, 1996, the Municipal Structures Act, 1998, and the Intergovernmental Relations Framework Act, 2005, among others, codify the constitutional and legislative framework of decentralization. Furthermore, according to Chilenga-Butao (2020) and Olowu and Wunsch (2003) South Africa's decentralised water governance is challenged with inadequate legislative reform Central actors that hold onto or reclaim resources. Paying for officials' salaries that depletes local resources. Lack of effectiveness from local councils due to executive dominance, internal dissension, inadequate organization, and low educational levels. Local organizations created to uphold centralized authority; alternatively behind the scenes, local elites control local governance.

2.3 Accessibility, availability, and reliability of water supply in rural households

Hove et al. (2019) argue that rural areas lack access to water that is clean to drink and sanitation. This has contributed majorly to the accumulation of avoidable death and diseases in rural areas, worsening their social and economic development. This indicates that the water supply by the government is not equitable. Furthermore, Hove et al. (2020) state that this is not without knowing that the goal for safe drinking water, i.e. the millennium development goal 2015, was achieved in 2010, ahead of the 2015 deadline with ninety one (91) percent of the world population having access to drinking water. However, a recent study by Meehan et al. (2020) argues that access to water that is safe is far from being universal. For example, in the United States, Pauloo et al. (2020) found that rural areas are at risk of access to safe water, and the joint monitoring program (2020) reported that approximately ten (10) percent of the United States rural populations rely on wells for safe water, most of which are unprotected. The fact that they rely on such wells for safe water indicates that they are excluded from adequacy that promotes the access to quality and quantity of water from a reliable municipal water supply. This means that rural areas are deprived of access to a municipal water supply to eradicate the high reliance on historical water structures and methods contributing to waterborne disease.

McDonald and Pieper (2017) substantiated that nationwide studies have shown that households relying on wells are vulnerable to chronic scarcity risks, mainly because their pumps become damaged, as levels of water decrease below the point of the pump intake, due to high reliance in times of drought (Uhlman, Boellstorff, McFarland, and Gholson, 2021). Furthermore, floods can also wash away contaminants into the wells due to high rainfalls, therefore deteriorating

the quality of water from the wells, as they are mostly unprotected. This does indicate that the impacts of municipal water supply go a long way, due to being improperly managed in terms of water policies, particularly those that promote equity.

Pierrce et al. (2019) stated that accessibility to and availability of municipal water provision demand the ability to access water supply through vertical pipes. That is associated with the geography and size of drinking water systems, compatible supply areas or districts, community or municipal boundaries, and water service inclusion decisions. Rural settlements are dispersed and informal as a result, and thus most of them become incompatible with federal or state water supply. Therefore this can bring about exclusion from the network. For example, according to McFarlene and Harris (2018), across Europe and North America their smaller systems tend to fail when providing universal water access gradually than larger systems. Additionally, according to Condon (2019), in American rural areas the communities there have small community water systems, which are failing to protect the health of the public due to poor regulation of agricultural waste, shrinking populations, pollution, and aging water infrastructure. These are all contributing to incidents of water quality violations in rural landscapes. In North Carolina, the racial segregationist policies that denied secure water supplies to African American communities are what gave rise to the under-bounding process in community water utility systems (Leker and MacDonald Gibson, 2018).

Accessibility and availability of municipal water provision require a nationality status and a sense of belonging, as it can lead to discrepancies in terms of water access. This system is called hydraulic citizenship, which, according to Anand (2017), is the president's ability to be acknowledged by agencies of water supply via legitimate water service. For example, residents born outside the United States still depend on water stores, trucks, and vending machines despite current developments in water and sanitation services locally (Gonzalez et al., 2019). In addition, in Delaware, many rural areas are not corporate and do not form part of any town that is organized or city government. Therefore, they are excluded from the town's centralized municipal water or sewer systems closer to them (Condon, 2019). In comparison to families with members who were all documented, households with individuals who had mixed status had 4.2 times higher probabilities of being water insecure (Jepson and Vandewalle, 2016). When brought together, the movement of water supply to these households and passing through them, despite the assurance of widespread access and water security, the flow of water follows patterns that reflect political marginality. This has impacted negatively on rural areas as they

are widely known to be marginalized in terms of service delivery. This is because they are far away from the city and urban areas, and some are on the outskirts of urban areas and form informal settlements that governments choose to marginalize.

According to Mitchell (2019), Deitz and Meehan (2019), Patrick et al. (2019), Hanrahan (2017), and Winnipeg (2016), the accessibility and availability of water provision require institutionalized structures that are evenly expressed via space and place, and not marginalized as they can bring about inequalities in access to an improved water supply. However, Curley (2019) stated that municipal water supply is subjected to a system that promotes racial expropriation, colonialism, and property rights. As a result, blame is shifted to technical problems or flaws in the network. This indicates that the municipal water supply that is deemed to be so critical for all lives is purposively influenced by government officials' endeavours and politics; therefore, accessibility is becoming very variable, inequitable, unpredictable, and unreliable. Sustainable access to sufficient safe water for human health has become a challenge for rural areas, making them resort to untested water sources.

According to Small et al. (2021), Muller (2020) and Stringer et al. (2021), it is known that in Africa, the overall amounts of water can cover the variability in access and utility, because physical quantities of bulk water are not the only determinants of water scarcity. However, it is also influenced by a more broad-based development criteria, like gender equality, security, health, education, and poverty, governance, and institutions. This argument indicates that there is a presence of changing social and institutional aspects of marginalization, which result in water provision that promotes segregation. This has subjected rural areas, mostly poor ones, to a poor water supply. For example, in a recent study by Hope and Ballon (2021), it was indicated by the Kenyan National Statistics that, in Kenya, about twenty four (24) percent of Kenyans stated in a national census that they rely heavily on surface water, which includes streams and rivers. Furthermore, there are about 34 African countries with 43,544 rural dwellers, indicating between the years 2016 to 2018 that the government was failing to supply water and thus rating them to be very bad or fairly bad at it, both in rural and urban areas.

In sub-Saharan Africa, rural communities are subjected to government institutions responsible for a lack of effective threat and responsibility management or allocation in the water supply. Furthermore, unconnected water points are not managed or monitored by a cohesive architecture. Therefore, infrastructure frequently breaks down and is only slowly repaired,

institutional accountability is frequently inadequate, and service performance is not defined and is mostly unknown. (Foster et al., 2019; McNicholl et al., 2019). For example, a study from Zimbabwe indicates that it takes between 13 and 214 days to repair a rural water point after it malfunctions, with a modal value of about one month (Foster, Furey, Banks, and Willetts, 2018). The amount of functionality that was unavailable the day of a visit is a related indicator of failure. There is a study on 453,177 rural water points conducted in 38 African countries that has estimated an average of one in four water points that are not working at any one time. Consequentially, such prolonged repairs are costly in terms of the economy, society, and health (Foster and Hope, 2017).

Gan et al. (2016) and Markonis et al. (2021) stated that the African continents are experiencing drought, climate change due to human pollution, and minimal water storage resolutions, which all have resulted in devastating water scarcity that continuously affect municipal water provision. According to Azeney et al. (2018) an African country suffering from submerged water scarcity creates challenges in efficiently and effectively providing safe, efficient, evenly distributed, accessible, and affordable water to the public in Ethiopia. Taye et al. (2018) stated that Ethiopia has river basins vulnerable to climate change. Climate change is making it more difficult for rural communities in Africa to depend on their water resources, which has been a problem for smallholder farmers for the past 20 years. Climate change is also making it more difficult for rural people to advance economically (Mutschinski and Coles, 2021).

Five million South Africans, especially in rural regions, lack access to a consistent source of drinking water as the nation continues to be semi-arid. (Smith, 2018). Furthermore, the South African municipal water supply is currently subjecting rural areas to heavy reliance on groundwater and rivers for their domestic use and productive use. Hence many authorities lack the resources to interact with and address community demands, and all of this occurs despite legislative and policy commitments to the right to water. (Hove et al., 2019). These guidelines are well established but difficult to maintain, according to Hope et al. (2020). This was endorsed by Tempelhoff (2018) with an observation he made on the history of water scarcity, that since long ago it has been a scarce resource, especially in southern Africa.

Additionally, Ngcobo (2019) noted that water has been debated throughout socio-economic development since democracy began in 1994, however, many communities are still being marginalized and prevented from accessing their right to free basic services, such as access to

water that is safe. For example, according to Damba-hendrik (2021), rural communities close to Confimvaba in the Eastern Cape stated that taps in their area have been without water for two years and more, and in 2019 the district municipality announced it will repair a broken engine used to pump water. However, it has since opted to blame high demand, drought conditions, vandalism, and unauthorized connections. This results in elders paying youth to fetch water for them, and private water collectors at a higher price.

According to Abubakar (2018), municipal water supply in South Africa is mainly due to a lack of political will, spatial inequality in the provision of services, and interference in the application of a range of policies relating to the supply of water services, particularly for rural areas. All these factors have led to a municipal water supply that marginalizes rural areas. For example in KZN, according to Moloi (2020), there is a rural water crisis at KwaManxili in Nquthu where villagers are subjected to long distances to fetch water from a pump at a borehole, and most of the women and children walk about two kilometres to the nearest source of water. Furthermore, there are times when this borehole runs dry, mostly in the winter seasons; as a result, they resort to using water from local streams. Such water is untested and can have severe impacts on their health. This impacts negatively on their social and economic development as their standard of living is neglected by the municipality in terms of water supply, subjecting them to poor health that will cost them money to get treated for water-borne diseases. Moreover, according to Stephen-Grootes (2021) in Gauteng, a Giyani water project funded with three billion Rand was set to build a 300km pipeline to provide 55 rural areas with water; however, those rural areas are still without water. Corruption and ways to escape blame when projects fail are vast in municipalities. This is because they lack proper stakeholder engagement. According to Richard and Mulala (2022) stakeholder engagement promotes accountability of the service provider to ensure any service is delivered accordingly, and it ensures a sustainable system of water resource management in post-apartheid South Africa.

According to Edokpayi (2018) South Africa has a large drinking water infrastructure and the government is committed to making potable water available to all South Africans. Additionally, according to Baloyi (2018) the government has provided community wells, trucks and tankers in several communities to provide potable water to some communities; however, some municipal wells have no water to flow through them, and many still lack sustainable access to clean and safe drinking water, especially in rural areas, for their domestic purposes and agricultural activities. Additionally, Viljoen and van der Walt (2018) claimed that

the South African water crisis results from inter alia inadequate water infrastructure repairs and investment, recurrent droughts channelled by varying climate conditions, inequalities in accessing water and sanitation, declining water quality, and not enough skilled water engineers. Due to financial limitations and the constrained capacity of the water supply infrastructure, the availability of drinkable water in rural areas continues to be a problem (Hoffman and Nkadameng, 2016). Additionally, rural municipalities typically fall short of the national water service delivery standards, widening the gap between urban and rural communities in the provision of water supply services.

Because run-of-river flow or groundwater are the only sources of water available to rural regions, these systems are particularly vulnerable to drought conditions. When compared to integrated water supply systems that serve urban regions, such water schemes may not offer the same level of supply certainty (McKenzie, 2016). This indicates a huge gap that exists between rural areas and urban areas in terms of water supply through a municipality, as urban areas receive a water supply that is reliant and continuous ensuring availability and accessibility of safe water while rural areas do not.

2.3.1 Affordability of water supply in rural areas

According to Teodoro (2018-2019) and Mack & Wrase (2017), water supply should be at an affordable rate according to the worldwide policy principles and human rights discourse. Furthermore, studies have shown a developing reality of water being expensive for many households with modest incomes, thus subjecting them to the risk of criminal accounts and shutoffs, particularly in rural areas. Additionally, in response to rising water rates and service shutoffs, Martins, Quinta, and Antunes (2019) claimed that this resulted in overlapping and cascading negative impacts.

Montag (2019) and Vanhille, Goedemé, Penne, Van Thielen and Storms (2018) stated that increased water bills in the United States cause water restrictions, unlawful use, and cost trade-offs to prevent service interruptions and reconnections fees. Most of these wells that rural areas rely on for water are mostly not registered. Households mostly sacrifice their needs and choose to remit water bills to prevent shut-offs. They also try to save water by not regularly bathing and washing their clothes, thus subjecting themselves to poor hygienic requirements (DeMyers et al., 2017). This reduces their employment opportunities and results in social stigma, stuck in a cycle of not being able to afford their water (Montag, 2019 and Goodling, 2019).

Additionally, according to DeMyers et al. (2017) and Gaber (2019) being unable to supply wholesome drinking water and ensure the maintenance of hygienic standards contribute to severe psychosocial suffering, inter alia feelings of shame, degradation of self-efficacy, insults to human dignity, and fear of imminent catastrophe.

According to Hutton and Varughese (2016) in an African context an annual capital is required to provide water supply with good management in rural areas for drinking. Particularly in sub-Saharan Africa, over five billion dollars a year is required which is higher than the costs needed for urban supply, including any global or industrialized regions. Additionally, according to Katuva et al. (2020) municipal water supply has created challenges for African governments, inter alia costs of repairing existing water infrastructure, lowest relative coverage of drinking water access, and the necessity to deliver new water infrastructure over time. These affect rural areas more than urbanized areas. This results in a municipal water supply that subjects rural communities to other sources of water that are not protected, thus exposing rural communities to water-borne diseases due to an unreliable municipal water supply and water infrastructure that is too old and costly to maintain.

Niasse and Varis (2020) stated that, regarding free water and equity, the proper utility of water in Africa is low, as the utilities exclude informal settlements in rural areas. Furthermore, this results in governments paying water bills for consumers, particularly in this current epidemic crisis of Covid-19. However, such services by the governments do not reach the poorest, living mostly in rural areas without improved water supply. For example, WHO and UNICEF (2019) discovered that water coverage in the water supply is very low. According to the first Global assessment, 29 percent of rural facilities are without water supply, and 42 percent of schools in rural areas are without a water supply (WHO and UNICEF, 2018).

Municipal water supply in South Africa is free of charge by the government to the registered indigent, particularly in rural areas within the jurisdiction of the municipality, as required by the free basic service policy. The municipal water supply is also subsidized to ensure its affordability for the public. Hence, according to Mack and Wrase (2017) and Teodoro (2018-2019), water should be provided at affordable rates according to the worldwide policy principles and human rights discourse. This is supposed to make South Africa the leading country in terms of high access to water by the public on the city, urban, town, and rural levels; however, even with these terms in place some communities are still without sustainable access

to water either in terms of the free basic service policy or water supply with tariffs. For example, issues like unreliable water supply from local government, old water infrastructure that is now dysfunctional are caused by expensive repairs of water infrastructure as they receive water supply in terms of free basic service policy. This is supported by Mboweni (2021) who stated that water supply without cost-reflective tariffs has brought about difficulties in terms of sustainable water supply by the municipalities, mostly for rural areas as most don't pay for municipal water supply. In South, Africa water is highly priced, therefore, there is failure in achieving cost recovery (Donnenfeld et al., 2018).

Nzama (2019) stated that the national government provides grants to municipalities to enable them to perform well in service delivery; however, they fail due to the lack of proper internal controls and poor financial management. Furthermore, ASGSA (2019) also stated that these problems make municipalities have poor financial management that includes irregular expenditure, unauthorised expenditure, and fruitless and wasteful expenditure.

2.4 Water legislation

The United States' Safe Drinking Water Act (SDWA), which was passed in 1974, charged the EPA with overseeing and upholding public drinking water safety. In order to guarantee the safety of drinking water, the EPA established criteria for drinking water quality and, together with its partners, undertakes several technical and financial projects. To ensure that the EPA would constantly look for, identify, and monitor potentially dangerous or pertinent substances that may be currently unregulated, the SDWA was updated in 1996. Similar actions were taken in other countries, and point-source pollution also improved as a result. A United Nations resolution from 2010 defined "safe and clean drinking water and sanitation" to be a human right (Ahuja, 2019).

The Nigerian Mineral Act of 1945, which came into effect in 1946, as did the Nigerian Water Act of 1963, the Nigerian Water Act of 1990, and the National Water Supply and Sanitation Policy of 2000, which outlined the institutional framework for rural and urban water supply and development in Nigeria (Obeta, 2018).

The 1998 National Water Act outlines how South Africa should respond to the country's climatic whims as well as the needs of a burgeoning population. It specifies what actions should be taken by various levels of government and water consumers as well as the protocols that

should be followed to deal with certain issues. In addition, according to Mwenge-Kahinda et al. (2016) the National Water Act of 1998 (NWA) identified the significance of catchment management agencies and water users' associations, stating that they must achieve robust water management. The act also outlines the institutions for managing water, inter alia Catchment Management Agencies and Water Users Associations. Furthermore, Mwenge-Kahinda et al. (2016) stated that the Act seeks to develop Catchment Management Agencies within 19 water management areas in South Africa and to delegate water resources management to the regional or catchment level. Residents within the South African National Water Resource Strategy Framework are also included.

Municipal water supply and sanitation services are governed by the Water 1997 Services Act (Makaya et al., 2020). The Water Service Act (1997) section 3(1) states that every individual has a right to access basic water and sanitation. In the event that there isn't enough water to meet everyone's needs or any new ones arise, the current laws outline the technical and administrative procedures that must be followed. These make it possible to divide water between people who already utilize it and others who are just now looking for it. In accordance with established regulations, the law also prioritizes maintaining sufficient water levels in rivers to maintain the ecosystem. Furthermore, according to the law, the minister is required to keep an eye on and report on both the water's availability and changing uses. She must create a plan to address shortages where they are anticipated under the legislation.

A law's implementation is not guaranteed just because it is written into the law. As Cape Town has demonstrated, a few years of healthy precipitation led people to think that their water supply was sufficient. Numerous waterways are contaminated by unregulated and unmanaged mining operations, as well as by wastewater treatment facilities that are inadequately run.

2.5 Current measures to address municipal water supply

There are current measures that are being used by countries in addressing poor municipal water supply to prevent negative impacts on social and economic development of rural areas. These measures include groundwater, rain harvesting, water pricing, capacity development programs, partnership in service delivery, investment in water storage infrastructure, and waste water treatment.

2.5.1 Groundwater

Internationally, there is evidence of groundwater use that serves as an alternative in both rural and urban areas. For example, Mandler (2017) stated that twenty-five percent of the freshwater utilized in the United States comes from groundwater. In dry or rural places, where surface water may be scarce or remote, it is especially crucial for irrigation and home usage. Rainfall replenishes groundwater, but it may take hundreds to thousands of years to make up for what we withdraw. Groundwater management in dry places is difficult because of the high demand for it and the delayed replenishment. Additionally, Donoso (2020) stated that in Chile groundwater is increasingly used as a source of water supply. This tendency is anticipated to continue growing in the future as a result of increased water demand brought on by economic expansion, as well as population growth, urbanization, water contamination and pollution, and the anticipated effects of climate change.

In sub-Saharan Africa, there is also a similar trend in the usage of groundwater as an alternative to the municipal water supply. According to Schultes et al. (2022) in sub-Saharan Africa boreholes (BHs) are used by forty-five percent of the rural population, including rural areas in Ghana. Despite recent improvements in water coverage and access, parallel use of unimproved sources continues. Regular infrastructure maintenance neglect encourages the non-exclusive use of BHs. For example, in Nigeria, Sasu (2022) stated that tube wells, boreholes, and drilled wells are some of the most frequently used sources of drinking water. Seasonal variations also affect the sources of drinking water. In the dry season, for instance, buying drinking water from tanker trucks and water merchants, buying it in bottles, or getting it from the surface is more typical. Contrarily, rainwater collection is far more common during the rainy season.

According to Hedden (2016) South Africa has adopted groundwater development and research and has discovered it to be the most reliable source of water when it's properly managed, with similar costs as those for surface water resources. However, research from WRC projects argues the reason it fails is due to technical breakdown, poor operations, and mismanagement.

2.5.2 Rain water harvesting

Due to growing water constraints and household water insecurity (HWI), domestic RWH has become increasingly significant on a global scale as an alternative water supply (Haque et al., 2016; Musayev et al., 2018; and Yannopoulos et al., 2019). RWH methods and procedures have been used more frequently since the middle of the 20th century in a variety of nations throughout the world as a tactic to lessen reliance on surface waters and aquifers (Santos and

de Farias, 2017; Yannopoulos et al., 2019). RWH can minimize HWI even in arid areas, where climate change would certainly make the burden on freshwater supplies worse (Musayev et al., 2018). Over 4,000 years ago, rural water harvesting systems were employed in the Middle East and Asia for a variety of uses, including agriculture (Yannopoulos et al. 2019).

According to Lebek and Krueger (2021) domestic rainwater harvesting is becoming more popular as an alternative water supply in underdeveloped rural areas; however, less than one percent of families in rural South Africa have traditional rainwater gathering systems. In KwaZulu-Natal, a household survey found that many homes temporarily harvest rainwater using makeshift gutters and drums. Furthermore, a household with just round huts is readily forced into unplanned rainwater collection, according to a statistical study, while a household with a high income, a brick house with straight gutters, and good water services facilitates conventional rainwater harvesting. The types of houses should be taken into account while scaling up rainwater gathering in rural areas. The Department of Water and Sanitation has contributed to the adoption of a rain harvesting program that currently focuses on the supply of surface and underground water tanks for rural households, clinics, hospitals, and schools. The harvest is for irrigation of food gardens, and domestic and other productive uses.

2.5.3 Water pricing

Internationally water supply is mostly priced to ensure its sustainable supply. For example, Donoso (2018) stated that the water supply in Chile is regulated in terms of water tariffs paid in the form of water bills. Larger water systems in Chile are found in urban areas and they can collect water tariffs that are large enough to ensure sustainable operations in the water supply, while in rural areas there are only small water systems to supply water causing a setback due to being small as they are unable to collect large water tariffs to ensure sustainable operations in the water supply.

According to Fielmua and Dongzagla (2020) the community-based management strategy is used throughout sub-Saharan Africa, particularly in Ghana. For the water systems to operate effectively, this strategy calls for decision-makers at the community level to come to a consensus on water pricing. The issue with water pricing is the one stated by academics that rural communities face financial sustainability issues with their water systems since they are unable to afford capital replacement costs and additional costs like operations and maintenance (Fielmua, 2018). Ghana's rural and urban water governance systems are very different from

one another. For instance, the cost of producing and distributing water in rural areas and small towns is entirely borne by consumers, including overhead expenses and salaries, whereas the cost of producing water in urban areas is mostly covered by government subsidies (Owusu-Mensah, 2017). Additionally, up until 2009, Ghana's rural and small-town residents paid about five percent of the cost of water services. This gave the communities a say in how much water is charged, how much money is used to pay for it, and how water is managed generally, giving the communities a sense of ownership over the water systems. This frequently leads to significant tariff differences compare with living in poor rural areas with limited choices (Foster and Hope, 2017).

Water supply in South Africa is regulated in terms of water tariffs paid by citizens receiving water in urban areas to ensure a sustainable municipal water supply for citizens. Hence, water supply without cost-reflective tariffs brings about difficulties in terms of sustainable water supply by the municipalities (Mboweni, 2021). Water is being subsidized in terms of a free basic service policy by the government to ensure its affordability accommodates everyone. These water tariffs are being paid in the form of bills. Rural areas receive water based on a free basic service policy for registered indigenous people. They do not pay for municipal water supply, as a means to try to accommodate the poor.

2.5.4 Capacity building programs

In Chile, according to Saavedra (2018) a National Capacity Building Plan has been developed by the National Federation of Sanitation and Water Services (FESAN) (PNFC). The PNFC seeks to enhance community organizations' capacity for management while retaining their participatory nature. Per the new standards established by the law, it focuses on providing social fairness, with fair and affordable pricing for the most vulnerable sectors of society, as well as the social and environmental sustainability of water resources. Community organizations can obtain the knowledge, skills, and resources necessary to improve their technical, legal, operational, administrative, financial, behavioural, and social skills through self-managed Community Learning Centres. Water Supply Services (APRs) can develop and improve their operational, financial, and management services through training. All of these organizations will take part in long-term investment plans and work on development projects, network expansion, and extension under the rural sanitation services law.

In sub-Saharan Africa, a National Water, Sanitation, and Hygiene Capacity Building and Research Programme has been established by the Federal Government to further the plans to end open defecation by 2025 and offer universal access to water and sanitation by 2030 (WaterAid, 2020).

Using a governmentality framework, the capacity-building interventions of three river rehabilitation projects launched in Durban between 2011 and 2016 include the Palmiet Catchment Rehabilitation Project (PCRP), the Aller River Pilot Project (ARPP), and the Sihlanzimvelo Stream Cleaning Programme (SSCP). Each project has its imaginaries, logic, and rationalities, with capacity development seen as a way to make water and people governable. These projects' logic is self-reinforcing since each one depends on the cultivation of its interventional objects, which are sustained by the subjects who are being developed. The initial framings and imaginaries of each project influence the information flow during the capacity-building processes, which has an effect on the degree of transformation attained (Mills-Novoa et al., 2020).

2.5.5 Partnership on service delivery

Richard and Mulala (2022) claim that stakeholder engagement promotes accountability of the service provider to ensure any service is delivered accordingly, and it ensures a sustainable system of water resource management in post-apartheid South Africa. According to Mumseen (2022), Benin has formed a partnership with the World Bank involving the private sector in bringing service delivery of water to rural areas and establishing the government's capacity for service delivery that is of good quality. Furthermore, Nigeria partnered with the World Bank for its sustainable urban and rural water supply, sanitation, and hygiene program to expand access to water and sanitation for urban and rural areas through improving capacity and sector reform. This is set to improve the economic growth, food security and lifespan, and ensure a sustainable inclusive development path in Nigeria and Benin.

According to Hamilton (2019), in South Africa the purchase of large water tanks and reservoirs is being assisted by the private sector. The administration of water is still largely in the hands of multinational corporations' to concurrently address soil and water limits that worsen food security issues.

2.5.6 Investment in water storage infrastructure

On November 15, 2021, United States President Biden approved the Bipartisan Infrastructure Law (BIL). The law has made a truly revolutionary investment in the water industry. The Environmental Protection Agency (EPA) received \$50 billion from the budget to improve the country's drinking water and wastewater systems. The Clean Water and Drinking Water State Revolving Funds (SRFs), which are a collaboration between the Agency, states, tribes, territories, and local communities, will receive a sizeable percentage of funding for water infrastructure. The EPA is dedicated to making the most of this funding to address the pressing water issues that communities are currently confronting (EPA, 2020).

Adamu, (2022) stated that the private sector must contribute to Nigeria's supply of drinkable water. The continuing politization and lack of dedication by state and municipal governments might be stopped by investing in the utilities.

According to Mwendera and Atyosi (2018) investment in water storage infrastructure has been adopted as a measure by national and local governments to boost municipal water supply for domestic and industrial use. This includes building infrastructure and jobs, irrigating land for sustainable agriculture, promoting ecotourism, making big dam construction regions more accessible, selling water to thirsty communities and regions both inside and outside of national borders, and improving accessibility to the areas where the dams are built. All are expected to increase the income and revenue of the municipal and federal governments. For irrigation, municipal, industrial, and domestic uses, water storage is mostly used in KwaZulu-Natal (Hedden, 2016). Additionally, Koda (2019) suggested that using reservoir water for irrigation could be a feasible solution.

2.5.7 Wastewater treatment

Onsite wastewater treatment systems (OWTS), also known as onsite systems, are a necessity for about twenty (20) percent of American households, yet only approximately two (2) percent of federal wastewater funds have been allocated to assist these systems thus far. There are huge differences in the funding for onsite systems that is available, how much is available, how it can be accessed, and how it is used across the nation, states, and localities. This is especially true for households and residents who depend on these systems (Calabretta, 2022).

Hedden (2016) stated that another measure taken is treating waste water as it increases the availability of water supply and water quality. However, the WRC reports stated that South

Africa's wastewater treatment is at the tipping point, due to the critical situation that only one-quarter of all systems are currently in use, and only sixteen (16) percent are in a low-risk state.

2.6 Chapter summary

In this chapter, it has been revealed that municipal water provision is important due to the positive impacts it has on the public in both urban and rural areas. These positive impacts include the social and economic development of rural areas. However, without good water governance that is decentralised accordingly to include rural areas other than just being centralised, universal access to water will never be achieved. The adoption of good water governance depends on how local governments can incorporate global aspirations into local policy and guarantee that their plans, policies, decision-making processes, and management practices reflect sustainable water governance. This gives an idea for local governments as to what must be considered within their jurisdiction, and incorporate global aspirations to effectively adopt good water governance.

Failure to adopt good water governance results in failure to deliver satisfactory services to the public, and it will also exhaust the water resources and the environment. Internationally water governance has shown poor quality as the public has been calling for better water governance because water governance systems are hierarchical, resulting in flawed policies and fragmented perspectives. Water governance has several deficiencies, including technical, financial, and political gaps. There is institutional fragmentation, a lack of coordination, and a lack of context that have caused a variety of social disputes.

There is poor formulation of policies to guide the management institutions and a weak institutional and legislative framework for the water management system which has been cited as a serious issue by several academics. Due to these flaws, public institutions are hampered by duplication of efforts, a lack of resources, vested political interests, and corruption. There is a lack of execution, insufficient policy formulation, and poor water governance. Furthermore, there is inadequate water management and a water shortage. National government institutions and non-formal institutional provisions lack integration between them. Water legislation is difficult to execute; a significant policy evaluation shows a shift back toward re-centralization from de-centralization. Municipal water supplies in rural areas is unreliable, less accessible, fewer, not equitably distributed, and not maintained. Measures are implemented such as rainwater harvesting, usage of groundwater, water storage, water pricing, community

participation, partnership in water supply, and use of surface water from rivers and dams. However, the fact that if water governance is still unrevised to ensure it is well implemented, the measures put in place will not be efficient and effective enough to ensure sustainable water supply and equitable distribution.

CHAPTER THREE: THEORETICAL FRAMEWORK

3 INTRODUCTION

Water governance theory and decentralization theory were used in this study. Water governance theory and decentralization theory are discussed focusing on their date of origin and the place where they were established, including discussing their concepts, advantages and disadvantages they have for the study. Additionally, their compatibility to the study and to each other is considered.

3.1 Rationale for choosing water governance and decentralisation theory

Water governance is mostly being centralised focussing mainly on the city and urban areas, but not on rural areas. For example, in Nigeria water governance is centralised, and a plan to encourage decentralized maintenance and replacement parts of supply for rural and small-town water sources was outlined; however, it was never implemented (Arimora and Musa, 2020). Furthermore, according to Neto et al. (2018) the execution of South Africa's water legislation is difficult, and a significant policy evaluation shows a shift back toward re-centralization from de-centralization. This all means that the main focus of governance is on the city and urban areas, excluding rural areas. The study therefore integrated water governance with decentralisation theory to ensure that water governance accommodate rural areas.

3.2 Water governance theory

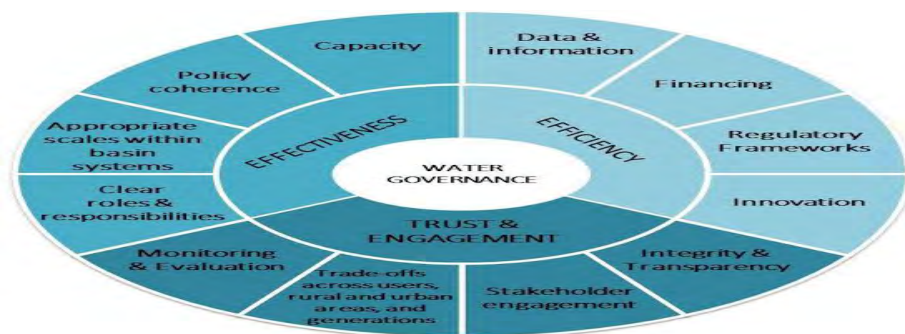


Figure: 1 Water Governance Theory. Adopted online at: <https://www.gwp.org/en/GWP-Mediterranean/knowledge-and-resources/OECD-Principles-on-Water-Governance/>

According to Rauschmayer et al. (2009) the procedure and organizations involved in decision-making are known as governance. However, it also includes the results of choices taken. Generally, it is the utilization of the political, economic, and administrative authority to manage the affairs of a particular region, consisting of mechanisms, processes, and institutions, where

citizens and groups express their opinions, make use of their legal rights, accomplish their obligations and mediate their differences (UNDP, 2001). The concept of governance has recently been used in the water sector for the first time (Franks et al., 2007), making its appearance in the Second World Forum that was held in The Hague in 2000 (Rogers and Hall, 2003).

Water governance theory was established in the early 1990s by the United Nations. They believed that water catastrophe is fundamentally a crisis of governance and societies are facing a lot of social, economic, and political challenges as to how to govern water effectively (UN, 2003). According to Ackhmouch (2016), there is a majority of broadly ranging definitions of the concept of water governance referring to varied actors involved and the necessary structures in the phase of drawing up and implementing water policies. Water governance is a variety of political, social, economic, and managerial systems meant to establish and manage water resources, and the provision of water services at all levels of society (Rogers and Hall, 2003). However, Araral and Wang (2013) noted that the general and descriptive nature of this definition can be excused from criticism, as the issues associated with politics, economics, finance, regulation, law, and water management can be involved in it.

The United Nations Development Programme (UNDP) provided a more specific definition that involves significant aspects, inter alia, water governance must address equity and efficiency in the allocation and distribution of water resources and services. Management of water must be focused on watersheds, the requirement for integrated water management methods, and balancing the utilization of water between economic activities and ecosystem. Furthermore, there is a call for an explanation of the functions of government, civil society, and the private sector with their services (UNDP, 2013). In addition, Araal and Wang (2013) found that, while the definition by the UNDP has more range than that provided by Rogers and Hall, and also has a simple explanation of general principles, it is still lacking diagnostic and prescriptive utility.

Ackhmouch (2016) further stated that government should not be considered as an end in itself, but it must be seen as a useful tool in formulating and executing water policies for those it was made for. Therefore, this brings to rise a concept that is highly dedicated to the principles of sustainability. Wiek (2012) states that sustainable water governance is set to manage available water resources in a planned procedure to secure acceptable and fair standards of social and

economic prosperity for the general population, where the enduring quality of the resource and ecosystem that sustains life remains uncompromised. In addition to this, Pahl-Wostl (2012) stated that this manner allows water governance to reconcile with disparities that exist within policies of different parties that conflict with restrictions developed by the ecosystem, and promotes participatory approaches whenever decisions are being made.

According to Moench et al. (2003) in addition to the actual decisions, water governance is primarily concerned with the process by which decisions are made, such as how, by whom, and under what circumstances. The idea encompasses the implementation of allocative and regulatory politics in the management of water and natural resources and broadly embraces the formal and informal structures by which authority is exercised. Effectiveness, efficiency, trust, and engagement according to OECD (2014) are the three dimensions with principles that are significant for the establishment of tangible public policies that seek to get results, and that form the basic structure of water governance. Ineffectiveness of the principles includes, inter alia, clear roles and responsibilities, appropriate scales within basic systems, policy coherence, and capacity. Inefficiency of the principles includes, inter alia, data and information, financing, regulatory frameworks, and innovative governance. In terms of trust and engagement, the principles include, inter alia, integrity and openness, involvement of stakeholders, trade-offs between users, rural/urban areas, and generations, as well as monitoring and evaluation.

3.2.1 Criticism of water governance theory

It is obvious that good governance requires considerable planning and does not just happen. It is the result of complex, protracted processes that require careful planning and nurturing. Overall conditions and the general environment must be favourable for good governance to emerge. Parties involved must be open to collective decision making. Effective and functional organizations must be created. Policy, legal, and political frameworks must be appropriate for the objectives being pursued for the common good (Rhodes, 1996; Kooiman, 2003; and Tiihonen, 2004).

The fact that governance-related concerns are typically shared rather than just being public or private causes governance activities at all levels to become dispersed across several society players, each of whose connections with one another is dynamic. Making public, private, and society actors actively and directly participate in problem-solving and opportunity creation within normative and institutional frameworks that serve as the cornerstones for any activity is

the difficulty facing anybody interested in governance. To be successful, these intricate interactions must take into account their interdependence and the fact that neither a public nor a private actor is capable of addressing the shifting societal concerns by themselves. This is due to the fact that no actor possesses the appropriate expertise, resources, or action potential to successfully use the necessary tools on their own or to dominate the decision-making process in a single-sided manner (Kooiman, 2003).

When it comes to civil society, governance enables it to function as both, a responsible stakeholder and a powerful force for reforms and development processes. In any nation, however, including civil society as a stakeholder is a highly difficult political, philosophical, and technical task due to its multifaceted and multi-stakeholder character. Simply put, there is no one, homogeneous entity called “society”, hence obligations cannot be shifted from the state to society. The various groupings of people who make up society include citizens, structured associations, and loosely knit groups with a wide range of interests and extremely intricate interactions. Because of the complexity of these interrelationships between the actors and institutions and because of their ongoing dynamism and evolution, governance discourses are typically only partially implemented, and their application is frequently primarily theoretical in nature and focuses more on developing strategies and guiding principles than on the challenging execution or implementation phase (Tiihonen, 2004).

The shifting dynamics of governance, has made it necessary to identify development needs and implement programs through partnerships and in the context of a thorough understanding of and respect for the intersecting oral linkages. As a result, country development strategies must look for agreements, pledges, and contributions from a variety of government departments as well as the corporate sector, development organizations, and civil society stakeholder groups both domestically and abroad (Tortajada and Cecilia, 2010).

3.2.2 Compatibility of the water governance theory to this study

The study explored the impacts of poor water provision in rural areas of Alfred Duma Local Municipality and how water governance could be improved to address social and economic development challenges. The theory is relevant to the study in contributing to the design and execution of policies with the potential of dealing with the current and future challenges of water provision, to bring about the fundamental advantages of wise management of water resources in terms of economy, society, and the environment.

The manner used in making decisions regarding water provision does not completely accommodate every individual as required by the theory, therefore, resulting in injustice made by the political, social-economic, and administrative systems. This is supported by the fact that most African countries like Nigeria, have rural areas which, according to Ezenwaji et al. (2016), have millions of people who still depend on untested or untreated drinking water sources for their domestic use. This implies that the safety managed water for consumption indicator involving three conditions - on-site accessibility, availability when needed, and contamination-free - as stated by Hutton (2016) and World Health Organization and UNICEF (2017) is not achieved. Water governance theory advises all levels of government in creating better water policies for all lives.

3.3 Decentralization theory

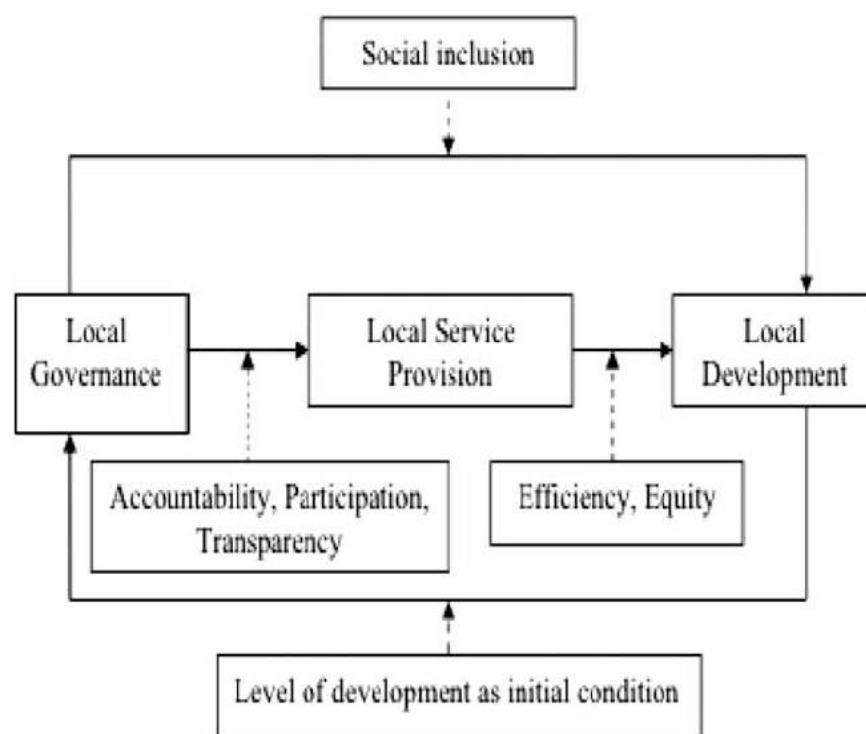


Figure 2: Decentralization Theory. Adopted online at: <https://images.app.goo.gl/4kzCXbZSvjGm2Vk69>

Decentralization was first introduced to the development community in the 1970s, but it has more frequently been linked to government waste (OseiKufuor & Bakade, 2013). This decentralization technique and plan at the time will accelerate improvement, overcome

bureaucratic bottlenecks arising from centralized government planning and control, and be interested in the globalization of the economy (OseiKufuor and Bakade, 2013). In the early 1990s, the decentralization debate extended to other social foundations, such as private sector and civil society ties. The World Bank used decentralization as a system in 1992 to strengthen public sector governance, strengthen policy and organizations, and for public and private businesses and financial accountability. It created the expected simple structure and promoted budget implementation (Osei, Kufuor and Bakade, 2013).

A global development organization has made significant strides in decentralization-related changes, including state retreat, increased bureaucratic control, and marketing of social welfare (OseiKufuor and Bakade, 2013). The idea and practice of decentralization have drawn attention not only to the exchange of power within the government, but also to the sharing of power and obligations among a wider range of governing bodies (OseiKufuor and Bakade, 2013). Faretti (2004) transfers power through missions of political reform aimed at exchanging decentralization of commitments, assets, or power from higher-level governments to lower-level governments. Decentralization policy is classified into one of three classes: administrative, tax, and political decentralization (Falleti, 2004).

3.3.1 Criticism of decentralisation theory

According to Rondinelli et al. (1989) public services are provided under the conditions of free choice and participation of local agencies as if the central government were the only provider. In this survey, the provision of basic services such as water and sanitation is the responsibility of the community, which means that poor people will receive basic services. Slater (1989), who conducted a study on decentralization in Tanzania, points out that decentralization expands and integrates the regional powers of state into local inhabitants. Similarly, Ghana used the same method of shifting the political costs to the government's alternative level but still retained general authority. Brazil followed the same strategy to increase profits after twenty years of the military in the junta. It is based on the use of local governments as a tax collection structure. Therefore, it was found that the concept of decentralization can be manipulated to achieve various goals (Bonga, 2007).

The most common reason for decentralization is to contribute to good governance in two important ways. First, it improves public sector responsiveness, and second, it improves public sector accountability (Stanton, 2009). The argument in favour of decentralized service delivery

is that if locals are involved in the decision-making process, the service will meet the needs identified in the region. Grindle (2007) argues that decentralization improves government accountability by bringing the government closer to the local population. For example, if individuals can elect local government officials, they can be more directly liable for their actions or omissions (Stanton, 2009). Therefore, in this theory, the investigation fulfils the constitutional obligation of local governments to provide basic services such as water and sanitation to people living in historically and informally populated areas or marginalized rural areas.

3.3.2 Compatibility of the decentralization theory to this study

The study takes into account the decentralization of government in an attempt to redistribute the authority, responsibilities, and resources to provide public services among different levels of government. The decentralization theory is compatible with the study as it will contribute to ensuring good water governance, improving public sector responsiveness and accountability, and involving locals in the decision-making process concerning the needs of the identified communities. Meanwhile, according to Rondinelli et al. (1989), decentralization is the transfer of obligations related to the planning, management, procurement, and allocation of resources from central government to local governments and their agencies. The decentralization of these two definitions creates a situation in which public goods and services are provided to citizens primarily through local governments to meet their needs. Goods and services concerning this theory is as follows: Basic services such as water and sewage are the responsibility of the municipality.

3.4 Institutional mechanisms for water supply

There is national and provincial government, municipalities, water services providers, water service intermediaries, water boards, and water committees which are the institutional mechanisms for water supply.

3.4.1 National, provincial. and local government

The National and provincial government are responsible for the monitoring and oversight roles to ensure that municipalities do their water services functions effectively. While the local governments are tasked to ensure that every person has access to water services. In this regard, the study consist of a local government that comprises of Alfred Duma Local Municipality, and uThukela District Municipality (Michelle, 2019).

3.4.2 Municipalities

According to RSA (1997) Water Service Act of 108 of 1997, state that municipalities are obligated to continuously ensure efficient, affordable, economical and sustainable access to water supply and sanitation services. However, not all municipalities are defined as water service authority for purposes of water service act of municipalities in South Africa (Stats SA, 2016). In this regard, the study consist of uThukela District Municipality which is water service authority for Alfred Duma Local Municipality.

3.4.3 Water services providers

In section 18 of the WSA municipalities can contract with a public or private water services provider to supply water and sanitation services (RSA, 1997). Furthermore, in section 19(2) of the WSA the providers may be in a form of the municipality itself, another municipality, a municipality utility, a multi-jurisdictional utility, a water board, a community-based organisation, a private company, and a venture owned jointly by a municipality and national government. In this regard the uThukela District municipality provides water for its local municipalities.

3.4.4 Water service intermediary

According to Michelle (2019) any person or organization obligated to supply water services to another under the terms of a contract, when the responsibility to provide water services is incidental to the primary goal of the contract, is considered a water services intermediary. The person is categorized as a supplier of water services rather than an intermediary if the primary objective of the contract is to deliver water services. For instance, farmers who have a contractual obligation to supply their employees with basic water services as well as housing and other relevant services while they are living on the property are regarded as intermediates. This also applies to mining businesses who give water to their workers residing in housing and hostels for miners.

3.4.5 Water boards

According to Water Service Act (1997) section 28(1)(a) of the Water Service Act water boards are referred to as organs of the state that were established by the minister to provide bulk water services to other water services institutions as their primary activity within a specific area. Furthermore South Africa has nine water boards, with Rand Water in Gauteng, Umgeni Water

in Kwa-Zulu Natal and Overberg Water in the Western Cape being the largest three water boards in the South Africa (WSA, 1998). In Alfred Duma Local Municipality, the uThukela District Municipality works in hand with Umgeni Water board to supply water. Two primary dimensions best describe the water boards as public bodies. The first is that they serve a public purpose, which implies that they are there for social responsibility reasons regardless of their shape or substance. They should allow unrestricted access to the bulk water distribution they offer. The second component is called "Enterprise," and it emphasizes an entity's corporate and commercial nature (Wamala, 1993:2). The conflict with these two elements is that, as public organizations, water boards must both abide by the state's business and commercial requirements as well as its social responsibilities.

3.4.6 Water service committees

The WSA gives the Minister the authority to create water services committees to offer consumers in a particular area water supply and sanitation services. The proposed service area's residents, the municipality, the Minister of Provincial Affairs and Constitutional Development, and the pertinent province must all be consulted by the minister (RSA, 1997). The Minister appoints the committee's chairperson, vice chairperson, and other members. The committee must create a constitution after it has been established, outlining how it will operate on a daily basis. Furthermore, communities may increasingly use this mechanism given the incapacity of municipalities to provide services despite community members paying their tariffs, despite the fact that committees of this sort are few, to the point of practically nonexistence (Michelle, 2019).

3.5 Chapter summary

This chapter has discussed water governance theory, and decentralisation theory. It has been discussed as to when the theories were established and where as well as to what makes them compatible for this study and the link that decentralization theory has with water governance theory. Critics were looking discussed. Additionally the institutional mechanism of water supply were discussed.

CHAPTER FOUR: RESEARCH METHODOLOGY

4 INTRODUCTION

This chapter describes the methodology used in the study. Jansen and Warren (2020) state that research methodology is about how a researcher systematically designs a study to ensure validity and reliability of results that address aims and objectives of the study. The discussion in this section is structured around the philosophy and paradigm, research design, research approach, study area and sampling method, data collection, and analysis of this study. Ethical considerations and measures to provide trustworthiness will also be discussed.

4.1 Research philosophy

The ontological approach of this study is relativism, which, according to Finkedlde and Livingston (2020), is interested in exploring the different ways people view the truth. The ontology of the study is that there are impacts of water provision on Alfred Duma Local Municipality; however, determining them depended on the lived experiences of the participants regarding water provision. The epistemological approach of this study is subjectivism which, according to Couper (2020) is the belief that knowledge is shared at all times through the lenses of language, gender, social class, race, and ethnicity. While undeniable that external reality exists, the investigation of subjectivism aims at understanding and increasing sensitization to ethical and moral issues, and personal and political emancipation. Subjectivism assisted the researcher in revealing how individuals' life experiences influence their view of the world regarding the impacts of water provision on Alfred Duma Local Municipality. This was done via interviews and focus group discussions. Relativist ontology combined with subjectivist epistemology resulted in an interpretivist paradigm. This was the theoretical grounding of this study.

4.2 Research paradigm

The interpretivist paradigm, according to Andrew (2012), is a qualitative paradigm that promotes the nature of reality which is socially constructed and which focuses on the connotations people ascribe to their experiences, and therefore is subjective in nature. Sounders (2012) states a researcher as a social fact must accept that differences exist between people. The theoretical ground is relevant to this study as the critical aim of the study is exploration. This requires the researcher to develop a close relationship with the region's locals who have local knowledge that enables the researcher to identify and understand the challenges of water provision, and the consequences to rural areas of Alfred Duma Local Municipality. Interacting with participants in the field deeply requires utilizing an exploratory or qualitative research approach (Husam and Abraham, 2019). This addresses the objectives of this study accordingly.

4.3 Research design

The researcher selected an exploratory research design. Surbhi (2016) stated that it is based on research conducted for formulating a problem, for a clearer investigation, and exploring and discovering ideas and thoughts. The design assisted in exploring and understanding the experiences and opinions of respondents regarding the impacts of water provision on Alfred Duma Local Municipality. The data collected, which originated from understanding their lived experiences, regarding the impacts of water provision on Alfred Duma Local Municipality rural areas, assisted in formulating the core measures to resolve their water issues. This was achieved by interacting with the community members of Alfred Duma Local Municipality via in-depth interviews, observations, and focus group discussions.

4.4 Research approach

The researcher decided to make use of a qualitative research approach so to have data analysed and interpreted concerning how participants perceive the studied phenomenon. Briefly explained, according to Bhandari (2020) the qualitative research approach is about gathering and analysing non-numerical data like videos, text, or audios to understand concepts, opinions, or experiences. This approach is used to gather in-depth insights into a problem or to produce original ideas for the study. According to King and Brooks (2017) researchers who use a qualitative approach usually prefer understanding itself and not just as a goal of the human sciences. It is also a comprehensive research paradigm with more or fewer variations. At the end of this research, the data will be able to gauge the perspectives of the community concerning the problem of water provision. The method assisted the researcher in collecting

data in a form of text and recordings collected via interviews and focus group discussions. The findings will assist the researcher to formulate recommendations that form part of the feedback.

4.5 Study area



Figure 3. Map showing Alfred Duma

The study area was Alfred Duma Local Municipality which has 36 Wards with 22 of them being rural. The study focused on the rural wards of Alfred Duma Local Municipality mainly. Alfred Duma Local Municipality (ADLM) was established after the August 2016 local elections by the merging of Emnambithi/Ladysmith and Indaka local municipalities to bring about a new municipality called Alfred Duma Local Municipality.

ADLM has a population of 356 274 people as per Stats SA (2016). According to age structure, the population group that dominates is between the ages 15 to 64 and this indicates who has the potential to be participatory citizens, as some of those people possess schooling to the matric level. There are 85 326 households with an average of four people per household. For this study, 18 participants were selected as participants.

Alfred Duma Local Municipality is under uThukela District Municipality. The uThukela District Municipality is the supplier of water for all areas under its family of municipalities. The uThukela District Municipality has a central purpose which is based on water and sanitation provision, and is therefore committed to leading water conservation initiatives around the uThukela district. The following are the water sources of the district. The uThukela River rises from the Drakensberg Mountains and provides water to a large portion of KwaZulu-

Natal. Other main rivers are the Klip River, Sundays River, Little Tugela, Bushmans River, and Sterkspruit Rivers. The rivers and related wetlands in the District, mainly the upper catchment wetlands, are of national significance.

4.6 Sampling method

The researcher used purposive sampling which falls under non-probability sampling. According to Crossman (2019) non-probability sampling is a method used to gather samples by not giving all individuals in a population equivalent chances of being chosen. Furthermore, according to Crossman (2020) purposive sampling is a non-probability sample chosen because of certain features of the population and the objectives of the study. In addition to this, purposive sampling is judgmental, selective, or subjective sampling.

This method was useful in obtaining a lot of data on the topic of this research by interviewing specific participants who were well informed. The total number of participants was 18. Participants who were selected included one councillor under the Alfred Duma Local Municipality, and two officials from uThukela District Municipality as it is the supplier of water to the Alfred Duma Local Municipality. One of the officials was from the Department of Water Services and Technical Services, and the other official was from the Department of Municipal Health Services & Water Services Authority. Furthermore, eight participants were reserved for those living in rural wards under the jurisdiction of Alfred Duma Local Municipality, and seven participants were reserved for a focus group discussion with those living in rural wards of Alfred Duma Local Municipality.

The recruitment of participants for the study was based on their age, gender, residence, education and employment. These criteria were considered to ensure a selection of participants that promote equality amongst participants, and relevancy. All participants are residing under Alfred Duma Local Municipality and supplied by uThukela District Municipality with water. Participants consist of both employed and unemployed males and females, and varied ages from 18 to 60 years of age. This ensures that the study consist of different opinions that are not generated from a single perspective within the same generation.

4.7 Data collection method

The researcher applied the use of primary data that originated from the participants via semi-structured interviews, and focus groups. These methods are meant to assist the researcher in

getting more insights directly from the participants regarding the impacts of municipal water supply in the study area.

4.7.1 Primary data

Primary data is collected directly from participants in the study area via semi-structured interviews, and focus groups in Alfred Duma Local Municipality rural areas to determine the impacts of water provision on Alfred Duma Local Municipality. The combination of semi-structured interviews and focus groups ensures good evaluation in understanding lived experiences and personal perspective, taking a personal approach so participants can express their opinions; exploring complex situations; providing participants with additional information during the conversations, asking follow-up questions and pursue new lines of inquiry, depending on the issues that emerge; and including the voices of people who are unlikely or unable to respond to survey request (Kallio et al. 2016, Eeuwijk and Angehrn, 2017). Furthermore semi-structured interviews and focus group discussion when combined allows the researcher to study participants in a more natural conversational pattern than typically occurs in a one-to-one interview. In combination with participant observation, focus groups can be used for learning about group attitudes and patterns of interaction.

4.7.1.1 Semi-structured interviews

The researcher used semi-structured interviews. Kallio et al. (2016) state that semi-structured interviews are flexible and versatile, suitable for face-face interviews, and encourage good interaction between the researcher and the interviewee. According to Young et al. (2017) it is an approach that allows a researcher to ask a standard set of questions to gather data. This permitted the researcher to ask more questions whenever an interesting aspect develops during the interview process. This flexibility of asking additional questions allowed the researcher to discuss in-depth the impact of water provisioning on Alfred Duma Local Municipality. This also allowed the researcher to know and understand the lived experiences of community members under Alfred Duma Local Municipality regarding the impacts of water provisioning on Alfred Duma Local Municipality's rural households.

The semi-structured interviews that were held consisted of 11 participants. This number was divided as follows: there was a councillor from the rural wards of Alfred Duma Local Municipality, and two officials from uThukela District Municipality as it is the supplier of water to Alfred Duma Local Municipality. One of those officials was from the Department of

Water Services and Technical Services, and the other official was from the Department of Municipal Health Services & Water Services Authority. Furthermore, eight participants were reserved for those living in rural wards under the jurisdiction of Alfred Duma Local Municipality. The interviews conducted were face-to-face and lasted around an hour to allow the researcher to have gain insights into the impacts of poor water provision on their rural households. A tape recorder was utilized to collect and secure data to be listened to at a later stage during data analysis. The interviews were done in November 2023.

The data collected was analysed and evaluated to determine the impacts of poor water provision on the study area, the levels of satisfaction with the sources of water according to the household heads, the frequency of water from main water sources, water source options, maintenance of water infrastructure of the water supply system, and distance travelled to collect water from a water point, all of which measured the impacts of water provision on Alfred Duma Local Municipality.

4.7.1.2 Focus groups

The researcher used a focus group discussion which, according to Eeuwijk and Angehrn (2017), is a method used to discuss a provided topic with a chosen group and an external professional moderator. The method functioned to assist the researcher to solicit the knowledge, experiences, practices, attitudes and perceptions of the participants which were shared in the course of interaction with these different people regarding the impacts of water provisioning on Alfred Duma Local Municipality. Furthermore, it is about the supposition that group processes triggered throughout a focus group discussion assist to recognize and clarify common knowledge between groups and communities, which would otherwise be challenging to obtain with a sequence of one-on-one interviews. Seven participants were reserved for a focus group discussion, and the total number of focus group discussions is one (1). A tape recorder to record and secure data collected during the discussions was also used. The group discussion lasted around an hour for the researcher to gain insight into the matter being discussed. The group discussion was done in November 2023. The focus group was held at the Limehill community hall in ward 34 because of the wideness of the hall to ensure social distancing.

4.8 Data analysis

Qualitative data analysis was done in this study since the data collected was qualitative. According to Medelyan (2019) qualitative data analysis is the examining and interpreting of qualitative data towards understanding its meaning. According to Dudovskiy (2018) data analysis in qualitative research assists the researcher in finding shared patterns inside the given answers and judgmentally analysing them to accomplish research aims and objectives. Simply put, qualitative data analysis assists the researcher in transforming data into findings by making use of recordings and transcribing and organizing the information collected from interviews, observation, documents, and audio-visual materials. The aim was to derive meaning from it when the researcher transcribed the recorded information and arranged it thematically for analysis.

Data for this study was analysed using thematic analysis that was done through MAXQDA software. According to Caulfield (2021) thematic analysis is a method of analysing qualitative data. This typically applies to various texts such as interview transcripts. The researchers carefully examined the data to identify common themes (themes, ideas, patterns of meaning that keep popping up). There are different approaches to performing thematic analysis, but the most common form follows a six-step process of familiarization, coding, generating themes, reviewing themes, defining and naming themes, and writing up. These steps were done through MAXQDA software which according to Kuckartz and Stefan Radiker (2019) is a software package for any type of qualitative research, including ground theory, literature reviews, exploratory market research, qualitative text analyses, and mixed methods approach. In familiarization, the researcher familiarized himself with the data collected to have an overview of it. It involved transcribing audio collected data to be inserted to the MAXQDA software in an English format. In coding, the researcher highlighted a section of text like phrases or sentences and came up with shorthand labels or codes to describe the content. In generating themes, the researcher looked over the codes created, and identified patterns among them and came up with themes. In reviewing themes, the researcher ensured that the themes were useful and accurate representations of the data, referring to the data and comparing the themes against it. In defining and naming themes, the researcher produced a final list of themes fully named and defined. There are eight (8) themes produced. In writing up, the researcher wrote an analysis of the data as an academic text with an introduction establishing research questions, aims, and approaches.

Credibility was considered to ensure research findings are plausible and trustworthy, dependability to ensure the extent to which the research could be replicated in similar conditions, confirm ability to ensure there is a clear link or relationship between the data and the findings, transferability to ensure findings may be transferred to another setting, context or group, and Reflexivity to ensure a continual process of engaging with and articulating the place of the researcher and the context of the research. These criteria ensure trustworthiness of qualitative research. The researcher had to have participants review the results, through asking people who provided the data whether the interpretations seem to be representative of their beliefs. The researcher had to verify with more data sources where possible to see if any do support the interpretations to ensure legitimacy. The researcher had to check for alternative explanations through considering whether there are other possible reasons why the researcher obtained the data, to rule out or account for alternative explanations. The researcher had to review the data with peers, since sometimes others will see things that the researcher missed or gaps that needs to be addressed. Peers also ensure that your conclusions are sound and reasonable.

4.9 Ethical considerations

The researcher issued consent forms to allow a person with legal capacity to give consent to participate. Confidentiality and anonymity of the participants has been ensured to protect the privacy of participants. The data collected is well protected in a secured environment and back up measures are in place as well.

4.9.1 Handling of participants

Consent forms were issued during interviews. According to Siegle (2019) informed consent enables a person with the legal capacity to give consent, who should be able to exercise free power of choice without any force, fraud, deceit, duress, overreaching, or other ulterior forms of constraints or coercion. The participants should also have sufficient knowledge and comprehension of the elements of the subject matter involved as so to enable them to make an understanding and enlightened decision. In this study, consent forms were issued to individuals who were participating in this research. Participants were given free will in deciding whether to volunteer or not which is very essential in research. Furthermore, participants were entitled to change their minds about participating in the study at any time if they wished to do so.

Confidentiality and anonymity were ensured for participants throughout the study compilation. According to Allen (2017) confidentiality and anonymity are ethical practices meant to protect the privacy of participants while collecting, analysing, and reporting data. Confidentiality is unrevealing of any personal, identifying information provided by participants from the data. Anonymity is to collect data without including any personal, identifying information. The confidentiality and anonymity of individuals partaking in the study have to be ensured. In this study, no identity of any respondents was revealed. Privacy and anonymity were assured as codes were used to ensure the study did not appear anonymous.

4.9.2 Data handling

Data was stored in an electronic system such as a laptop and USB, and non-electronic systems such as paper files and articles. A USB and a laptop were used to store research data to ensure its longevity, retrieval effectiveness, and ease of upgrade to newer media. Paper files were used to store research data to ensure reliability in any case of the electronic system being bridged and research data being altered by unauthorized access. Data handling responsibility belongs only to the researcher; this means that only the researcher has access to the data of this study stored at those particular times of necessity for storage, sharing, archival, retrieval, and disposal purposes. Research data is stored for a period of five years.

4.9.3 Secured environment for electronic data

The systems used to store data of individual files is being protected with login details and passwords. . The access rights are only reserved for the researcher. Update virus protection to prevent vulnerability of data is done regularly. Physical access to equipment and storage media is limited. Data recoverability in case of emergencies is ensured. Electronic storage media to avoid outdated storage/retrieval devices is updated regularly. Multiple locations are used to backup multiple copies. When wireless devices are used, files are encrypted to prevent accidental file sharing and the researcher keeps track of wireless connectivity. When a piece of electronic data was originally recorded, the date and time is recorded as well to prevent alteration or manipulation at a future date.

4.9.4 Back up data

A backup has been created in the form of physical copies to be stored in a safe with a lock along with a USB containing data in a digital form. The researcher is the only one with access

to these storages of data. The digital data stored is being kept in a cloud storage, and hard copies in a safe with a key.

4.10 Chapter summary

This chapter has discussed methodology, research philosophy, research paradigm, research design, research approach, study area, sampling methods and data collection methods of this study. Primary data in this study was derived from qualitative semi-structured interviews and focus groups. Furthermore, secondary data included documents. In addition there was a discussion on ethical considerations looking at the handling of participants, handling of data, establishing a secured environment for electronic data, and back up of data.

CHAPTER FIVE: ANALYSIS INTERPRETATION AND DISCUSSION

5 INTRODUCTION

The study has previously stated that rural areas have a poor municipal water supply as they rely on untested water sources such as dams, rivers, and boreholes that are few and dysfunctional, whereas there are water rights that promote access to safe water for all people. This chapter focuses on the presentation of the analysis and interpretation of qualitative data that has been collected from participants in the study area using qualitative research methods for data collection. Furthermore, a discussion of the findings of the study based on the analysis of data is included.

5.1 Demographic characteristics of the participants

In this section, a discussion on the demographic variables that were used based on their importance in the study is discussed. These variables consist of gender, age, education, employment, and residence. These variables are presented in Table 1 below.

Table 1: Participants' profile

Number	Gender	Age	Educational level	Occupation	Community status
1	Male	43	Tertiary education	Employed	Municipality official
2	Female	35	Tertiary education	Employed	Municipality official

3	Male	29	Tertiary education	Councillor	Community member
4	Female	39	Tertiary education	Primary educator	Community member
5	Female	38	Tertiary education	Nurse	Community member
6	Male	40	Secondary education	Self-employed	Community member
7	Male	26	Secondary education	Self-employed	Community member
8	Female	26	Tertiary education	Self-employed	Community member
9	Male	30	Secondary education	Self-employed	Community member
10	Male	39	Secondary education	Self-employed	Community member
11	Male	29	Secondary education	Self-employed	Community member
12	Male	19	Secondary education	Unemployed	Community member
13	Female	55	Secondary education	Self-employed	Community member
14	Female	38	Tertiary education	Self-employed	Community member
15	Male	23	Tertiary education	Unemployed	Community member
16	Male	20	Secondary education	Unemployed	Community member
17	Female	60	Primary education	Unemployed	Community member
18	Female	29	Secondary education	Unemployed	Community member

5.1.1 Gender distribution of participants per age group

In this study, the gender of the participants per age group was considered, due to their importance in determining the dominant group of gender per age within the participants. Poor water supply can influence gender inequality of the community members, For example females need water more often than males, particularly children at school for their menstrual hygiene (Rodriguez, 2019), Furthermore, WHO and UNICEF (2017) stated that woman and girls disproportionately serve as water purveyors, collecting water in eight of 10 households, and such as, often face the burdens of needing to transit long distances to retrieve water. This indicate that females are affected more than males by an inaccessible or unavailable water supply. The table 2 below revealed that there are more males than females who were able to participate in the study. The total number of males is ten and the total number of females is eight. There are four males ranging from 18-28 years of age and also four males ranging from 29-39 years of age. Furthermore, there are only two males ranging from 40 to 50 years who participated.

Additionally, the study identified that there were only two females ranging from 18 to 28 years of age, three females ranging from 29-39 years of age, zero females ranging from 40-50 years of age, and two females ranging from 51-60 years of age. The total number of participants combining both males and females ranging from 18-28 years of age is six, for those ranging from 29-39 years of age is seven, for those ranging from 40 to 50 is two, and for those ranging from 51-60 is two. The total of participants both males and females ranging from 18-28 years of age equated to six, for those ranging from 29-39 years of age equated to seven, those ranging from 40-50 years of age equate to three, and those ranging from 51-60 years equated to two. Lastly, the overall total for all participants equated to eighteen. The overall total reflects the previously stated sample number of participants, and therefore this means there was success in getting the required number of participants.

Table 2: Gender distribution of participants per age group

		AGE				TOTAL
		18-28	29-39	40-50	51-60	
Gender	Male	4	4	2	0	10

Gender	Female	2	4	0	2	8
Total		6	7	3	2	18

5.1.2 Distribution of participants regarding educational qualifications

In this study education of participants has been identified to be important for determining the level of literacy and illiteracy of participants in the study area. Poor water supply can negatively influence education, and education can also result to poor water supply. For example, according to Sommer et al. (2016) poor water supply result to individuals losing their dignity and affect their education particularly children at school, and grown-ups at work. Based on the table below, in terms of primary education, there are zero males with primary education, there are seven male participants with secondary education, there are three male participants with tertiary education, and there are no male participants who are without education. This indicates that all male participants in this study have achieved some the educational level.

Furthermore, there is one female participant with primary education, there are two female participants with secondary education, and there are five female participants with tertiary education and zero female participants without education. The total number of participants combining both males and females with primary education is one, for secondary education is nine, for tertiary education is eight, and for participants without education it is zero. Their results indicate that there are more females with tertiary education than males, and there are more males with secondary education than female participants.

Table 3: Distribution of participants in terms of education level

		EDUCATION				TOTAL
		Primary education	Secondary education	Tertiary education	No education	
Gender	Male	0	7	3	0	10
Gender	Female	1	2	5	0	8
Total		1	9	8	0	18

5.1.3 Distribution of participants by employment

In this study, the employment of participants has been considered to be important to determine the level of employment of participants. The employment status can influence the access of water supply. Unemployed, or people living on a minimum wage try to save water by not regularly bathing and washing their clothes, thus subjecting themselves to poor hygienic requirements (DeMyers et al., 2017). This reduces their employment opportunities and results in social stigma, stuck in a cycle of not being able to afford their water (Montag, 2019 and Goodling, 2019). The participants were asked about their employment status. Their results indicated that only one male participant is employed, five male participants are self-employed, and four are unemployed participants. Furthermore, three female participants are employed, three female participants are self-employed, and two female participants are not employed. The study identified that both male and female participants who are employed equated to four, those who are self-employed equated to three, and those who are unemployed equated to two.

The results indicate that there are more male participants that are self-employed than female participants that are self-employed. Additionally, more male participants are unemployed than female participants, and more female participants are employed than male participants.

These results indicate that there is a dominance of entrepreneurship due to low employment. People are embarking more on businesses to generate income, therefore boosting their local economic development.

Table 4: Distribution of participants by employment

		EMPLOYMENT			
		Employed	Self employed	Unemployed	Total
Gender	Male	1	5	4	10
Gender	Female	3	3	2	8
Total		4	8	6	18

5.2 Findings of the study

The findings presented are based on the interviews and focus groups conducted during the data collection phase, with the councillor, municipal officials, and community members. During data collection, questions were set for participants to answer based on their experiences regarding water provision in Alfred Duma Local Municipality rural areas by uThukela District. Those questions were set to be a guide toward successfully compiling data that would purposively serve the objectives of the research. The researcher utilised a tape recorder to obtain data from the participants effectively.

5.2.1 Discussion of themes and sub-themes

The themes and sub-themes generated from the analysis of data that was done using thematic analysis are presented in table 5. The analysis of the data revealed themes and sub-themes. The themes comprise equitable water provision, efficiency, and effectiveness of water supply, community meetings about water supply, privatised natural water sources, measures to improve water provision, water supply management, challenges of water provision, and causes of water shortages. These themes have their sub-themes.

Table 5: The themes and sub-themes

THEMES	SUB-THEMES
1. Equitable water provision	1.1. Spatial inequality 1.2. Affordability inequality 1.3. Gender and age inequality
2. Efficiency and effectiveness of water supply	2.1. Intermittent tap water 2.2. Poor transparency 2.3. Dirty tap water
3. Community meetings about water supply	3.1. Zero community meetings 3.2. Unhonoured requests 3.3. Meetings held only when there is a problem

4. Privatised natural water sources	4.1. Few natural water sources available 4.2. Larger dams are privatised
5. Measures to improve water provision	5.1. Provision of water trucks 5.2. Cooperation and collaboration 5.3. Installation of boreholes 5.4. Do away with politically monopolised water 5.5. Water treatment
6. Water supply management	6.1. Water treatment 6.2. Water control system 6.3. Umgeni Water board
7. Challenges of water provisioning	7.1. Small water plants
8. Causes of water shortage	8.1. Outdated and unmaintained water infrastructure 8.2. Poor integration between stakeholders 8.3. Poor budget allocation 8.4. Corruption in water projects

5.2.1.1 THEME 1: Equitable water provision

A question to determine if the provision of water to rural areas in the Alfred Duma Local Municipality by uThukela District Municipality is equitable was deemed to be important in this study. To understand the experiences of participants regarding the equitable municipal provision of water. Therefore, participants were asked to describe their own experiences regarding water provision by uThukela District Municipality in their rural areas under Alfred Duma Local Municipality in terms of being equitable. The results revealed a common thread shared by the participants, which stated that there is inequitable water supply by uThukela District Municipality for their rural areas under Alfred Duma Local Municipality. This inequality comes in a form of spatial geography, employment, gender and age. This is evident in their statements discovered during interviews the researcher had with them.

Sub-theme 1.1: Spatial inequality

The study has discovered a common thread shared by the participants, that there is spatial inequality that excludes them in terms of water supply. This is evident in their statements that in their rural areas there are sections that have been without water for a long time, whilst other sections within the area do get water. Furthermore, water boreholes are not equitably being distributed.

Participant 17: *“Tap water supply is not equitable, whereby we have been without tap water for a long time in Limehill area at the upper section. However, in the lower section of Limehill area, they do get tap water supply intermittently (community member).”*

Participant 14: *“Boreholes are not equitably distributed, and water supply are dispatched to political favoured communities and households. Therefore, we travel long distances in the Esidakaneni area for untested water such as rivers (community member).”*

According to Romano and Akhmouch, (2019) and Bertule, (2018) water resources must be developed, managed, and used equitably. Additionally, according to Abubakar (2018) municipal water supply in South Africa is mainly due to spatial inequality in the provision of services. However, the study has discovered that water resources are not used equitably, as there are not enough boreholes, there is an inequitable tap water supply, and water trucks are dispatched for the communities and households favoured by the councillor.

Sub-theme 1.2: Affordability inequality

The study has discovered a common thread shared by the participants, that there is affordability inequality that excludes them in accessing water supply. This is evident in their statements that in their rural areas the water trucks are supplied to those who can afford to pay, this disadvantages those who are without means of income due to being unemployed.

Participant 12: *“Municipal water trucks in Uitval are supplied to those who pay for them, whilst, the municipal water supply is not for sale. Municipal water trucks must be supplied to us all as the community, as I am not employed how I am supposed to pay for a water truck (Community member).”*

Participant 14: *“Sometimes we pay private water suppliers with our social grant money, whereas other sections of the area sometimes get water with no expense (Community member).”*

Unemployed, or people living on a minimum wage try to save water by not regularly bathing and washing their clothes, thus subjecting themselves to poor hygienic requirements (DeMyers et al., 2017). This reduces their employment opportunities and results in social stigma, stuck in a cycle of not being able to afford their water (Montag, 2019 and Goodling, 2019). This supports what the participants have stated, that they are being forced to pay for water that they barely afford due to being unemployed.

Sub-theme 1.3: Gender and age inequality

The study has discovered a common thread shared by the participants, that there is employment inequality that excludes them in accessing water supply. This is evident in their statements that woman and children in the study area are the ones that are mostly tasked with water collection, thus traveling long distances due to unavailable tap water.

Participant 14: *“We travel long distances as woman, along with our children mostly girls to collect water in Limehil, whereas we stay in Esidakaneni (Community member).”*

WHO and UNICEF (2017) stated that woman and girls disproportionately serve as water purveyors, collecting water in eight of 10 households, and such as, often face the burdens of needing to transit long distances to retrieve water. This is supported by the discovery made by the study that in Alfred Duma Local Municipality woman travel long distances with children to collect water. This indicates the presence of gender inequality. Figure 4 shows a river used by the communities to collect water, and water barrels.



Figure 4: River and water barrels used by the communities for water

5.2.1.2 THEME 2: Efficiency and effectiveness of water supply

A question on the effectiveness and efficiency of uThukela District Municipality in supplying water to rural areas under Alfred Duma Local Municipality was deemed to be important for this study to understand how well uThukela District Municipality can supply water to its rural areas. Regarding this question, participants were asked to respond using their own experiences.

Sub-theme 2.1: Intermittent tap water

Tap water supplied intermittently was identified as a common thread shared by participants during the interviews when they were expressing their experiences on the effectiveness and efficiency of water supply. They stated that it is being supplied for about 48 hours once per two or three weeks in all areas that are receiving tap water. However, this has impacted them negatively as there are community members with small businesses that rely on the availability and accessibility of clean water for their production. There are non-profit organizations that involve agricultural activities to feed the poor.

Participant 3: *“We receive tap water once per two or three weeks, while the economic status of the community members varies and rural areas comprise of poverty-prone families, and denying us basic access to clean portable water is just sad and criminal (Councillor).”*

Participant 13: *“I am running an agricultural NPO in Esidakaneni, we are subjected to travel a long distance to fetch water from the dirty river, and borehole. This further prevents us from planting crops on a big scale to be able to care for a lot of poor households.”*

Participant 8: *“I am running a small business in my area selling cooked food, but the challenge is the unavailability and inaccessibility of water supply, as a result, it is hard to keep the place clean and to cook enough food to attract customers (Community member).”*

Participant 10: *“Water is generally received on a roster and for example, ward 35 (Uitval) gets water once a week for 48 hours now the problem was aggravated by the load shedding and further load reduction experienced by rural areas. With the reservoirs not receiving enough time to build capacity, water has become a scarcity (Community member).”*

Participant 3: *“The uThukela District Municipality is not supplying water effectively and efficiently in wards 31, 33, 30, 32, 34, 35, and 36, people are struggling in getting water. An intermittent water supply system is being used. However, this system is not properly utilised, there are no even water trucks dispatched to supply the communities, yet promises were made but none were delivered (Councillor).”*

According to Erickson et al. (2017) during intermittent water supply, chemical and microbiological contamination are very high. Therefore this means that Alfred Duma communities are subjected to highly contaminated water from their taps as it is being supplied intermittently. Furthermore, communities wait for a long periodical cycle of water supply to get a turn in receiving tap water as they get it once per two or three weeks.

Sub-theme 2.2: Poor transparency

Poor transparency was discovered by the study to be a common thread shared by the participants during the data collection stage. The participants stated that they are not being properly informed as to when water will be available in the taps in their yards, and for how long.

Participant 11: *“We are never properly informed when water will be available on the taps on our yards. You happened to be at work and when you come back home, you come across people telling you that water was running from the taps just for a half day (Community member).”*

Participant 17: *“There are times where they inform us that they will release water on our taps on a certain day, but they never do. The same thing with water trucks (Community member).”*

According to Murat and Islam (2018), transparency is important for the integrity and reliability of public institutions such as those responsible for water supply to promote public trust and public support. It ensures accountability of the institution towards the communities and allows the communities to get all the information they need about the work of the institution, and also partake in decision-making. However, the study discovered that Alfred Duma communities are not being properly informed, as they are being given false information on the intermittent water supply schedule. This is supported by Hove et al. (2019) stating that many authorities lack the means to engage with and respond to community needs.

Sub-theme 2.3: Dirty tap water

Dirty tap water was discovered to be a common thread shared by the participants during the interviews. Participants stated that water from the taps is dirty and not safe to consume without boiling it first. Hence, Erickson et al. (2017) stated that during intermittent water supply, chemical and microbiological contamination is very high.

Participant 16: *“Tap water for the rural areas cannot be consumed without boiling it, as it has a bitter taste as though there is too much chlorine. I only use the water for cleaning, doing laundry, bathing and cooking. I do not hold uThukela District in high esteem and feel like they have failed us so many years after democracy (Community member).”*

Participant 4: *“Water is a huge challenge at home even at work, when water is being supplied at that time as it is done via a roaster, it turns out to be dirty. As I am a health practitioner at the Limehill clinic, patients are having challenges drinking pills using dirty water that is not properly treated, yet it comes from the taps (Primary educator).”*

Participant 10: *“Tap water is not clean for us to drink. We mostly rely on boreholes for clean water even though we know it is not purified, but it is better than that we receive on taps.”*

Participant 11: *“Tap water comes out brown in colour when supplied, which is something that was never seen years ago before the water got supplied intermittently (Community member).”*

The results show that the uThukela District Municipality does supply some of the rural areas with water in their taps at their yards. However, the results show that the water supply is not reliable and not clean. This is supported by Foster et al. (2019) and McNicholl et al. (2019)

who stated that in Africa rural communities are subjected to government institutions responsible for water supply that infrequently allocates or manages threats and responsibilities effectively. Furthermore, health facilities such as Limehill clinic are also without a safe water supply for workers and patients.

5.2.1.3 THEME 3: Community meetings about water supply

A question on the discussion of water issues in community meetings with the councillor has been considered an important factor in this study in order to understand whether the problem of water supply is being discussed with the community or not, especially about the plans to ensure that the communities have water. Therefore, the participants were asked to express their experiences during the public meetings and if there were any kinds of inputs from the community, and any requests made by the councillor to the community, regarding water provisioning improvements

Sub-theme 3.1: Zero community meetings

The study discovered that during the interviews the participants shared a common thread that there are zero community meetings in the area. They stated that the meetings were last held before Covid-19, and even then the community meetings were only held when there was a violent protest. Though the strategy being taken by the community results in community meetings being held, it is at a cost of certain damaged municipal infrastructure due to violent protests. Post-Covid-19 no community meetings have been held regarding the water supply.

Participant 12: *“The community meetings were last conducted before the Covid-19 pandemic, since then, there are no meetings have been held.”*

Participant 7: *“Public participation is not a strong point in local government, especially in rural areas. Public meetings only spring up when there is a threat to demonstrate through protest action that violent government infrastructure, due to lack of services, especially for access to roads, housing, water, and electricity.”*

Participant 5: *“No community meetings are being held after post-Covid-19, we have no idea what is going on, what are the plans to ensure water supply in our area, nothing is being communicated with us (Community member).”*

According to Hove, Kahn, Lucia, and Rhian (2022) the community meeting approach is a way of involving communities in setting priorities and designing collective action to improve service delivery outcomes and confirm an effective response and equitable service delivery system. However, the study discovered that no community meetings are being held, as they were last conducted before the post-Covid-19 era. This means Alfred Duma communities are being left uninformed about the plans, if there are any, towards ensuring an effective water supply.

Sub-theme 3.2: Unhonoured requests

The study has discovered that the participants during the interviews have raised a common point that their requests made during the last meeting they had before Covid-19 were and still are not honoured. Furthermore, the meetings became pointless to the communities, though they never stopped attending, as their requests and inputs were ignored. These requests involve the installation of more boreholes, the dispatching of more water trucks, and a request to meet with the uThukela District Municipality.

Participant 18: *“On the last meeting before covid-19, the community members raised that there must be more water boreholes established in the area for hygiene and agricultural activities, and the water trucks must be provided for the community every week for drinking and cooking. However, nothing was done (Community member).”*

Participant 3: *“The community members during the times of functional community meetings, did request me as a councillor to invite the uThukela District Municipality officials from the Department of Water. I ensured that the request is escalated to the required officials. However, till today, they had never responded (Councillor).”*

Participant 6: *“I do not know the ward councillor and have never seen him/her. Therefore, it would be unfair to comment on whether there are improvements as the state of the area has remained the same, since they were inaugurated in December 2021 (Community member).”*

Participant 15: *“The inputs of us community members seem to be falling on deaf ears for the following reasons. In a political term, for example, it is only when approaching elections do we see an influx of politicians accompanied by local government officials to come and make more promises they cannot keep in return for our votes (Community member).”*

According to Hove et al., (2019) many authorities lack the means to engage with and respond to community needs. This supports what the study discovered which is exactly as stated by Hove et al. (2019). The uThukela District Municipality and Alfred Duma Local Municipality are not doing a good job of engaging with and responding to community needs.

5.2.1.4 THEME 4: Privatised natural water sources

A question on how many natural water sources are privatised in rural areas of Alfred Duma Local Municipality was considered to be important for this study to understand the availability of natural water sources made available for the communities to utilise. Therefore, the participants were asked how many natural water sources are privatised and how could they have been of use to them if they were not privatised. In response to the question, the participants from a focused group discussion shared a common response that there are no privatised natural water sources.

Sub-theme 4.1: Privatised dams

The study has identified that in the study area the most and only privatised natural water sources that have been raised by the participants are dams. These dams are privatised by farmers for their agricultural activities such as the irrigation of crops, and they also serve as a drinking source for their livestock.

Participant 7: *“I am not sure about the exact number of privatised natural water sources; I only know three dams (3) as there are not much of dams anyway in our communities (Community member).”*

Participant 4: *“Dams are the most and only privatised natural water source by farmers, not sure about the exact number of them. These dams are mostly located on the land of farmers. The communities are left with very few and small dams for them to use (Community member).”*

Participant 3: *“There are some of the natural water sources privatised in rural areas by farmers such as dams, as they are within their land that they use for agricultural activities. Engagement with the farmers should be held to release the water held at their dams because this water crisis targets black communities (Councillor).”*

Dams are getting privatised by farmers because municipalities have not planned on utilising them for communities. Lique et al. (2016), Seddon (2018) and Oral et al. (2020) noted that it is slowly becoming increasingly evident that nature-based solutions can be used to improve water storage and conservation. Examples include: water basin restoration and conservation, green infrastructures such as rain gardens and wetlands, and managed groundwater and groundwater recharge.

Sub-theme: Public boreholes and rivers

The study has discovered that the available natural water sources to the communities are the boreholes and rivers, though there are a few dams as well. However, all of these water sources are scattered, boreholes are dysfunctional, and dams and rivers are dirty.

Participant 14: *“The natural water sources that are available for us to utilise, though there are only a few of them, are dams, boreholes, rivers, and rainwater. Boreholes are for drinking and cooking, dams and rivers we use them for hygienic purposes (Community member).”*

Participant 17: *“Natural water sources available in the area are not reliable. Borehole water damages our electrical appliances such as the kettle. They are not clean enough to drink or cook, as they do not undergo a purification system (Community member).”*

Participant 12: *“There are seven (7) boreholes scattered in rural areas under Alfred Duma Local Municipality such as in (Uitval, Llimehil, Esidakane, Stanford, and Tholeni), and are not enough to supply the whole areas, hours are wasted in fetching water from distanced boreholes, which sometimes are not working. The population relying on boreholes is very high, and time for school and studying is affected. Time for work is also affected (Community members).”*

The above results show that rural areas rely heavily on boreholes, rivers, and dams to have water for their domestic purposes. These sources of water also assist community members who run small businesses. However, there is a challenge they are facing: these sources are far away, unreliable, few, and scattered in rural areas. However, UN-water (2018), Kabeer (2016), and UNDP (2018) substantiated that rural areas are mostly neglected when it comes to basic service delivery such as water. Therefore, there is lateness and absenteeism at school or work. There is poor hygiene in the food business that is established in rural areas of Alfred Duma Local

Municipality and, as a result, customers end up not supporting food services there. Overall the social and economic development in rural areas is poor. Figure 5 shows one of the boreholes and dams used by the communities to get water.



Figure 5: Borehole and a dam

5.2.1.5 THEME 5: Measures to improve water provisioning

A question on what measures would you recommend to be implemented towards improving water provisioning, particularly in rural areas under Alfred Duma Local Municipality, was considered to be important for the study to know the measures that the communities would like to be implemented. This is because the communities know best what they want and how they want it based on their service delivery needs from their government to ease their challenging situation of water availability, accessibility, and reliability.

Sub-theme 5.1: Provision of water trucks

Most participants shared a common thread that both the uThukela District Municipality and Alfred Duma Local Municipality must work together in providing water trucks for their rural communities to supply safe water at least five days a week. This is because the situation with unavailability and inaccessibility of water for any purpose is very difficult.

Participant 4: *“The Municipality must bring more water trucks to supply the communities to its rural areas, about four days a week because they struggle in supplying water in our taps for us as the community to drink and for cooking. Though it will not be enough at least we will be getting some safe water to drink and cook (Primary educator).”*

Participant 5: *“It will be wise for the uThukela District Municipality to work together with Alfred Duma Local Municipality in acquiring water trucks that are enough to supply at least half the population a day. They must supply three days a week, and on Saturdays for those who are mostly at work during the week days (Nurse).”*

The study has shown that the provision of sufficient water trucks for a satisfactory number of days, while they try to resolve the challenge that is an obstacle to supplying water to the communities using the taps installed in every household, is one of the measures to be taken into account. According to Omarova et al. (2018) water trucks are regarded as a makeshift measure for drinking water supply provision for the population, whereby the delivery is made once a week. If this delivery can be made more than once a week, it can truly make a difference for rural communities. Baloyi (2018) has claimed that the government has provided trucks, and tankers in several communities to provide potable water to some communities. However, based on what the study has discovered, water trucks are not supplied to communities and are only reserved for those who are willing to pay.

Sub-theme 5.2: Cooperation and collaboration

Some participants showed a common thread on the importance of cooperation and collaboration in service delivery by district and local municipalities, and the communities they serve. However, communities are being left out of any decision-making processes.

Participant 6: *“Cooperation and collaboration are the key factors in service delivery, cooperation will integrate the uThukela District Municipality, Alfred Duma Local Municipality, external stakeholders, and communities they serve to ensure effective, efficient, and sustainable service delivery of water. Cooperation mostly brings about accountability to those obligated to deliver public services to the communities they serve (Community member).”*

Some participants’ value cooperation and collaboration to be the key to service delivery because it keeps everyone informed and involved, therefore those who are supposed to be accountable to deliver service are compelled to abide by the law as they will be monitored. Where they lack, through cooperation and collaboration, stakeholders involved will come to the rescue. Water is a globally used resource and, currently, the world is facing a crisis in accessing it, due to it becoming a scarce natural resource. In addition, water management

solutions, such as Nature-Based Solutions (NBS) which, according to Wendling et al. (2018), aim to prevent the consequences of climatic disasters, require cooperation and collaboration among institutions and stakeholders, including local community participation.

Sub-theme 5.3: Installation of boreholes

The study discovered that the participants shared a common point of view that if more boreholes are installed to accommodate the whole communities under Alfred Duma, this will make life easy for them. These boreholes will be able to supplement other modes of water supply to avoid reliance on one mode of supply.

Participant 15: *“There must be more boreholes developed in Tholeni, Limehill, Uitval, Ekuvukeni, Stanford, and Sidakaneni communities as there are not enough of them. These boreholes will assist both the municipality and communities in ensuring there is availability and accessibility of water supply that is also reliable (Community member).”*

Participant 8: *“The boreholes would be more useful if there was enough to supply us all as the community, however, they are not enough. I call for the installation of more boreholes as we use its water for a lot of purposes such as drinking, cooking, and irrigation (Community member).”*

Their usage of boreholes that are enough for the communities to utilise and are well managed will assist in easing the challenges that the communities are experiencing. This is supported by Hedden (2016) who stated that South Africa has adopted groundwater development and that research has discovered it to be the most reliable source of water when it's properly managed, with similar costs as those for surface water resources. This means that if more boreholes are provided within the communities that need water and they are well managed, they will be creating a reliable source of water for the communities. However, based on the evidence of the study, there are not enough boreholes and they are not well managed as most are dysfunctional. This is supported by Baloyi (2018) who stated that some municipal wells or boreholes have no water to flow through them.

Sub-theme 5.4: Do away with politically monopolised water

The study has discovered that municipal officials are trying to do away with a politically monopolised water supply, as it is a challenge that hinders good municipal water supply meant

for all people under the municipal jurisdiction. A politically monopolised water supply brings about a lack of political will, and spatial inequality in the supply of water to the public.

Participant 2: *“I would recommend that politicians should not monopolise water and let those that are affiliated with them by profession because politicians lack the will to deliver as required, they subject communities to spatial inequality in water supply (Municipal official).”*

Participant 1: *“The politicians bring their political issues to the public service delivery, therefore resulting in biases and marginalisation of communities (Municipal official).”*

Participant 8: *“Councillors under Alfred Duma Local Municipality are calling water tankers to be dispatched to their sections, marginalising the rest of the communities (Community member).”*

According to Abubakar (2018) municipal water supply in South Africa is mainly due to a lack of political will, spatial inequality in the provision of services, and interference in the application of a range of policies relating to the supply of water services, particularly for rural areas. This supports the discovery of the study from the study area that there is a politically monopolised water supply that hinders good municipal water supply for all people.

Sub-theme 5.5. Water treatment

The study has discovered from the participants that sometimes when tap water comes out from the taps it is dirty. The participants require the uThukela District Municipality to ensure that they do proper water treatment to avoid supplying dirty water to the communities.

Participant 13: *“Water treatment must be done accordingly, and water be tested before being released to taps in communities, because the tap water that the municipality is supplying to us is mostly dirty (Community member).”*

Participant 16: *“I boil my tap water every time before I use it, sometimes I even buy bottled water when am able to do so (Community member).”*

Participant 10: *“Tap water is not clean for us to drink, we mostly rely on boreholes for clean water even though we know it is not purified, but it is better than that we receive on taps (Community member).”*

Participant 11: *“Tap water comes out brown in colour when supplied, which is something that was never seen years ago before the water got supplied intermittently (Community member).”*

According to Dinka (2018) the municipal water supply is essential in providing suitable water for the population through a water supplier to reduce the risks of water pollution in various elements of the water supply system like water source, treatment, and distribution of water. However, the uThukela District Municipality does not ensure such benefits of municipal water supply. Therefore, the participants require the municipality to do proper water treatment before supplying tap water to the communities.

5.2.1.6 THEME 6: Water supply management

A question on how water supply is managed in rural areas under the Alfred Duma Local Municipality by uThukela District Municipality was considered to be important to this study to understand how water supply is managed. The participants indicated that there is water treatment, water control system, and partnership with Umgeni Water bored.

Sub-theme 6.1: Water treatment

The study has discovered that the uThukela District Municipality does make use of water treatment plants to ensure safe drinking water for the communities they serve. They are guided by SANS 241-2:2015 which requires the performance to be reported against five risk categories inter alia acute health: microbiological, acute health: chemical, chronic health: chemical, operational, and aesthetic.

Participant 2: *“We treat water according to SANS 241-2:2015 that requires us to consider acute health microbiological for the state of the water with respect to the absence and presence of diseases causing micro-organisms. Acute health chemical for determinants that poses an immediate unacceptable health risk if present at concentration values exceeding the numerical limits as specified in SANS 241:2015 (Municipal official).”*

Participant 1: “ *Other considerations are chronic health chemical for determinants that poses unacceptable health risk if ingested over an extended period if present at concentration values exceeding the numerical limits as specified in SANS 241:2015. Operational for determinant that is essential for assessing the efficient operation of treatment systems. Lastly, aesthetic for determinant that is essential for assessing the efficient operation of treatment systems (Municipal official).*”

Participant 2: “*There is a collection of untreated water directed to the drainage basin, which is directed to the water treatment pipes, then to the treated water transfer pipes, and from there to the drinking water supply pipes before being directed to pumping stations. Lastly, it is stored in tanks and can be distributed to consumers (Municipal official).*”

According to Jia et al., (2016) the municipal water supply is crucial as it provides a system of hydrological and hydraulic components that include all buildings and facilities to meet the water needs of industrial centres and the general population. This includes the collection of untreated water directed to the drainage basin, which is directed to the water treatment pipes, then to the treated water transfer pipes, and from there to the drinking water supply pipes before being directed to pumping stations. Finally, it is stored in tanks and can be distributed to consumers.

Sub-theme 6.2: Water control system

The study has discovered that the uThukela District Municipality is currently using a water control system which allows them to supply water intermittently as it can detect the amount of water being supplied and can stop if it exceeds the amount required.

Participant 1: “*There is a water control system that is being used in supplying water for the whole area. A water control system is a system where water is supplied from the water mains into the ground, then pumped up to the elevated tank, then distributed to each floor. When the water level in the elevated tank is low, water is pumped up from the ground tank to supplement it. When the water level reaches a certain point the pump stops (Municipal official).*”

Participant 2: “*The water control system allows the uThukela District Municipality to supply water to specific areas for a specific period, then stop the supply and move to supply other areas. The system allows water to be supplied intermittently (Municipal official).*”

The above statement has revealed that the uThukela District is purposively supplying water intermittently through a water control system to try to accommodate all wards based on a roster. Intermittent water supply (IWS) refers to a piped water supply that provides water to customers for fewer than 24 hours a day (Mokssit et al., 2018). The areas under the uThukela District Municipality are taking turns in terms of water supply, meaning water is not being supplied all at once to all areas under their jurisdiction. However, inequitable supply, a rise in non-revenue water (NRW), and declining water quality are all effects of the IWS (Ghorpade et al., 2021).

Sub-theme 6.3: Partnership with Umgeni Water board

The study has discovered that the uThukela District Municipality is assisted by Umgeni Water board, in ensuring water supply.

Participant 2: *“uThukela District Municipality has Umgeni Water board serving as a middle man in water supply as they intervene with prefabrication of dysfunctional water plants when we fail to get them fixed (Municipal official).”*

Participant 1: *“uThukela District Municipality was overtaken by Umgeni Water board, but that contract was dissolved as the municipality owes the Umgeni Water board. The uThukela District Municipality is now back to functioning as water service authority (Municipal official).”*

Richard and Mulala (2022) claim that stakeholder engagement promotes accountability of the service provider to ensure any service is delivered accordingly, and it ensures a sustainable system of water resource management in post-apartheid South Africa. According to Mumseen (2022), Benin has formed a partnership with the World Bank involving the private sector in bringing service delivery of water to rural areas and establishing the government’s capacity for service delivery that is of good quality. In this regard, Umgeni Water board intervene mostly when there is a need for prefabrication of dysfunctional water plants to ensure water supply. However, the study discovered that rural areas under Alfred Duma Local Municipality have serious water shortages, yet urban areas have water running in their taps.

5.2.1.7 THEME 7: Challenges of water provisioning

A question on what are the challenges of water provisioning in 22 rural wards under the jurisdiction of Alfred Duma Local municipality was considered important for this study to understand the challenges that they are experiencing as uThukela District Municipality.

Sub-theme 7.1: Small water plants

The study has discovered from the municipal officials that they are challenged with small water plants which are set to supply the all the rural communities of Alfred Duma Local Municipality. This is a challenge because these small water plants were only meant for a smaller population than it is now. These water plants fail to accommodate the whole population and as a result they are forced to supply water intermittently. Even that system is not reliable.

Participant 1: *“The currently available water plants are in Emabhekazi (olifantskop plant), Esahlumbe (Tugela estate), and Umhlumayo. The challenge is that these are small water plants (1.0 mega litres), and communities are expanding in population size making these water plants irrelevant to accommodate a high population (Municipal official).”*

Participant 2: *“The Olifantskop dam has a high silt, and a tender was issued to ensure that the dam can be used to accommodate the increased population with safe water, however it was a failed project (Municipal official).”*

Participant 1: *“The households in rural areas (Ekuvukeni, Limehill, Tholeni, Uitval, Stanford, and Esidakaneni), were subjected to drought in 2003, 2007, 2015, and 2017. This is all due to the increasing population, in Umhlumayo the borehole and the tank are small to supply such a high population, whereas the uThukela Dam has high silt. The communities end up relying upon water trucks that are not reliable at all (Municipal official).”*

Pierrce et al. (2019) stated that accessibility and availability to municipal water provision demand the ability to access water supply through vertical pipes. That is associated with the geography and size of drinking water systems, compatible supply areas or districts, community or municipal boundaries, and water service inclusion decisions. However, the results of the study show that the uThukela District Municipality does not have large enough water plants to supply today's increased population. The water plants that they have are no longer relevant.

5.2.1.8 THEME 8: Causes of water shortage

The question on the causes of water shortage in 22 rural wards under the jurisdiction of Alfred Duma Local Municipality was asked to determine the roots that led to the failure of supplying water to rural areas that satisfy the needs of the communities.

Sub-theme 8.1: Outdated and unmaintained water infrastructure

The study discovered that the cause of water shortages in rural communities is the unmaintained water infrastructure which is a common problem raised by both municipal officials and the communities. A few boreholes are dysfunctional and the rest of the boreholes have been not working for a while now.

Participant 1: *“The cause of water shortage in the 22 rural wards out, is that the water plants or should I say water system is outdated (Municipal official).”*

Participant 2: *“There is an urgent need to update these water systems to make them compatible with the current and future population. This is because the current water systems were meant for the previous population which has now increased a lot (Municipal official).”*

Participant 10: *“The current water infrastructure such as boreholes, is not being maintained as most of them are dysfunctional and run dry, and some are no longer working at all (Community member).”*

The above statements indicate that the main cause of water shortage in most of the wards is outdated water systems. The water systems that are currently in use were meant for a small population. However, changes require adaptations. The increased population requires larger water systems, and the current water infrastructure for the community requires multiplication and maintenance. The above statement is supported by Viljoen and van der Walt (2018) who stipulated that the South African water crisis results from inter alia inadequate water infrastructure repairs and investment.

Sub-theme 8.2: Poor integration between stakeholders

The study has discovered that the uThukela District Municipality is in partnership with Provincial Cogta and Rand Water through the Development Bank of Southern Africa to ensure

a good water supply for all people. However, it failed in drilling and equipping boreholes that yield water.

Participant 2: *“I believe that Provincial Cogta and other stakeholders such as Rand Water through the Development Bank of Southern Africa have failed in that municipal allocations such as the Water & Sanitation Infrastructure Grant Focus on drilling and equipping boreholes that yield no water (Municipal official).”*

Participant 12: *“I do not recall being in any of the community meetings we had before post-Covid-19 about the installation of boreholes by the provincial Cogta and Rand Water, which I believe is the reason why that project failed, as it is comprised of poor stakeholder engagement as we were not informed (Community member).”*

According to Richard and Mulala (2022) stakeholder engagement promotes accountability of the service provider to ensure any service is delivered accordingly, and it ensures a sustainable system of water resource management in post-apartheid South Africa. However, Provincial Cogta and Rand Water through the Development Bank of Southern Africa failed to equip communities with boreholes that yield water, because communities were not informed about the project. Hence, community meetings before they stopped used to sit every month, but now they are only held when there are protests because community requests are unhonoured. Poor integration in South Africa seems to be indeed a problem, hence, Hornby et al. (2016) stated that there is a lack of integration between national government institutions and informal institutional frameworks in South Africa.

Sub-theme 8.3. Poor budget allocation

The study has discovered from the municipal official that there is poor budget allocation, whereby the municipal infrastructure grant focuses on erecting pump stations and reticulation networks, whilst there is no water source. Without a proper water source for these pump stations and reticulation networks, they must first invest in establishing better water sources.

Participant 1: *“Municipal infrastructure grant focuses on erecting pump stations and reticulation networks yet there is no source to which that water is supposed to come from (Municipal official).”*

Nzama (2019) stated that the national government provides grants to municipalities to permit them to perform well in service delivery; however, they fail due to the lack of proper internal controls and poor financial management. ASGSA (2019) also stated that these problems make municipalities have poor financial management that includes irregular expenditure, unauthorised expenditure, and fruitless and wasteful expenditure. The study discovered that there is poor budget allocation, as the municipal infrastructure grant focuses on erecting pump stations and reticulation networks, whilst there is no water source.

Sub-theme 8.4: Corruption in water projects

The study discovered from the municipal official they had a water project that was handed over to a private contractor. However, it was a failed project that was set to build a larger dam to supply uThukela District Municipality areas.

Participant 1: *“The was a budget allocation for a project set to build a larger dam to supply areas under uThukela District Municipality, however, the project was never complete till today, and was considered a failed project as it unnecessarily exceeded a planned budget due to corruption (Municipal official).”*

The study has shown that corruption in water projects is hindering progress toward improving the standard of living in terms of water supply for the communities. According to Grootes (2021) corruption and ways to escape blame when projects fail are vast in municipalities. For example, in Gauteng, a Giyani water project funded with 3 billion was set to build a 300km pipeline to provide 55 rural areas with water but those rural areas are still without water.

5.3 Chapter summary

The chapter discussed the presentation of the findings of the study based on the qualitative results generated from the analysis of data. It revealed that water supply in rural areas under Alfred Duma Local Municipality by uThukela district Municipality is challenged both for the communities and for the uThukela District Municipality itself. The communities are receiving an intermittent supply of water that is not predictable and reliable. The communities do have taps but they are dry. The communities have very few water boreholes and few dams and rivers. The problem with these sources are distances from the communities and they are not reliable.

The uThukela District Municipality is challenged with small water systems. Therefore, a simpler solution for the municipality is to focus the budget on establishing more water sources and improving these small water systems to be larger to accommodate the current high population. Furthermore, what is needed is to ensure coordination, cooperation, and collaboration in water governance, management of natural water sources, and the use of technologies to detect water losses and monitor territorial areas, as well as to analyse the performance of infrastructure-related targets and the quantification of future infrastructure investments, in conjunction with the formulation of metrics.

CHAPTER SIX: DISCUSSION OF THE FINDINGS, RECOMMENDATIONS AND CONCLUSION

6 INTRODUCTION

This chapter focusses on providing remarks that are based on the objectives of the study. The objectives of the study consist of evaluating the quality of water governance, determining the accessibility, availability; and reliability of water supply, and identifying recommended measures to address the poor municipal water supply. The recommendations made by the researcher and areas for further research are discussed.

6.1 Discussion of the findings

The discussion of the findings is based on the objectives of the study. These objectives were considered important to be restated in this chapter as outlined from chapter one, as they will now be clustered with findings that will answer the questions of this study.

6.1.1 Objective one: To evaluate the quality of water governance of uThukela District Municipality for water provision to rural areas of Alfred Duma Local Municipality

The study has discovered that uThukela District Municipality is currently using a water control system, where water is supplied from the water mains into the ground, then pumped up to the elevated tank, then distributed to each floor. When the water level in the elevated tank is low, water is pumped up from the ground tank to supplement it. When the water level reaches a certain point the pump stops. This system allows the intermittent water supply procedure to happen, where water is supplied based on a roster for different areas to prevent small water

pipes and water plants from getting damaged due to high pressure. The study has discovered that there are gaps in the water governance of the uThukela District Municipality. There is no equity.

There is no transparency in the municipal water supply. For example, when the municipality informs the communities about tap water supply roster, it mostly turns out to be false information and most of the time communities are not informed. The water supply is politically monopolised, there is corruption interfering with water projects for communities, there is no maintenance of municipal water infrastructure, and there is poor budget allocation for water services, whereas according to Murat and Islam (2018) transparency is important for the integrity and reliability of public institutions, such as those responsible for water supply to promote public trust and public support. It ensures accountability of the institution towards the communities and allows the communities to get all the information they need about the work of the institution and partake in decision-making.

There is poor integration between stakeholders which results in failed community projects, yet Richard and Mulala (2022) claim that stakeholder engagement promotes accountability of the service provider to ensure any service is delivered accordingly, and it ensures a sustainable system of water resource management in post-apartheid South Africa. There is also poor budget allocation as, for example, the municipality used an allocated budget to develop a pump station without any water source for the pump station to pump. This is supported by Nzama (2019) who stated that the national government provides grants to municipalities to permit them to performing well in service delivery; however, they fail due to the lack of proper internal controls and poor financial management. In addition, ASGSA (2019) also stated that these problems make municipalities have poor financial management that includes irregular expenditure, unauthorised expenditure, and fruitless and wasteful expenditure. The participants have indicated that corruption in water projects is hindering progress toward bettering the standard of living in terms of water supply for the communities.

There is no cooperation and collaboration with the communities regarding decision making processes about water supply. For example, the study discovered that community meetings are currently not being held and were last held before Covid-19. Even then, the meetings were only held when persuaded by protests due to poor service delivery. This is not a good influence because protesting results in damaged municipal infrastructure. Therefore, there is a setback in the progress made toward the social and economic development of rural areas. Whenever

meetings were held, the community inputs and requests ended up not being honoured, as there is poor community participation in rural areas.

6.1.2 Objective two: To determine the accessibility, availability, and reliability of water supply to the rural households of Alfred Duma Local Municipality

Accessibility, availability, and reliability of water supply in rural areas under the jurisdiction of Alfred Duma Local Municipality is poor. The study has discovered evidence from the participants that the water supply is inequitable. For example, the Limehill area has sections that receive water intermittently, while other sections do not have tap water. However, according to Edokpayi (2018) South Africa has a large drinking water infrastructure and the government is committed to making potable water available to all South Africans. The study has discovered that there are not enough boreholes as they distributed inequitably by spatial geography. There is an inequitable tap water supply and water trucks are dispatched for the communities and households favoured by the councillor.

Water trucks are only supplied to those areas or households that are willing to pay for the supply of water and it is expensive. Due to employment inequality. However, water supply for indigent people in South Africa is based on free basic policy. Additionally, Teodoro (2018-2019), and Mack & Wrase (2017) state that water supply should be at an affordable rate according to the worldwide policy principles and human rights discourse.

The already existing boreholes are few and not equitably being distributed and are mostly dysfunctional. However, Hedden (2016) stated that South Africa has adopted groundwater development and that research has discovered it to be the most reliable source of water when it's properly managed, with similar costs as those for surface water resources. Tap water is intermittently supplied to rural areas only once per two weeks or three weeks. Yet inequitable supply, a rise in non-revenue water (NRW), and declining water quality are all effects of the intermittent water supply system (Ghorpade et al., 2021). The participants also indicated that when tap water is being supplied it turns out to be dirty and it cannot be consumed without first boiling it. This is supported by Erickson et al. (2017) who stated that during intermittent water supply, chemical, and microbiological contamination is very high.

The current challenge experience by the uThukela District Municipality is the small water plants they have in supplying water to a larger population. These systems are said to be meant for a smaller population which is why water is being supplied intermittently and it is not a reliable system. However, Pierrce et al. (2019) stated that accessibility and availability to municipal water provision need to have the ability to access water supply through vertical pipes. That is associated with the geography and size of drinking water systems, compatible supply areas or districts, community or municipal boundaries, and water service inclusion decisions.

The participants stated they do not have water because of outdated and unmaintained water infrastructure. This is supported by Viljoen and van der Walt (2018), who stated that the South African water crisis results from inter alia inadequate water infrastructure repairs and investment. The boreholes which the communities rely on the most are not functional and sometimes run dry. Borehole water damages electrical appliances that use water.

Some of the participants have indicated that they have small businesses that they run which require clean water to continue being functional. However, due to unreliable water supply, their business is not making enough profit to feed their family and to boost local economic development. Other participants are involved in non-profit organizations that specialize in agricultural activities to plant enough crops to produce enough food for poor families while improving their social development by eradicating poverty.

6.1.3 Objective three: To identify recommended measures to address poor municipal water supply that affect social and economic development in the rural households of Alfred Duma Local Municipality

Hedden (2016) stated that South Africa has adopted groundwater development and that research has discovered it to be the most reliable source of water when it's properly managed, with similar costs as those for surface water resources. The measures that participants have identified involve the installation of boreholes that are enough and equitably distributed. According to Omarova et al. (2018), water trucks are regarded as a makeshift measure for drinking water supply provision for the population, whereby the delivery is made once a week. Participants want water trucks to be dispatched to the communities to supply water every week, and not to be sold. Water management solutions, such as Nature-Based Solutions which aim to

prevent the consequences of climatic disasters, require cooperation and collaboration among institutions and stakeholders, including local community participation (Wendling et al., 2018). In addition to this, participants call for the implementation of cooperation and collaboration that involves them in the decision-making process that is related to the community needs. This means community meetings are being demanded by the communities to be held every month. According to Abubakar (2018) municipal water supply in South Africa is mainly due to a lack of political will, spatial inequality in the provision of services, and interference in the application of a range of policies relating to the supply of water services, particularly for rural areas. In this regard, participants also want a water supply that is not politically monopolised.

Regards to equity, there is no equitable distribution of water and water infrastructure. However, Water governance theory calls for the equity and efficiency in the allocation and distribution of water resources and services (UNDP, 2013). Decentralization theory is about the involvement of locals in the decision-making process, to meet the needs identified in the region. Thus, improving government accountability and responsiveness (Stanton, 2009). The results show that decentralisation in water governance in uThukela district municipality is not properly being implemented as it consist of poor transparency, cooperation, integration and collaboration with the communities and external stakeholders. Water governance theory state that good governance requires considerable planning, as it is the result of complex, protracted processes that require careful planning and nurturing. Overall conditions and the general environment must be favourable for good governance to emerge. Parties involved must be open to collective decision making. Effective and functional organizations must be created. Policy, legal, and political frameworks must be appropriate for the objectives being pursued for the common good (Rhodes, 1996; Kooiman, 2003; and Tiihonen, 2004). However, the study has shown that there is poor integration, cooperation, and collaboration of uThukela District with stakeholders, councillors, and communities with regards to water supply. Therefore, there is biasness in water supply contradicting the water policies. Effective and functional organization created is currently being owed a lot of money by uThukela District Municipality.

6.2 Summary of the study

The study has explored the impacts of poor water provision in rural areas under Alfred Duma Local Municipality which is being provided by the uThukela District Municipality. **Chapter one** of the study focused on the discussion that involved the background of the study, problem statement, aim of the study, objectives of the study, research questions, significance of the

study, the feasibility of the study, intellectual property, knowledge dissemination, and the outline of the study.

Chapter two of the study has focused on a universal literature review that includes the significance of good municipal water provision where the study revealed that good municipal water provision is important for both social and economic development, mostly for rural areas. This is because it boosts agricultural activities, small businesses, and the livelihoods of households. Without a municipal water supply, people are subjected to waterborne diseases, poverty, and poor school and work attendance. Furthermore, the study discussed the quality of water governance, where the study discovered that water governance is key to supplying water equitably and sustainably. However, the problem is that water governance is mainly centralized and not decentralized. This ends up marginalizing rural areas from public basic service delivery such as water as their water infrastructure is not updated and maintained. Water supply is poorly managed, and this has been evident by the existing threads of rural communities under the jurisdiction of the municipality not receiving water that is within their human rights.

The study further discussed the accessibility, availability, and reliability of municipal water supply. It was discovered that the municipalities have their demands in terms of the structure of the settlements to allow the installation of water pipes and taps. These demands mostly challenge rural communities as most of them build their houses forming a structure of a settlement that is informal and some houses are scattered; however, even those with all the requirements such as formal settlement with installed water pipes, and taps in the back yards are still without water as their taps have run dry. The study discovered a popular thread that rural communities are left to rely on water boreholes, dams, and rivers which are all water sources that are not being properly managed in terms of use and maintenance. Rural communities end up trying to buy water that they cannot afford. The current measures being utilized for improving municipal water supply by municipalities include the usage of groundwater such as water wells and boreholes. There is also the use of water trucks. These are sources deemed to be important to supplement municipal water supply via standpipes. There is the use of dams and rivers. However, they are highly unreliable due to being polluted.

Chapter 3 of the study focused on the theoretical framework that included the water governance theory and decentralisation theory which were two theories that were used in the study. The study considers water governance to be a must for municipal water supply, as it

ensures an effective and efficient supply of equitable water for all, in a sustainable manner. The decentralisation theory is there to ensure that water governance is decentralised and not only centralised. This will support rural areas as they are mostly on the outskirts of the Central Business District.

Chapter 4 has discussed methodology of the study focussing on, inter alia: research philosophy and paradigm, research design (exploratory research design), research approach (qualitative approach), study area, sampling methods to sample a larger population into a small manageable population, data collection method that was used to collect data, data analysis method used for the study which was thematic analysis, and the ethical considerations for participants were also taken into account.

Chapter 5 has discussed the presentation and analysis of the study. This chapter considered demographic data, equity in municipal water provision, effectiveness, and efficiency of municipal water provision, community meetings on water issues, privatisation of natural water sources, and measures to be implemented toward improving water provisioning, particularly in rural areas under Alfred Duma Local Municipality, and discussion on the findings of the study.

Chapter 6 focuses on the summary of the study, formulates a conclusion based on the objectives of the study, and makes recommendations based on the findings of the study.

6.3 Recommendations

The researcher has carefully analysed the challenges that municipal water supply has in rural areas of Alfred Duma Local Municipality, and has suggested that coordination in water governance, cooperation and collaboration, and nature based solutions and technologies to keep municipal water infrastructure well maintained need to be considered.

6.3.1 Coordination in water governance

Coordination has been identified as an important component of excellent administration Sharma and Kumar, (2020), Herrera (2019), Horne (2019), Nshimbi (2019), Romano and Akhmouch (2019), Romano and Akhmouch (2019), Jemenez et al. (2020) and Bertule (2018), nonetheless, all took various approaches to it. Bertule et al. (2018), for example, think its important governance functions include a set of tools and mechanisms which various agencies and stakeholders can use to develop water management and governance through collective

action, and thereby duplication is avoided. According to the normative approach, coordination between multiple levels of legislation is necessary to avoid opposing and contradictory rules that obstruct the attainment of SDGs. Integration of water regulations and legislation is significantly more crucial for developing countries as donor countries' 'non-aid policies' can be dangerous (Nshimbi, 2019).

6.3.2 Collaboration and cooperation in water governance

The study has discovered that communities demand community meetings to be held every month and issues discussed must be valued and addressed urgently. The uThukela District Municipality must show transparency. For this to work requires cooperation, but for it to work effectively and efficiently, it requires both cooperation and collaboration. This is supported by Romano and Akhmouch (2019) and Bertule (2018) who stated that collaboration and cooperation among stakeholders (private sectors, district, municipalities, and communities) ensures the development of well managed and equitably used water resources in a sustainable, and efficient manner. In addition, Cisneros (2019) has also emphasized the value of collaboration to ensure water security for everybody by 2030, as mandated by the Sustainable Development Goals. The major methods via which various types of collaboration and coordination should be used to create positive results include stakeholder engagement (Horne, 2019); stakeholder participation (Benson et al., 2020; Hegga et al., 2020; Cisneros, 2019; Benson et al., 2020; Hegga et al., Herrera, 2019; and Schreurs et al., 2018) and multi-stakeholder consultation (Barraque et al., 2017; Romano and Akhmouch, 2019). These are deemed necessary for water management and governance to function effectively and efficiently.

6.3.3 Technologies

The study has discovered that there is a problem with the outdated water systems. The world is evolving, and the population is growing at a fast rate, therefore, challenging service delivery that is sustainable and efficient. In this regard, technologies can be a solution. This is supported by Donnenfeld et al. (2018) who state that South Africa must employ technologies to assist them in realigning supply and demand for the resources while maintaining water security for future generations. In addition, climatic disasters are becoming more common, posing a major danger to access to water and sanitation services, particularly in developing nations. These are highly lacking in rural areas. Furthermore, this has led Delanka et al. (2020), Adshead et al.

(2019), Calabrese et al. (2019), Mycoo (2018) and Hadjimichael (2016) to emphasize the necessity of determining the nature, incidence, and repercussions of these events, as well as to provide technical methods for predicting, preventing, and dealing with consequences. Water infrastructure data gaps restrict decision-making, timely interventions, and investment planning for reducing water losses and improving water quality services in the water sector.

According to Hadjimichael et al. (2016) for knowledge generation, artificial intelligence systems have been widely utilized to model, optimize, or mine data. Furthermore, the water sector, artificial neural networks, analytical hierarchy process, and satellite-based wetland observation services are commonly used solutions followed by clustering (Hadjimichael et al., 2016; Calabrese et al., 2020). These advanced technology systems are used to detect water losses and monitor territorial areas, as well as to analyse the performance of infrastructure-related targets and the quantification of future infrastructure investments, in conjunction with the formulation of metrics.

6.3.4 Nature-based solutions

The study has discovered that the communities require natural water sources to be released from privatisation as they are mostly privatised by farmers, whereas they could have been of good use for the community. This indicates that natural water sources such as dams or rivers can be useful for the communities, even though they are easily polluted. This is supported by Lique et al. (2016); Staddon (2016) and Oral et al. (2020) who note that there is little but increasing evidence that nature-based solutions, for example, water basin restoration and conservation, green infrastructures such as rain gardens and wetlands, and managed groundwater and groundwater recharge, water storage, and conservation can be improved. This will translate into improved access to water and possibly less competition between the various users and uses of water; however, environmentally friendly water policies are being neglected, and rural areas are being marginalized in terms of basic services, while those are still accommodating natural water sources due to lower population growth and industrialization. However, UN-water (2018), Kabeer (2016), and UNDP (2018) substantiated that rural areas are mostly neglected when it comes to basic service delivery. Therefore, their natural water sources end up being privatized, and their aging and dysfunctional water infrastructure unmaintained.

Coordination, collaboration, cooperation prioritised on the recommendations are aligned with the water governance theory and decentralisation theory. These theories have common factors such as involvement of communities and external stakeholders to decision making process so to address the identified needs of the people. The technologies and the use of nature based solutions is no possible without a well decentralise water governance.

6.4 Areas for further research

The study was focused on the impacts of water provision on Alfred Duma Local Municipality by uThukela District in rural areas. The importance of cooperative and collaborative water governance in municipal water supply was established in the literature used by the study. Therefore further research is recommended to be conducted to establish the importance of cooperative and collaborative water governance in the municipal water supply to ensure a sustainable, reliable, and equitable water supply.

6.5 Chapter summary

This chapter has discussed the summary, conclusion, and recommendations made by the study, based on the results that were formulated from the data analysis. The study has hopes that it will contribute towards resolving the challenge of accessing the available and reliable municipal water supply in rural areas to ease their economic and social development as most of it revolves around water supply.

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APPENDICES

Appendix A: Consent form (English version)

Participation consent declaration

Informed consent declaration

(Participation)

Project Title: Impacts of poor water provision of Alfred Duma Local Municipality, KZN, South Africa

Mr Zonke Bhekokuhle Nene from the **Department of Anthropology and Development Studies at the; University of Zululand** has requested my permission to participate in the above-mentioned research project.

The nature and the purpose of the research project and of this informed consent declaration have been explained to me in a language that I understand.

I am aware that:

1. The research project is only for academic purposes.
2. The University of Zululand has given ethical clearance to this research project and I have seen/may request to see the clearance certificate.
3. By participating in this research project I will be contributing towards helping raise awareness in the community on issues involving the provision of water supply in rural areas.
4. I will participate in the project by agreeing to be interviewed.
5. My participation is entirely voluntary and should I at any stage wish to withdraw from participating further, I may do so without any negative consequences.
6. I will not be compensated for participating in the research.
7. There may be risks associated with my participation in the project. I am aware that:
 - a. The following risks are with my participation: Expressing my views on the matter may elicit feelings of discomfort.
 - b. The following steps have been taken to prevent the risks: The researcher will allow a moment of debriefing after the interview where I will talk about how I felt expressing my views on the subject matter.
 - c. There is a 10% chance of the risk materialising.
8. The researcher intends publishing the research results in the form of articles in journals; however, confidentiality and anonymity of records will be maintained and my name and identity will not be revealed to anyone who has not been involved in the conduct of the research.
9. I will receive feedback in the form of verbal feedback recorded on the tape recorder regarding the results obtained during the interview.
10. Any further questions that I might have concerning the research or my participation will be answered by the researcher.
11. By signing this informed consent declaration I am not waiving any legal claims, rights or remedies.

12. A copy of this informed consent declaration will be given to me, and the original will be kept on record.

13. Please tick on the appropriate box below, if you do allow audio recordings

	ALLOW	DISALLOW
Audio recorder		

I **student no:** have read the above information/confirm that the above informed has been explained to me in a language that I understand and I am aware of this document's contents. I have asked all questions that I wished to ask and these have been answered to my satisfaction. I fully understand what is expected of me during the research.

I have not been pressurised in any way and I voluntarily agree to participate in the above-mentioned project.

.....
Participant's signature

.....
Date

Appendix B: Consent form (Isizulu version)

Isimemezelo semvume yokubamba iqhaza

Isimemezelo semvume esiyaziwe

(Ukubamba iqhaza)

Isihloko Sephrojekthi: Imithelela yokungahlinzekwa kahle kwamanzi kuMasipala Wendawo wase-Alfred Duma, KZN, eNingizimu Afrika

Mr Zonke Bhokokuhle Nene uvela ezifundweni ze-Anthropology nentuthuko (Anthropology and development studies) eNyuvesi yaseZululand; ungicele imvume yokubamba iqhaza kulo msebenzi wocwaningo oshiwo ngenhla

Ubunjalo nenjongo yephrojekthi yocwaningo, kanye nalesi simemezelo semvume enolwazi ngichazelwe ngolimi engiluqondayo.

Ngiyakwazi lokhu:

1. Inhloso yephrojekthi yocwaningo ingeyezinjongo zemfundo kuphela
2. INyuvesi yaseZululand inikeze imvume yokuziphatha kulo msebenzi wocwaningo futhi ngibonile/ngingacela ukubona isitifiketi sokugunyazwa.
3. Ngokubamba iqhaza kulo msebenzi wocwaningo ngizobe ngifaka isandla ekusizeni ukuqwashisa umphakathi ngezindaba ezithinta Imithelela yokuhlinzekwa kwamanzi ezindaweni zasemakhaya.
4. Ngizobamba iqhaza kuphrojekthi ngokuvuma ukuxoxa naye.
5. Ukubamba kwami iqhaza kungokokuzithandela futhi uma kunoma yisiphi isigaba ngifisa ukuhoxa ekubambeni iqhaza, ngingenza kanjalo ngaphandle kwemiphumela emibi.
6. Ngeke nginxeshezelwe ngokubamba iqhaza ocwaningweni.
7. Kungase kube nezingozi ezihlobene nokubamba kwami iqhaza kuphrojekthi.
Ngiyakwazi lokho:
 - a. Lezi zingozi ezilandelayo zikhona ngokubamba kwami iqhaza: Ukuveza imibono yami ngalolu daba kungase kudale imizwa yokungakhululeki.
 - b. Izinyathelo ezilandelayo zithathwe ukuvimbela ubungozi: Umcwaningi uzovumela isikhashana sokuxoxisana ngemuva kwenhlolokhono; laphe ngizokhuluma ngendlela engizizwe ngayo ngiveza imibono yami ngale ndaba
 - c. Kunamathuba angu-10% okuthi ingozi ibonakala
8. Umcwaningi uhlose ukushicilela imiphumela yocwaningo ngendlela yama-athikili kumajenali nokho, ngokuyimfihlo futhi ukungaziwa kwamarekhodi kuzogcinwa futhi igama lami nomazisi wami ngeke kudalulwe kunoma ubani ongazange azibandakanye ekuqhutshweni kocwaningo.
9. Ngizothola impendulo ngendlela yempendulo yomlomo eqoshwe kusiqophamazwi mayelana nemiphumela etholwe ngesikhathi senhlolokhono.
10. Noma yimiphi eminye imibuzo engingase ngibe nayo mayelana nocwaningo noma ukubamba iqhaza kwami kuzophendulwa umcwaningi.

11. Ngokusayina lesi simemezelo semvume enolwazi angideli noma yiziphi izimangalo ezingokomthetho, amalungelo noma amakhambi.
12. Ikhophi yalesi simemezelo semvume enolwazi ngizonikezwa mina, futhi eyokuqala izogcinwa kwirekhodi.
13. **Sicela uphawule ebhokisini elifanele elingezansi, uma uvumela ukurekhodwa komsindo**

	NGIYAKUVUMELA	ANGIKUVUMELI
Irekhoda yomaindo		

Mina ngifunde ulwazi olungenhla /
ngiqinisekisa ukuthi ukwaziswa okungenhla ngichazelwe ngolimi engiluqondayo futhi
ngiyakwazi okuqukethwe yile dokhumenti. Ngibuze yonke imibuzo ebengifisa ukuyibuza futhi
iphendulwe ngendlela egculisayo. Ngikuqonda ngokugcwele okulindeleke kimi ngesikhathi
socwaningo.

Angikaze ngicindezelwe nganoma iyiphi indlela futhi ngivuma ngokuzithandela ukubamba
iqhaza kuphrojekthi eshiwo ngenhla.

.....

Isiginesha yombambi qhaza

.....

Usuku

Appendix C: Semi-structured interview questions for municipal officials in uThukela District Municipality (English version)

1. Semi-structured interview questions for municipal officials in uThukela District Municipality

- 1.1. How is water supply managed in rural areas under the Alfred Duma Local Municipality by UThukela District Municipality?

- 1.2. What are the existing challenges of water provisioning in 22 rural wards under the jurisdiction of Alfred Duma Local Municipality?
- 1.3. What are the alarming causes of water shortage in 22 rural wards under the jurisdiction of Alfred Duma Local Municipality?
- 1.4. How many natural water sources have been privatized in the communities and how could they have effectively and efficiently helped the rural areas under the jurisdiction of Alfred Duma Local Municipality?
- 1.5. What are the current measures being implemented, and future measures to be implemented in creating a sustainable and equitable distribution of water for the 22 rural wards under study?

Appendix D: Interview questions for municipal officials in uThukela District Municipality (Isizulu version)

1. Imibuzo engxoxo eqhelekile yezikhulu zikamasipala Umasipala wesifunda uThukela

- 1.6. Kulawulwa kanjani ukuhlinzekwa kwamanzi ezindaweni zasemakhaya ngaphansi kukaMasipala Wendawo i-Alfred Duma?
- 1.7. Yiziphi izinselelo ezikhona zokuhlinzekwa kwamanzi kuzo zonke izigceme ezingama-36 ngaphansi kukamasipala wendawo i-Alfred Duma?

- 1.8. Yiziphi izimbangela ezishaqisayo zokushoda kwamanzi kuzo zonke izigceme ezingama-22 zasemakhaya ngaphansi kukamasipala wendawo i-Alfred Duma?
- 1.9. Mingaki imithombo yamanzi Emvelo esenziwe yangasese emiphakathini futhi ibingasiza kanjani ezindaweni zasemakhaya ezingaphansi kukamasipala wendawo i-Alfred duma?
- 1.10. Yiziphi izinyathelo ezisetshenziswayo njengamanje, kanye nezinyathelo zesikhathi esizayo ezizosetshenziswa ekudaleni ukusatshalaliswa kwamanzi okusimeme nokulinganayo kuzo zonke izigceme ezingama-22 zasemakhaya?

Appendix E: Interview questions for community members under Alfred Duma Local Municipality (English version)

1. Semi-structured interview questions for community of Alfred Duma Local Municipality

- 1.1. What are your thoughts and experiences as an Alfred Duma Local Municipality community member regarding water provisioning by uThukela District Municipality in terms of equity?

- 1.2. How effective and efficient is uThukela District Municipality in terms of water delivery to its rural communities?
- 1.3. During the public meetings were there any kind of inputs from the community, and any requests made by the councillor to the community regarding water provisioning improvements?
- 1.4. How many natural water sources are privatized, and how could they have been of help to the rural community if they were not privatized?
- 1.5. What measures would you recommend to be implemented towards improving water provisioning particularly in rural areas under the Alfred Duma Local Municipality?

Appendix F: Interview questions for community members under Alfred Duma Local Municipality (Isizulu version)

1. Imibuzo yengxoxo eqinisekile yomphakathi ka-Alfred Duma Local Municipality

- 1.1. Uthini umbono wakho kanye nolwazi lwakho njengelungu lomphakathi likaMasipala wase-Alfred Duma, mayelana nokuhlinzekwa kwamanzi nguMasipala wesiFunda uThukela ngokulingana?

- 1.2. Ngabe usebenza kahle kangakanani uMasipala wesiFunda uThukela mayelana nokuletha amanzi emiphakathini yawo yasemakhaya?
- 1.3. Ngesikhathi semihlangano bekukhona yini iziphakamiso ezivela emphakathini, kanye nezicelo ezenziwa yikhansela emphakathini mayelana nokuthuthukiswa kokuhlinzekwa kwamanzi?
- 1.4. Mingaki imithombo yamanzi Emvelo esenziwe yangasese emiphakathini futhi ibingasiza kanjani ezindaweni zasemakhaya ezingaphansi kukamasipala wendawo i-Alfred duma?
- 1.5. Yiziphi izinyathelo ongancoma ukuthi zisetshenziswe ekuthuthukiseni ukuhlinzekwa kwamanzi ikakhulukazi ezindaweni zasemakhaya ngaphansi kukaMasipala Wendawo i-Alfred Duma?